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**Institute of Diplomacy and International Studies**

**Climate Change and Human Security in Africa: A Case Study of the  
Mau Forest Complex, 1963 – 2012**

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## Declaration

I, Shazia Chaudhry, hereby declare that this Doctoral thesis is my original work and has not been presented for a degree in any other University.

Name.....

Signed.....Date.....

This thesis has been submitted for examination with our approval as University Supervisors;

Supervisor's Name.....

Supervisor's Title.....

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Supervisor's Name.....

Supervisor's Title.....

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## **Dedication**

*To the sweet memory of my loving father.*

## **Acknowledgements**

The journey of this research involved moments of joy as well as spells of fear and frustration but finally Allah Almighty made this possible. I love you my Lord with all the capacity that I possess and shall always be indebted for all your kindness and blessings.

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## **Abstract**

Climate change has gained considerable degree of attention within the scholarly body of diplomacy and international studies. Analysts of the field argue that due to increased amount of GHG emissions, dynamic shifts are taking place in the global climate change. For instance, due to climate changes, the world has been facing rapid temperature rise, recurring droughts, desertification, heat waves, sea level rise, and flash floods. Consequently, with constrained availability of environmental resources, there are widespread negative impacts on human security, especially in the developing and underdeveloped regions. With other parts of the globe, Africa has been a key focus of discussions for the climate change community. The continent being home to the world's most marginalised people, is the greatest victim of climate change. Although, climate change is considered as a grave human security concern, the available literature fails to capture key issues. This study, therefore, analysed the likely inter-linkages between two variables; climate change and human security in Africa, employing the case study of the Mau Forest Complex. More specifically, the study provides an overview of the historical and contemporary analysis of the climate change debate; examined the conceptual and theoretical linkages between climate change, environmental scarcity, and human security in Africa and in the Mau Forest Complex and; analyse the causes, major impacts, and intersections between climate change and human security in Africa and in the Mau Forest Complex. Theoretical framework used in this study is Homer-Dixon's environmental/renewable resource scarcity model. In relation to the study, this theory helped to trace out the interplay between climate change, scarcities of fundamental resources, and the consequent human security implications in Africa, as well as in the Mau Forest Complex. Primary data was compiled using semi-structured and unstructured interviews, focus group discussions, and records of researcher's personal observations during the field trips. Quantitative data was sourced from Kenya Metrological Department. Secondary data relied on the internet and library research. Thematic analysis method was used to analyse key issues arising from the discussions. The major findings of the study include; (1) Human activities are the major determinants of climatic changes in Kenya's Mau Forest Complex. (2) Climatic changes have notably led to resource scarcities with fundamental effects on various aspects of human security on the African continent, and in the Mau Forest Complex; (3) Climate change served as a key driver of human insecurity in Africa. The study recommends that while dealing with climate change and human security, global, regional, and national institutions, regimes, and policies be guided by taking consideration of the broader human insecurities. Study also recommends that future research be based on studying climate change led emerging threats to the security of vulnerable communities. Specifically, future research needs a key focus on identifying novel insecurities especially in relation to the developing and underdeveloped states, in particular from the broader perspectives of climate change governance and human security. Furthermore, research studies may look into issues regarding the ineffectiveness of the global, regional, and national climate change and security regimes and policies.

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## List of Abbreviations

AF	Adaptation Fund
ASEAN	Association of the South East Asian Nations
ASF	Africa Standby Force
AU	African Union
CAHOSCC	Conference of Africa Head of States and Governments on Climate Change
CDM	Clean Development Mechanism
COP	Conference of the Parties
EAC	East African Community
ECOWAS	Economic Community of West African States
EMCA	Environmental Management and Coordination Act
ENSO	<i>El-Nino</i> Southern Oscillations
EU	European Union
EU ETs	European Union’s Emission Trading System
FAO	Food and Agriculture Organisation
GCM	Global Circulation Model
GDP	Gross Domestic Product
GHGs	Greenhouse Gases
GEF	Global Environmental Facility
HFCs	Haloflourocarbons
ICISS	International Commission on Intervention and State Responsibility
ICPAC	IGAD Climate Prediction Centre
IDPs	Internally Displaced Persons
IGAD	Intergovernmental Authority on Development
IGOs	Intergovernmental Organisations
ILO	International Labour Organisation
IOM	International Organisation for Migration
IPCC	Intergovernmental Panel on Climate Change
JI	Joint Implementation
KEFRI	Kenya Forestry Research Institute
KFWG	Kenya Forest Working Group

KIFCON	Kenya Indigenous Forest Conservation Project
KWS	Kenya Wildlife Services
LDCI	Least Development Countries Fund
LHWP	Lesotho Highlands Water Project
MDGs	Millennium Development Goals
MFC	Mau Forest Complex
NCAR	National Centre for Atmospheric Research
NEPAD	New Partnership for Africa's Development
NGO	Non Governmental Organisation
NOAA	National Oceanic Atmospheric Administration
ODA	Overseas Development Assistance
OPEC	Organisation of Petroleum Exporting Countries
PSC	Peace and Security Council
REDD	Reducing Emissions from Deforestation and Forest Degradation
R2P	Responsibility to Protect
RVF	Rift Valley Fever
SADC	Southern African Development Community
SCCF	Special Climate Change Fund
TAR	Third Assessment Report
UN	United Nations
UNDP	United Nations Development Programme
UNCED	United Nations Conference on Environment and Development
UNEP	United Nations Environmental Programme
UNESCO	United Nations Educational, Scientific, and Cultural Organisation
UNFCCC	United Nations Framework Convention on Climate Change
UNICEF	United Nations Children's Fund
UNODC	United Nations Office on Drugs and Crime
WBGU	German Advisory Council on Global Climate
WCI	Western Climate Initiative
WMO	World Meteorological Organisation
WOMP	World Order Models Project

## **Operationalisation of Key Concepts**

### **Climate change**

In this study, climate change refers to a change in the state of the climate that can be identified by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer led by anthropogenic/human activities. This study specifically deals with persistent human induced/anthropogenic changes in the composition of the atmosphere or in land use.

### **Climate variability**

The term is used to denote deviations of climatic statistics over a given period of time (e.g. a month, season or year) from the long-term statistics relating to the corresponding calendar period. In this sense, climate variability is measured by those deviations, which are usually termed anomalies such as *El Nino*. This study noted that climate variability may be due to natural internal processes within the climate system (internal variability), or to variations in natural or anthropogenic external forcing (external variability).

### **Human security/insecurity**

Human security entails safety from such chronic threats as hunger, disease, and repression, and protection from sudden and hurtful disruptions in the patterns of daily life, weather in homes, jobs, or communities. Human insecurity can be led by war, genocide, terrorism, human rights violation, climate change, and human displacement etc. Unlike classical security, human security means to protect individuals and communities from every day threats. This study analysed climate change led human insecurities in Africa with a key focus on the Mau Forest Complex.

### **Forests**

A forest is a minimum area of 0.05-1.0 hectare (ha.) with tree crown cover of more than 10-30 per cent with trees, with potential to reach minimum height of 2-5 meters at maturity. A forest may consist either of closed forest formations where trees of various storey and undergrowth cover a high proportion of the ground or of open forest. Forests provide uncountable ecological and economic benefits as has been noted in the case study of the Mau Forest Complex.

**Deforestation**

A natural or anthropogenic process of cutting, clearing, and removal of forestland where the land is thereafter converted to non-forest use such as farms, ranches, and human settlements. This study intended to examine the impacts of large-scale deforestation on natural climate and the consequent resource scarcity and human security implications.

**Drought**

A drought refers to an unusually severe and prolonged dry period led by lack of rain. Drought is caused by not only lack of precipitation and high temperatures but by overuse and over population. This study noticed that climate change led droughts in Africa have affected all aspects of human security with loss of livelihoods, famine, malnutrition, migration, and even conflicts.

**Rainfall variability**

This refers to an abrupt fluctuation in the average patterns of precipitation. It has greatly damaged water availability, agricultural production, and pastoral activities in the sub-regions of Africa and especially in arid and semi arid lands.

**Renewable resource scarcity/environmental scarcity**

It refers to the scarcity of renewable resources, such as cropland, forests, river water and fish stocks. This scarcity can arise from degradation or depletion of the resource, from increased demand, supply, as well as from unequal distribution. For instance, in this study, climate change increases the scarcity of the regular patterns of rainfall and temperature on which farmers and majority of the African people rely.

**Climate change adaptation**

This refers to initiatives and measures to reduce the vulnerability of natural and human systems against actual or expected climate change effects. This study looked at the role of international, regional, and national strategies for climate change adaptation in Africa, Kenya and in the Mau Forest Complex.

**Climate change mitigation**

Climate change mitigation involves technological change and substitution that reduce resource inputs and emissions per unit of output. Mitigation means implementing policies to reduce GHG emissions and enhance sinks. This study also examined the role of global, regional, and national climate change mitigation measures that can help reduce global GHG emissions.

# CHAPTER ONE

## INTRODUCTION TO THE STUDY

### 1.0 Introduction

Global climate change has become one of the most debated topics of the first quarter of the 21<sup>st</sup> century. There is no doubt that the issue is ‘unequivocal’<sup>1</sup> as today billions of people are exposed to far-reaching implications of climate change induced disasters. Among other challenges, human security threats of climate change are of key relevance to international peace, stability, and development. Climate change impacts are extensive and threaten the future survival of humanity.

The rapidly changing climate led to the United Nations Security Council’s debate in 2008 whose focus was on the implications of climate change on security. Though this debate did not come up with concrete measures to curb climate change induced insecurity, it was noted that indeed climate change has complicated the security dilemma.<sup>2</sup> In June 2009, United Nations General Assembly (UNGA) held discussions on possible links between climate change and security. The major outcome of this debate was the passing of a resolution, which requested for a report from the UN Secretary General to map out the possible security repercussions of the global climate change.<sup>3</sup>

Many regions of the world are already poverty stricken and home to civil wars and interstate conflicts whereby climate change impacts often exacerbate the problem. With combined effects, some of the contemporary conflicts can be attributed to climate change.<sup>4</sup> For instance, United Nations Secretary General Ban Ki Moon announced that apart from other socio-economic factors, violence in Darfur has clear association with climate change.<sup>5</sup> The Conference of Parties (COP) in its 15<sup>th</sup> session held in Copenhagen in 2009, noted in its decision

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<sup>1</sup> Climate Change 2007: The Physical Science Basis, Summary for Policy Makers, *Fourth Assessment Report of the International Panel on Climate Change*, (Cambridge: Cambridge University Press, 2007).

<sup>2</sup> United Nations, ‘Security Council holds first ever debate on impact of climate change’, United Nations Security Council, 5663<sup>rd</sup> Meeting, April 2007.

<sup>3</sup> United Nations, *Climate Change and its possible Security implications*, Report of the General Secretary, 64<sup>th</sup> Session, Item 114 of the Provisional Agenda, United Nations General Assembly, 11 September 2009.

<sup>4</sup> L. A. Swatuk, *Environmental Security in Practice: Transboundary Natural Resources Management in Southern Africa*, Paper presented for presentation in Section 31 of the Pan European Conference on International Relations, The Hague, 9-11 September 2004.

<sup>5</sup> B. K. Moon, A climate culprit in Darfur, *Washington Post*, 16 June 2007.

CMP/15/.....that in coming years, the world is going to face more floods, heat waves, droughts, hunger, migration, and displacement.<sup>6</sup>All this is associated to the changing climate.

According to a study done by the Christian Aid Organisation, by the end of 21<sup>st</sup> Century, such disasters will kill millions of people and more than a billion may have to flee from their homes.<sup>7</sup> Along with other myriad environmental problems, climate change also poses a potential threat to the capacity of many underdeveloped and developing states to provide basic needs and services to its people. There is fear that in extreme circumstances such negative impacts of climate change may lead to increased cycles of violence and widespread human security challenges.<sup>8</sup>

Most countries are seriously concerned about their future weather related catastrophes, which can cause huge social, economic, and political crises. International, national, and regionally based negotiations are also being held for developing mitigation and adaptation policies to deal with the issue of climate change. This study sought to explore the relationship between climate change and human security in Africa. For this purpose, it aims to contribute to knowledge in the field of human security and climate change. Furthermore, the study intends to make a deeper theoretical and empirical assessment of the likely human security threats posed by the gradual variations in the global climate.

## **1.1 Statement of the Research Problem**

A significant body of research agrees that human activities such as deforestation, overuse of fossil fuel, urbanisation, and commercial agricultural practices are the prime causes of the global climate change.<sup>9</sup> There are growing alarms that rapidly changing climate will hasten the depletion of scarce resources of arable land, freshwaters, forests, and fisheries,<sup>10</sup> which may increase the incidents of famines, diseases, loss of livelihoods, violence and civil strives.<sup>11</sup>Due to

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<sup>6</sup> Copenhagen Accord, Copenhagen, December 2009. Also, *2010 UNEP Year Book*, UNEP, Nairobi, 2010. Chapter 4, p. 43.

<sup>7</sup> *Human Tide: A Real Migration Crisis*, A Christian Aid Report, May 2007. Also, *The Climate of Poverty: Facts Fear and Hope* (London: Christian Aid, 2006).

<sup>8</sup> H. Brauch, 'Climate Change, Environmental Stress, and Conflict', In: *Climate Change and Conflict*, Berlin: Federal Ministry for Environment, Nature Conservation, and Nuclear Safety, 2002, pp. 9-112.

<sup>9</sup> P. Forster et al., 'Changes in Atmospheric Constituents and in Radiative Forcing', In: *Climate Change 2007: The Physical Science Basis*, Contribution of Working Group I of the Fourth Assessment Report of the IPCC, S. Solomon et al., (Cambridge: Cambridge University Press, 2007).

<sup>10</sup> J. Barnett and W. N. Adger, 'Climate Change, Human Security and Conflict', *Political Geography*, 26, 2007, pp. 639-655.

<sup>11</sup> P. T. Renard, 'Heated Terror: Exploration of the Possible Impacts of Climate Change on the Causes and the Targets of Terrorism', *Les Cahiers du RMES*, Volume V, Numero1, ETE 2008, p.7.

weak governance, chronic poverty, conflicts, and financial and technological constraints, Africa will be one of the most marginalised regions with additional human security challenges.<sup>12</sup>

Due to the interaction of multifaceted issues, climate change-human security nexus is complex and raises some critical questions. Therefore, to examine these issues, the case of the Mau Forest Complex has been employed. The Mau Forest Complex is a natural asset, which provides strategic ecological and economic goods and services at local, national, and regional scales. Since the late 1980s, about a quarter of the 400,000 hectares of the forest has been lost due to heavy encroachment and destruction by illegal excisions, land distribution, logging practices and use of forest fires to clear land for settlements and cultivation.<sup>13</sup> As a result, the natural climate of the area has been greatly changed leading to frequent and intense droughts, severe frosts, erratic rainfall, and significant temperature rise.<sup>14</sup>

Consequently, there are wide spread negative impacts with declined water percolation, increased soil erosion, changed river flows, and flash floods, especially for the pastoralists, subsistence farmers, and majority of the population living in the areas around the Mau Forests. For instance, decreased water supply to the adjacent areas and a compromise of the vegetation health threaten agricultural production, food supply and job security of millions of people who rely on the agricultural output of tea, rice, wheat, maize, pyrethrum, potatoes, and tourism activities.<sup>15</sup> Due to increased human interference and depletion of the natural forest, biological diversity cannot be sustained and the forest dwelling communities are unable to practice their traditional ways of life. Due to intense droughts, drying up of watering points and loss of pastures, the pastorals often engage in crimes such as cattle rustling and violent conflicts.<sup>16</sup>

There are also fears that if the rapid changes in the climate are not contained, local and regional tourism may decline with substantial losses of revenues and economic insecurity. In addition, due to the regional significance of the Mau Forest Complex, trans-boundary rivers, and lakes may cause tensions between the riparian states. Such situation in the Mau Complex

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<sup>12</sup> O. Brown et al., "Climate Change as the 'New' Security Threat: Implications for Africa", *International Affairs*, 83:6, 2007, pp. 1141-1154.

<sup>13</sup> M. J. Kinyanjui et al., 'An Inventory of the Above Ground Biomass in the Mau Forest Ecosystem', *Open Journal of Ecology*, 4, pp. 619-627, 2014.

<sup>14</sup> M. J. Kinyanjui, 'NDVI-based Vegetation Monitoring in Mau Forest Complex', *African Journal of Ecology*, 49, pp. 165-174, 2010.

<sup>15</sup> Interview with Mr. J. M. Mbinga, Deputy Director Kenya Forestry Research Institute, Londiani, 12 February 2014.

<sup>16</sup> Ibid.

provides a pertinent environment to study the impacts of human activities such as deforestation, unjust resource distribution, and illegal settlements near the ecologically sensitive lands leading to climate change and human insecurity.

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 Africa, with significant emphasis on the case of the Mau Forest Complex of Kenya, especially during the period 1963-2012. In this regard, the key guiding questions of this study are; what are the major contributing factors of global climate change? How does the changing climate influence scarcity of fundamental resources and human insecurity in Africa, and in the Mau Forest Complex? Moreover, what is the role of the international, regional, and national climate change and human security institutions, regimes and policies at regional and national levels?

## **1.2 Objectives of the Study**

The overall objective of the study is to critically examine the impacts of climate change on human security in Africa, and especially with a key focus on the Mau Forest Complex in Kenya. More specifically, the study aims to:

- 1) Provide an overview of the historical and contemporary perspectives of the climate change debate;
- 2) Provide a conceptual and theoretical analysis of the linkages between climate change, renewable resource scarcity, and human security in Africa and in the Mau Forest Complex.
- 3) Examine the causes, key impacts, and intersections between climate change and human security; with a case study of the Mau Forest Complex in Kenya.

## **1.3 Literature review**

Literature review of this study has four sub-sections; literature explaining the concept of human security; literature on the climate change debate, literature examining the relationship between climate change and human security issues and literature on the impacts of anthropogenic climate change in the Mau Forest Complex.

The following literature review will guide to pursue this research and further explore links between climate change and human security. In addition, following literature review will help to find gaps in the available literature. The review of the literature in the field of human

security and climate change will also determine an appropriate theoretical framework for the analysis of this study.

### **a) Conceptualisation of Human Security**

Traditionally, the concept of security has been viewed in narrow terms with a state-centered focus. As a result, security was primarily measured within the parameters of military means, to defend territorial integrity threatened by state's internal hostilities or external antagonists. At large, it had a core focus on international security endangered by nuclear armament.<sup>17</sup> However, after the end of the Cold War, the map of security studies was extended due to persistent problems of chronic poverty, ethnic violence, terrorist attacks, epidemics, economic uncertainties, human rights violations, growing incidents of intra-state wars and issues of poor governance. Thus, renewed understanding of security was replaced with people-centric approach, which drew more emphasis on the well-being of humanity.<sup>18</sup>

There is no single precise definition to describe human security, as it remains open-ended. However, the concept has been widely explained by various researchers, academics, organizations, and policy makers to look for answers to three broad questions; Security from what? Security for whom? And, security by what means? In the United Nations agenda for peace and security, security provides freedom from fear and want.<sup>19</sup> More specifically, human security includes 'safety from such chronic threats as hunger, disease, and repression. Moreover, it means protection from sudden and hurtful disruptions in the patterns of daily life---weather in homes, in jobs or in communities'.<sup>20</sup>

Generally, relating security to human wellbeing means to prioritise the primary needs of individuals, vital for their survival such as food and physical health. More importantly, in the human security context, security provides the assurance that people will be safe in their cities, households, and workplaces. Additionally, they will continue to enjoy basic ingredients of welfare like economic sustenance, environmental conservation, self-confidence, and freedom from violence and political tyranny.<sup>21</sup>

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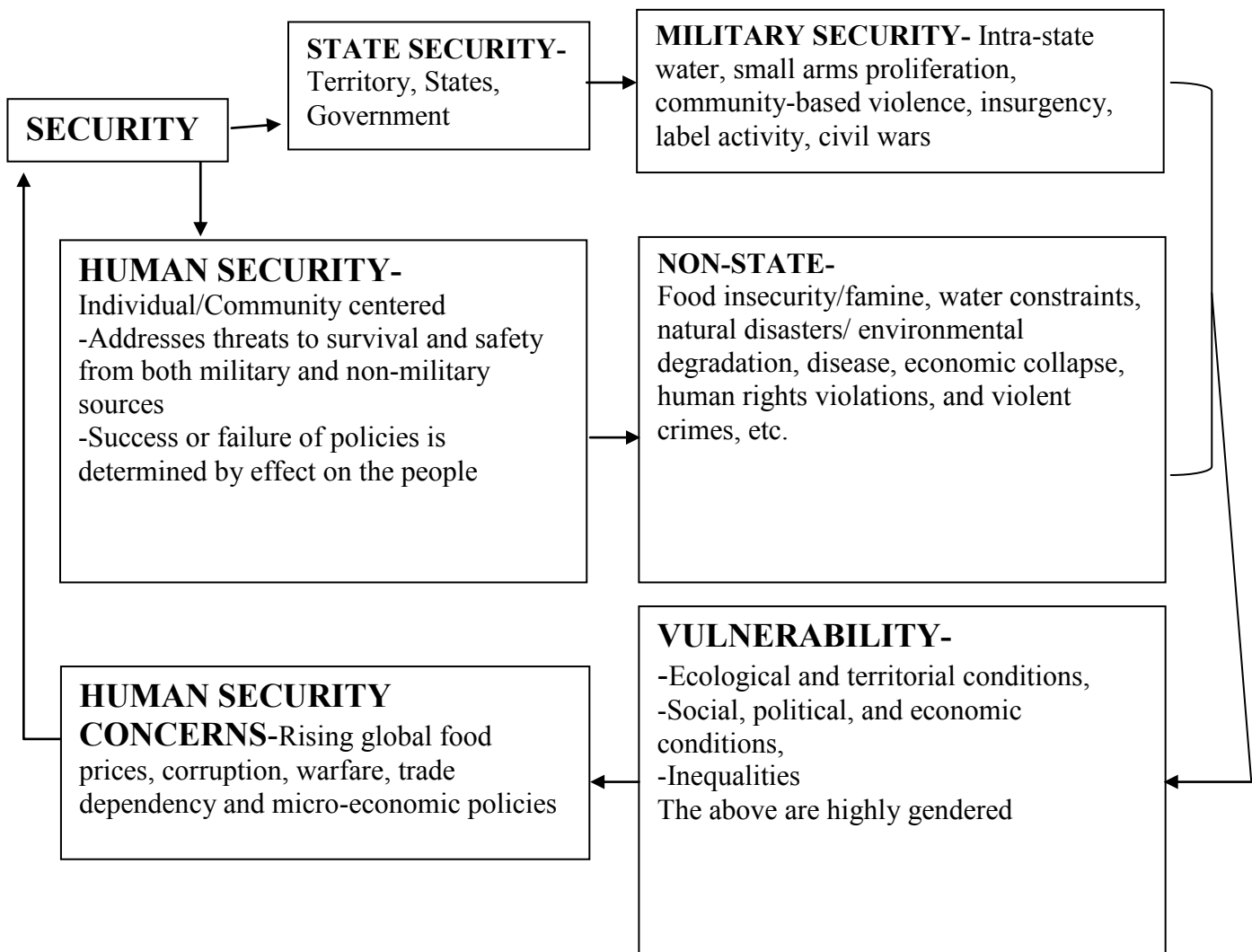
<sup>17</sup> K. Bajpai, *Human Security: Concepts and Measurements*, Kroc Institute Occasional Paper#19: OP: 1, August 2000, p. 3.

<sup>18</sup> S. Tadjbakhsh and A. Chenoy, *Human Security: Concepts and Implications*, (New York: Rutledge, 2007), p. 1.

<sup>19</sup> United Nations Development Program, 'New Dimensions of Human Security', *Human Development Report 1994* (New York: Oxford University Press, 1994), p. 24.

<sup>20</sup> *Ibid*, p. 22.

<sup>21</sup> M. Sorros, *The Endangered atmosphere: Preserving a Global Commons*, (Columbia: University of South Carolina Press, 1997), p. 236.



**Figure 1.1** Securities in the Human Security Framework.

Source. Prof. R. S. Odingo (Department of Geography and Environmental Studies, University of Nairobi)

Human security involves examining the role of varied dimensions of security in the daily lives of individuals and communities instead of securing the state borders alone.<sup>22</sup> At the same time, implementing necessary policy frameworks is detrimental to human security. However, the outcome of these policies is determined by monitoring the levels of success or failure on

<sup>22</sup> S. D. Beebe and M. H. Kaldor, *The Ultimate Weapon is no Weapon: Human Security and the new rules of War and Peace*, (New York: Public Affairs, 2010), p. 5.

peoples' lives as has been indicated in figure 1.1. While examining wider threats to people's security, the United Nations Development Program (UNDP) outlined seven key components of human security; economic security, food security, health security, environmental security, personal security, community security and political security.<sup>23</sup>

During 1994, Haq emphasised that the human centric security paradigm should reinforce the safety of human societies through a sustainable developmental process where each individual of the universe needs equal and just treatment. The contemporary approach to security asked for a new world order based on the dignified human life through a process of human development and welfare. In addition, it stressed for the provision of a conducive environment of wide choices for markets, credits, jobs, land distribution, and social welfare.

Another important feature of Haq's human security approach aims to provide equitable and sustainable access to developmental opportunities and resources for the present and the future generations.<sup>24</sup> Thus, human security proposes an agenda for security where the vital core of life is to enjoy freedoms and rights. According to Kofi Annan, human security is derived from three essential items; peace, security and development.<sup>25</sup> Although, human security still recognises the state as an authority to provide security, however, state providing human security has to be democratic, offering full liberty and rights to her citizens and accredited for the provision of security. In the human security perspective, sovereignty is a responsibility but dependent on the consent and capability of the state concerning.<sup>26</sup>

Some direct and indirect threats like 'unchecked population growth, disparities in economic opportunities, excessive international migration, income inequalities, inter and intra-state conflicts, religious and ethnic animosities, environmental degradation, drug production and trafficking and international terrorism'<sup>27</sup> may arise to endanger human security within and among countries. Therefore, human security institutions must provide the formula to identify, fight, avoid, and mitigate these threats by the use of soft power like preventive diplomacy and development initiatives. In addition, human security is a platform where nations must equally participate and cooperate to build and endorse this blue print into public policy action. Local

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<sup>23</sup> Ibid.

<sup>24</sup> M. Ul Haq, *New Imperatives of Human Security*, RGICS Paper No. 17, (New Delhi: Rajiv Gandhi Institute for Contemporary Studies, 1994), p. 2.

<sup>25</sup> K. Annan, 'Secretary General Salutes International Workshop on Human Security in Mongolia', Two Day Session in Ulaanbaatar, May 8-10, 2000, Retrieved online, 20 May 2010.

<sup>26</sup> S. Tadjbakhsh and A. Chenoy, *Human Security: Concepts and Implication*, op cit, p. 238.

<sup>27</sup> *Human Development Report 1994*, Chapter 2, 'New Dimensions of Human Security' op cit, pp. 22-47.

governments and international community must reform and respond to all-encompassing and integrative human security agendas with new instruments where use of force must be avoided to the fullest.<sup>28</sup>

Since the inception of human security, many countries and organisations have given a central place to human security concept in their political agendas. For instance, in June 1999, the Group of Eight (G8) announced that the group was determined to fight the underlying causes of multiple threats to human security.<sup>29</sup> Specifically, middle powers such as Canada, Japan, and Norway have been at the forefront to construct human security and articulate it into their foreign policies.<sup>30</sup> Human security therefore, serves as a competing approach to security and it has gained significant popularity over the past two decades. However, some critics in the field of security and development view the concept of human security debatable, perhaps due to its ambiguity and all inclusiveness.<sup>31</sup>

Most of the critics argue that the existing definitions of human security are too broad and vague. Secondly, its practical use is greatly limited as it has a varied list of threats at one end, while it lacks coherence when it comes to application of the solutions offered.<sup>32</sup> Simultaneously, to some researchers, human security concept is of little use for academic research and policy making as it lacks appropriate framework for analysis.<sup>33</sup> For instance, neo-realists view security in the context of war against organised violence between states or militarised groups. In their view, this type of violence is entirely distinct from the type of violence led by domestic, political, structural or gender issues.

At the same time, there are wide contrasts between causes of war and factors that trigger other types of violence. Secondly, these critics argue that such integrative and multi-dimensional view of security with policy implications, may lead to confusion.<sup>34</sup> Given these circumstances, few scholars have tried to narrow down the concept by using fewer variables (threats to security).

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<sup>28</sup> Ibid.

<sup>29</sup> L. Axworthy, 'An Address on Human Security', Minister of Foreign Affairs to the G8 Foreign Ministers, 9 June 1999.

<sup>30</sup> K. Bajpai, *Human Security: Concept and Measurement*, Kroc Institute Occasional Paper#19: OP:1, August 2000, p. 17.

<sup>31</sup> E. Huchful, 'From Military to Human Security' In: J. Akokpari et al., (eds.) *The African Union and its Institutions*, (Auckland park; Jacana Media, 2008), pp. 63-81.

<sup>32</sup> H. Owens and B. Arneil, 'The Human Security Paradigm Shift: A New Lens on Canadian Foreign Policy?' Report of the University of British Columbia Symposium on Human Security', August 2003.

<sup>33</sup> R. Paris, 'Human Security: Paradigm Shift or Hot Air', *International Security*, Volume 26, No. 2 (Fall 2001), pp. 87-102.

<sup>34</sup> Ibid.

For the purpose of its practical and functional usage,<sup>35</sup> for instance, King and Murray narrowed it down. They further argue that for better recognition of human security, the concept needs to include only the vital ingredients of wellbeing, which may put human life and property at risk. In their view, human security needs to be built on five key pillars; poverty eradication, provision of education and health facilitation, political freedom and democracy.<sup>36</sup> However, this approach to human security fails to clarify the rationale for favoring only one set of values while dismissing others.<sup>37</sup>

Likewise, Bajpai recommends an overall ‘human security audit’ by explicitly emphasising on the measurement of ‘direct and indirect threats to individual’s bodily safety and freedom’. In transition, steps need to be taken to measure the abilities of various societies. For this, there must be strategies to handle these threats with appropriate enactment through the establishment of rules and democratic institutions.<sup>38</sup> However, just like King and Murray’s view, this argument ignores to justify for the selection of only five indicators that can actually bring human security nearer to human insecurity, as the exclusion of physical security can easily lead to violence.

Besides the ongoing criticism, the breadth and depth of the human security concept has provided a platform to enhance interdisciplinary research, especially in the areas of security studies, international relations and development studies. In particular, the concept of human security is greatly appreciated where security of individuals and societies is mainly endangered due to non-military threats such as natural resource scarcity, climate change, human displacement, spread of pandemics, population growth, and terrorism.<sup>39</sup> Therefore, conclusively, the concept of human security is a way of measuring the map of emerging sources of violence against humanity at individual as well as at community levels. Furthermore, the major aim of human security construct is to invent new measures of human well being.

#### **b) The climate change debate**

Genealogy of the word climate took its root from the Greek term *Kilima*, referring to slope, or inclination, which initially was simply thought to be dependent on the height of the Sun above

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<sup>35</sup> G. King and C. J. L. Murray, ‘Rethinking Human Security’, *Political Science Quarterly*, Volume 116, Number 4, 2001-02, pp. 585-610.

<sup>36</sup> *Ibid*, p. 593.

<sup>37</sup> R. Paris, *op cit*. p. 95.

<sup>38</sup> K. Bajpai, ‘Human Security: Concept and Measurement’, *op cit*.

<sup>39</sup> R. Paris, *op cit*.

the horizon, or a function of the latitude.<sup>40</sup> In Aristotle's belief, climate explained the quality of air emitted by a city or a state. While, to other scholars, climate is an average weather pattern measured over time usually over months to years or decades. It includes the variance in average temperature, rainfall variability, and wind over the selected period.<sup>41</sup>

Thus, climate change refers to 'a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods'.<sup>42</sup> Since the existence of the planet earth, its climate has always been shifting within the spells of intense heat to ice ages. However, since the middle years of the 19th Century, global mean surface air temperature records indicate an increasing trend, and there has already been a significant temperature rise since the late 1950s.<sup>43</sup> Research indicates that the issue of climate change has complex and multiple origins, including some natural as well as numerous anthropogenic (human induced) causes.<sup>44</sup>

The IPCC further suggest that behind these growing warmer temperatures, scientists have brought forth different explanations such as irresponsible human activities; meaning the greenhouse effects and the deforestation processes. With very high level of accuracy, the IPCC asserts that 'the atmospheric concentrations of carbon dioxide, methane, and nitrous oxide have increased to levels unprecedented in at least 800,000 years. Carbon dioxide concentrations have increased by 40 per cent since pre-industrial times, primarily from fossil fuel emissions and secondarily from net land use change emission'.<sup>45</sup>

There is strong evidence that increase in the greenhouse emissions is a result of swift industrialisation and developments in the transportation and agricultural sectors. These gases pollute the air and deplete the ozone layer, which is a protective shield from the harmful effects

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<sup>40</sup> J. R. Flemming, *Historical Perspective on Climate Change*, (Oxford and New York: Oxford University Press, 1998), p. 11.

<sup>41</sup> William Tsuma, 'Climate Change-Conflict Nexus: Framework for Policy-Oriented Action', In: *Conflict Trends*, Issue 2, Environment, Climate Change and Conflict, Accord, 2011, p. 3.

<sup>42</sup> United Nations, *United Nations Framework Convention on Climate Change*, FCCC/INFORMULA/84 GE.05-62220 (E), New York: United Nations, 1992.

<sup>43</sup> J. T. Houghton, *Climate Change 1995: The Science of Climate Change*, Contribution of Working Group 1 to the Second Assessment Report of IPCC, Cambridge University Press, 1996. p.5.

<sup>44</sup> Le Treut, Herve and Somerville, Richard et al., 'Historical Overview of Climate Change', In: *Climate Change 2007: The Physical Science Basis*, Contribution of Working Group I to the Fourth Assessment Report of the IPCC, (Cambridge, Cambridge University Press, 2007).

<sup>45</sup> 'Summary for Policy Makers', In: *Climate Change 2013: The Physical science Basis*, Contribution of the WGI to the fifth Assessment Report of the IPCC, (Cambridge: Cambridge University Press, 2013), p. 11.

of ultraviolet radiations from the sun.<sup>46</sup> Observational data demonstrates that during the past century, global temperatures have been rising at an average rate of 0.05 degrees centigrade per decade.<sup>47</sup> This temperature rise is contributing to more rainfall in the eastern part of America, northern Europe, and northern and central Asia, while southern parts of Asia and northern, southern, and eastern regions of Africa are experiencing severe droughts, and drying out slowly.<sup>48</sup>

Surging temperatures have led to significant decline in the average yearly snowfall, receding glaciers, and sea level rise, contributing to increased frequency of flash floods. For instance, in the year 2002, a massive block of floating ice in Antarctica called Larsen B, shattered suddenly and a huge part of it vanished.<sup>49</sup> Likewise, Peru presents a good example where the glaciers are melting at an alarming rate. Consequently, communities in the Cusco and Apurimac regions of Peru are facing severe spells of cold, drought, and shortage of water resources, leading to food insecurity and reduced livelihoods.<sup>50</sup>

In the eastern Africa, glaciers of Mount Kenya, Mount Kilimanjaro and Rwenzori Mountains have drastically reduced over the past few decades.<sup>51</sup> Data indicates that first nine years of the 21<sup>st</sup> Century have been the warmest period on the record, year 2005 being one of the hottest.<sup>52</sup> Studies suggest that during the period of 1977-97, forty countries in Sub Saharan Africa experienced consistent droughts and severe water scarcity, virtually with huge economic losses.<sup>53</sup> At the same time, these inconsistent weather patterns influenced degradation and depletion of the resources.

Changing climate triggers frequent disasters. As a result, many parts of the globe are affected by changes in the soil regime, depletion of the watering points, and displacement or

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<sup>46</sup> 'Summary for Policy Makers', In: *Climate Change 2013: The Physical science Basis*, Contribution of the WGI to the fifth Assessment Report of the IPCC, op cit.

<sup>47</sup> J. C. Nkomo, A. O. Nyong and K. Kulindwa, 'The Impacts of Climate Change in Africa', Final Draft submitted to, *The Economics of Climate Change: The Stern Review*, July 2006.

<sup>48</sup> G. Walker & D. King, *The Hot Topic: How to tackle global warming and keep the lights On*, op cit, p. 39.

<sup>49</sup> Ibid.

<sup>50</sup> N. Salzmann et al, 'Integrated Assessment and Adaptation to Climate Change Impacts in the Peruvian Andes', *Advances in Geosciences*, 22, 2009, pp. 35-39. In: *Global Environmental Outlook (GEO) 2010*, (Nairobi: UNEP, 2010), p44.

<sup>51</sup> W. Maathai, *The Challenge for Africa*, (London: William Heinemann, 2009), p. 252.

<sup>52</sup> National Climatic Data Centre State of the Climate Report, November 2009.

<sup>53</sup> E. Miguel, S. Satyanath & E. Sergenti, "Economic shocks and Civil Conflict: An Instrumental Variable Approach," *Journal of Political Economy*, 2004, p.1112.

permanent migration of the local communities.<sup>54</sup>The International Disaster Database indicates that in the year 2008, 99 percent of 104 natural disasters were climate related; 75 percent of these grew due to drought and as a result, 16.7 million people were affected.<sup>55</sup>Furthermore, due to increased amount of carbon dioxide, most of the deserts are experiencing loss of plant and animal biodiversity.

In addition, other factors such as growing population, overgrazing, and the deforestation process are continuously increasing the world's deserts.<sup>56</sup> In Kalahari Desert, for instance, aridity is increasing with climate change. Likewise, the Sahara desert has already spread out as much as 1000 km to the south. Compound affects of these changes are growing acts of violence in the Sahelian region of Africa.<sup>57</sup>Global Climate Models (GCMs) are commonly used to study the behavior of air, future changes in earth's climate and every day weather forecast.

However, some scientists like King and Nkomo have identified their concerns as these models lack accessibility to remote areas of underdeveloped regions, therefore, face difficulties in data collection.<sup>58</sup>Nkomo et al assert that GCMs provide little practical information about different regions of Africa, and particularly about small towns. Therefore, data collection of future climatic conditions within a country becomes difficult and unreliable.<sup>59</sup>Due to climate change induced disasters, approximately four billion people are vulnerable and five hundred million are at extreme risks of insecurity. Therefore, for the past few years, to deal with these challenges of climate change, environmental issues have taken priority on local, regional, and international agendas.

During the 1972 first international environmental conference held in Stockholm, where first global action plan for the environment was adopted, and the United Nation's Environmental Program (UNEP) was established. Likewise, the World Meteorological Organisation's role has been phenomenal in holding conferences to assist the policy makers to formulate and adopt climate change sensitive policies. In 1988, Intergovernmental Panel on Climate Change (IPCC)

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<sup>54</sup> Ibid.

<sup>55</sup> *GEO 2010 Year Book*, UNEP, op cit.

<sup>56</sup> M. L. Parry et al., *Climate Change 2007: Impacts, Adaptation and Vulnerability*, Working Group II, Contribution to the Fourth Assessment Report for International Panel on Climate Change, Cambridge University Press, 2007, p, 223.

<sup>57</sup> Ibid.

<sup>58</sup> G. Walker and D. King, op cit, pp. 31-32, Also Ho-Won Jiong, *Peace and Conflict Studies*, Institute for Conflict Analysis and Resolution, George Mason University, USA, 2000, pp. 267-70.

was established to study global climatic changes and their adverse effects. During May 1992, the United Nation's Framework Convention on Climate Change (UNFCCC) was adopted in New York, which is the first international climate treaty and came into force in 1994. It holds its annual climate conferences on yearly basis and commonly known as the Conference of the Parties whereby all the member states get together to discuss the issue.

The Rio Conference (Earth Summit) followed in June 1992 where socio-economic factors of the environmental issues were given priority. During December 1997, Kyoto Protocol was adopted. Here, the participating nations agreed to reduce 5.2 percent of greenhouse gas emission during the period of 2008-2012.<sup>60</sup> Since the climate change issue has surfaced on the international political agenda, most of the governments and regional organisations together with the international community have intensified their research on climate change and its adverse impacts on humanity. The Vienna Convention for the Protection of Ozone Layer (1988), Montreal Protocol (1989), the Kyoto Protocol, and the 2009 Copenhagen accord are major international initiatives to assess environmental issues. The United Nations' General Assembly resolution 43/53 calls for an integrated action of human beings to deal with the climate change.

There is an urgent need of financial and technological assistance from the developed world to reduce the vulnerability of poor people of the world who are at a greater risk of hunger, migration, disease, and wars, due to climate change. It has been strongly emphasised that climate change is mainly caused by rapid industrialisation of developed nations; it is therefore their moral obligation to provide financial assistance for the affected countries. Specifically, the poor and developing countries urgently need to develop climate change mitigation and adaptation policies as agreed in the Kyoto Protocol.<sup>61</sup>

There are growing discussions that climate change is a global challenge and needs to be addressed by a global framework where all nations must be treated on the basis of justice. In particular, industrialised countries must contribute to develop renewable clean energy mechanisms in the poorer countries.<sup>62</sup> According to World Bank's survey, initially, funding of \$10 to 40 billion per year is needed for the developing countries' assistance, which will be provided with three types of funds. These funds include the Adaptation Fund (AF), the Special

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<sup>60</sup> Kyoto Protocol on UN's Framework Convention on Climate Change, United Nations, December 1997.

<sup>61</sup> *Human Tide: A Real Migration Crisis*, A Christian Aid Report, May 2007.

<sup>62</sup> K. Annan, *The Anatomy of a Silent Crisis*, Human Impact Report, Global Humanitarian Forum Geneva, 2009, pp. i-iii.

Climate Change Fund (SCCF), and the Least Developed Countries Fund (LDCF).<sup>63</sup> Africa's response to climate change has been relatively slow, as many of the African states do not have technological and financial capabilities. Secondly, there is also lack of climate change policy implementation and legislation, which further hampers the efforts to fight the climate change issues.

### **c) The Nexus between climate change and human security**

Security provides a milieu of protection from posed dangers. It is a feeling of safety from the existence of threats.<sup>64</sup> However, human security is a much broader concept and needs to be examined by looking at economic, political, social, community, food, health and the environmental parameters,<sup>65</sup> as these are considered significant components of human well being and development. Human security emphasises the domains of human safety and well-being at present, and in future as well.<sup>66</sup> Climate change is one of the global issues, which exacerbate multiple problems for the humanity. It threatens human life, health, and property, especially for the people who entirely rely on the environment for their livelihoods. Due to climate change, some regions are becoming warmer, drier, with increased desertification, and severe droughts. While, others are receiving more than usual precipitation, leading to flash floods and storms.<sup>67</sup>

A number of scholars argue that climate change is not just an environmental problem; it needs to be approached from the wider perspectives of human security. Therefore, in the recent years a number of scholars have addressed diverse security issues within the climate change discourses. For instance, O'Brien et al observes that climate change poses multifaceted challenges to human security. Historically, natural forces primarily drove the phenomenon. However, in today's reality, it is all about social factors and needs to be examined by looking at social issues such as poverty, inequality, conflicts, land degradation, growing incidents of diseases, food and water insecurity.

Multiplicity of these issues can trigger conflicts within societies. Thus, the authors suggest that to deal with climate change, humans and communities need to be placed at the core of the issue and there is an urgent need to look at climate change from the perspectives of human

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<sup>63</sup> *Human Tide*, op. cit.

<sup>64</sup> G. King and C. J. L. Murray, 'Rethinking Human Security', *Political Science Quarterly*, Volume 116, Number 4, 2001-02, p. 594.

<sup>65</sup> N. Dower, 'Peace and Security: Some Conceptual Notes' In: M. Salla et al (eds.), *Essays on Peace: Paradigms for Global order*, Central Queensland University Press, Rockhampton, 1995, pp. 18-23.

<sup>66</sup> G. King and C. J. L. Murray, 'Rethinking Human Security', *Political Science Quarterly*, op cit.

<sup>67</sup> *Forum 2009: Climate Change, The Anatomy of a Silent Crisis*, Global Humanitarian Forum, Geneva, 2009.

attitudes, human rights, morals and obligations.<sup>68</sup>In particular, climate change poses multiple security stresses for the developing and poorer states that are already struggling to deal with poverty reduction, hunger, disease control, and growing numbers of refugees.<sup>69</sup>

The majority of poor inhabit the regions that are more vulnerable to climate change impacts and they have weak resilience capacity to fight climate change. Secondly, they do not have any alternative resources to rely on, in the face of climate change shocks or hazards. With the rising sea levels, global climatic change poses a serious threat to the people who are living in low lands and near the seashores.<sup>70</sup>In this regard, the president of Federated States of Micronesia (these are around 607 small islands, spread in the Western Pacific, Southwest of the main island of Hawaii) presented his views and said that the sea level rise and other associated costs of climate change were critical security threats to the survival of these nation-states.<sup>71</sup>

In addition, issue of sovereignty and safeguarding the borders are two measures of national security, which are threatened by the sea-level rise.<sup>72</sup> For example, during the period of 2001-2009, more than 68 million of the Bangladeshi population was directly affected by flash floods and cyclones. Five and a half million Bengalese had to relocate to neighboring country due to food insecurity and loss of livelihoods.<sup>73</sup> In the aftermath, political crisis and national security issues in the regions of Assam, Tripura, and West Bengal caused multiple threats to national and regional human security.<sup>74</sup>

Other safety covers like insurance policies are either unavailable or are beyond the reach of the poor. Their subsistence sources of income are usually farming, herding, fishing, or tourist industries. Climate change elevates poverty level by destroying the sources of livelihoods of the poor.<sup>75</sup> For instance, frequent drought cycles and flash floods often kill the livestock and reduce the crop yields. Likewise, increased acidity of the oceans damages the coral reefs and fish stocks. In future, such negative impacts of climate change may ruin the tourist industries and the

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<sup>68</sup> K. O'Brien et al. (eds.), *Climate Change, Ethics, and Human Security*, (Cambridge: Cambridge University Press, 2010).

<sup>69</sup> K. Annan, In: *Forum 2009: Climate Change, The Anatomy of a Silent Crisis*, op cit.

<sup>70</sup> J. L. Jacobson, 'Holding back the sea', *State of the World 1990* (W.W. Norton, 1990), p. 79.

<sup>71</sup> L. Falcam, Address to the East West Centre Senior Policy Seminar, August 2001, Honolulu, Hawaii, In: Jon Barnett, 'Security and Climate Change' op cit.

<sup>72</sup> Ibid.

<sup>73</sup> Ibid.

<sup>74</sup> T. Homer-Dixon, *Environment, Scarcity and Violence*, (Princeton: Princeton University Press, 1999), pp. 141-142.

<sup>75</sup> *Forum 2009: Climate Change, The Anatomy of a Silent Crisis*, op cit. p. 34.

livelihoods where people rely on these sources for their incomes. Increased ocean temperatures, rising sea levels and frequent storms negatively affect the coral reefs. The coral reef Alliance estimates the losses of billions of dollars due to long-term coral bleaching.<sup>76</sup>

The IPCC predicts that during the period of 2030-2060, the global mean temperatures will rise from 2 to 5 degrees centigrade. These rising temperatures will have severe negative impacts on sustainability of the environmental resources such as fresh water supplies, fisheries, forests, and arable land. This will consequently depress economic well being and development of the affected communities.<sup>77</sup> The IPCC reports and the Stern's review identify major threats to water supply, agriculture sector, health, and industry. Studies affirmed that some regions of the developing world would be hardest hit where climate change will multiply with existing conditions and may overburden the adaptive capacities of governments leading to various state security problems.<sup>78</sup>

Reoccurring and prolonged drought cycles, changes in the precipitation patterns, salinisation of river deltas, desertification, and weakening of ecosystems are potential threats to food and health security in many countries of Africa, Asia, and Latin America. The nations living in poor conditions, which are particularly dependent on renewable resources such as fisheries and agricultural production, will be exposed to hunger and malnutrition. There is considerable decrease of maize production, a staple food for many nations in America, Asia, and Africa. Agriculture is a major source of livelihood for majority of population in developing countries. However, research shows that warming will also affect positively and increased yields of some crops in the northern hemisphere.<sup>79</sup>

Some key studies demonstrate that in future, climate change will potentially increase the scarcity of fundamental resources. Homer-Dixon identifies three forms of resource scarcity; demand induced scarcity, supply induced scarcity, and structural scarcity. Researchers fear that environmental scarcities may provoke environmental degradation, and this consequently triggers depletion of the natural resources leading to numerous human security issues. In the author's

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<sup>76</sup> Ibid.

<sup>77</sup> *Climate Change 2013: Summary for Policy Makers*, Contribution of the Working Group II to the fifth Assessment Report of the IPCC, (Cambridge: Cambridge University Press, 2013).

<sup>78</sup> A. Miljkovic, *Environmental Impacts on Human Security and the Potential of Conflict*, Report prepared for Sciences Po Lille, France, 2008.

<sup>79</sup> W. N. Adger et al., *Human Security*, Chapter 12, IPCC WGII, AR5, (Cambridge: Cambridge University Press, 2014).

view, resource scarcities are very firmly linked to environmental changes and that, weak and economically marginalised societies will be at a greater risk of violence and insecurity.<sup>80</sup>

In addition, Homer-Dixon argues that greenhouse induced climate change can significantly provoke group rebellion, while ethnic animosities may lead to genocides, due to increased grievances of the deprived poor against the elite groups, who would like to take hold of the dwindling resource supply.<sup>81</sup> Due to changing weather patterns, decreased precipitation, and lower food production, states may experience economic turmoil, which can easily aggravate riots and destabilise human security.<sup>82</sup>

Recent studies indicate that climate change led resource scarcity poses multiple challenges to national and international peace and security. For instance, observations by Schwartz and Singh show that environmental conflicts often arise when climate change coupled with environmental degradation leads to factors, such as, low agricultural output, massive migration, and outbreak of epidemics. Furthermore, deforestation, soil erosion, flooding, drought, clean water scarcity and pollution are common features of environmental degradation and climate change, which frequently lead to multiple security issues and as a result conflicts arise within groups and states.<sup>83</sup>

Miguel et al, for example, examine the adverse effects of climate change in Africa during the period of 1981-1999. Observations reveal that during the periods of reduced precipitation, the likelihood of conflict increased by fifty percent in the region.<sup>84</sup> Likewise, human security and conflict in the Darfur area of Sudan Republic has significant links to climate change. Consequently, a combination of longer periods of drought, overgrazing in the arid and semi-arid areas led to land degradation and increased desertification. The worst impacts of the situation were violence escalation and insecurity in Darfur.<sup>85</sup>

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<sup>80</sup>Homer-Dixon, 'Environmental Scarcities and Violent Conflict: Evidence from Cases', Peace and Conflict Studies Program, University of Toronto, *International Security*, Volume 19, No. 1. Summer (1994), pp. 5-40.

<sup>81</sup> Ibid.

<sup>82</sup> N. Gaan, *Environmental Security: Concepts and Dimensions*, (Delhi: Kalpaz Publications, 2004), pp. 149-150.

<sup>83</sup> D. Schwartz, and A. Singh, 'Environmental Conditions, Resources, and Conflicts' op cit.

<sup>84</sup> E. Miguel, S. Satyanath and E. Sergenti, 'Economic shocks and Civil Conflict: An Instrumental Variables Approach', *Journal of Political Economy*, 112 : 4, 2004, In: W. Maathai, *The Challenge for Africa*, op cit. p. 252.

<sup>85</sup> 'Environmental Degradation Triggers Tensions and Conflict in Sudan', UNEP, Geneva, June 2007. Retrieved on line 12 April 2012.

However, scholars such as Kevane and Gray<sup>86</sup> argue that the decline in rainfall patterns did not significantly exacerbate the Sudanese conflict. The major conflict erupted in 2003, while the rainfall data suggests that there has been less rainfall since 1971. However, this decline was gradually spread over a period of 30 years. Other studies argue that variation in the rainfall patterns and longer spell of droughts in the Sahel during the 1970-80s, considerably contributed to the intensity of this conflict.<sup>87</sup> In addition, the local government had poor coping capacity, which further attributed to social decay and economic shortfall in the Gross Domestic Product (GDP) of the country. Thus, combination of such factors led to a violent conflict and inflicted massive loss of life and property in the Darfur region of Sudan.<sup>88</sup>

Kaplan assert that climate change can challenge international peace and stability, and conflicts may arise within economically weak societies due to their lesser capability to fight against the new weather hazards.<sup>89</sup> In addition, climate change will increase the inequality at regional and country levels due to poor or better adaptability within states and some particular areas within states. This may lead to certain level of political instability.<sup>90</sup> Particularly, the costs of climate change, such as, arising economic disparities among nations, green house effect, deficiency in agricultural production, water scarcity and other economic losses may affect social well being of various societies. Stern underlines some indirect social and environmental security implications of climate change such as loss of biodiversity, higher death rates due to increased diseases, climate led disasters, violence and migration.<sup>91</sup>

Other scholarly discussions demonstrate that climate change led disasters undermine human security as every year; thousands of people need to move from their homes. There are predictions that due to climate change, the number of refugees will hike in future because progressive changes in weather pattern will force local communities to move to the nearby towns to look for new shelters and livelihoods. This will overburden the urban areas by putting extra pressure on the available infrastructure. Water scarcity will be a major problem in Asia, Latin

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<sup>86</sup> M. Kevane and L. Gray, *Darfur: Rainfall and Conflict*, Environmental Research Letters 3, August 2008.

<sup>87</sup> A. Giannini et al., 'Oceanic Forcing of Sahel Rainfall on Interannual to Interdecadal Timescales', *Science* 302, pp. 1027-30.

<sup>88</sup> M. Kevane and L. Gray, *Darfur: Rainfall and Conflict*, Environmental Research Letter 3, op cit.

<sup>89</sup> R. D. Kaplan, 'The Coming Anarchy', *The Atlantic*, February 1994.

<sup>90</sup> N. P. Gleditsch, R. Nordas & I. Salehyan, op cit, p. 3.

<sup>91</sup> N. Stern et al., *Economics of Climate Change: The Stern Review*, op cit.

America and many parts of Africa. Furthermore, millions of people will die due to floods, famine, diseases, and droughts, leading to increased violence and wars.<sup>92</sup>

Clark and Reuveny analyse the links between human migration, security, and violence.<sup>93</sup> However, observations reveal that in fifty percent of the cases, use of violence and insecurity was enhanced by ethnic and ideological motives, while the remaining half never showed any signs of violence.<sup>94</sup> Another analysis of conflict and migration indicates that occasionally, environmental refugees become easy prey for organised groups. A recent study has shown that some of the refugees are influenced for recruitment where they are used to spread violence and mobilise rebel movements. However, there is no direct relationship found between climate change led migration and violence.<sup>95</sup>

Smith and Vivekananda examine the potential consequences of climate change and argue that underdeveloped countries are facing a ‘double headed’<sup>96</sup> problem of climate change and insecurity. The physical effects of climate change will leave poor people more vulnerable to adaptability due to a number of factors, such as, political instability and weak governance.<sup>97</sup> Barnett and Adgar also support the argument that climate change is a potential threat to human security and sustainability of resources. The authors warn against the future critical changes in the weather patterns, which are likely to undermine peace and security, therefore, governments should equip themselves to face new climate change challenges.<sup>98</sup> Okoth suggests that in order to resolve environmental issues at the global and national levels, it is imperative to use bio-diplomacy that involves negotiations on conservation and sustainability of the ecosystems and resources.

Likewise, idea of environmentalism (conservation of sustainable human-nature relationship) is integral to the survival of humanity.<sup>99</sup> Maathai asserts that sustainability and management of the environment must be the focal point of African governments’ development

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<sup>92</sup> *Human Tide: The real Migration Crisis*, A Christian Aid Report, op cit.

<sup>93</sup> W. A. V. Clark, *Environmentally Induced Migration and Conflict*, WBGU, Los Angeles, Berlin, 2006.

<sup>94</sup> R. Reuveny, ‘Climate Change-Induced Migration and Violent Conflict’, *Political Geography*, 26(6) 2007, pp. 657-673.

<sup>95</sup> I. Salehyen and K. S. Gleditsch., ‘Refugees and the spread of civil War’, *International Organization*, 60 (2), 2006, pp. 335-366.

<sup>96</sup> D. Smith and J. Vivekananda, ‘A Climate of Conflict’, *International Alert*, November 2007.

<sup>97</sup> Ibid.

<sup>98</sup> J. Barnett and W. N. Adger., ‘Climate Change, Human Security and Violent Conflict’, *Political Geography*, 26, 2007, pp. 639-655.

<sup>99</sup> P. G. Okoth and B. A. Okoth (eds.), *Conflict in Contemporary Africa*, (Nairobi: Jommo Kenyatta Foundation, 2002), p7.

strategies. Maathai further argues that most conflicts in Africa are directly or indirectly resource-based. For instance, conflicts in Chad, Somalia, Ethiopia, and Kenya are the results of resource scarcity and land degradation. The Sudanese civil war is triggered by different facets of environmental degradation, such as deforestation, overgrazing of fragile soils, rapid desertification, drought, and migration. Therefore, management of the environment must focus on policy development because ‘protecting and restoring ecosystems, and slowing and reversing global warming, are matters of life and death’.<sup>100</sup>

This literature review indicates that in future, global climate change and related human security issues are going to grow complex and may become one of the greatest source of concern due to increased risk of interacting political, social, economic and environmental impacts. In conclusion, the literature presents strong evidence that the world is already experiencing multiple challenges due to the global climate change. However, if left uncontrolled, these climatic changes will directly as well as indirectly effect lives of billions of people. O’Brien suggests that wide spread climate change issues cannot be relied on limiting the carbon emissions or with the application of green energy or clean and pollution free atmosphere, however, there is need for institutional framework which can approach climate change as a security issue.<sup>101</sup>

#### **d) The Effects of Human Encroachment in the Mau Forest Complex**

Comprising the originally gazetted area of 405,000 hectares, the Mau Forest Complex is the largest block of closed canopy forest in East Africa. The complex covers 22 forest blocks including, Transmara, OlPusimoru, Maasai Mau, Eastern Mau, Mau Narok, South-West Mau, Western Mau, Mount Londiani, Eburu, Molo, West Molo, Tinderet, Northern Tinderet, Timboroa, Nabkoi, Kilombe Hill, Metkei, MajiMuzuri, Chemorogok and Lembus.<sup>102</sup>

The Mau Forest Complex has strategic importance as it stores water, regulates river flows, mitigates floods, recharges the ground waters, reduces soil erosion and siltation, purifies water, conserves biodiversity, and regulates the microclimate. Originating from the Mau Complex, twelve of its rivers feeds six major lakes in the region. Mau’s goods and services are

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<sup>100</sup> Ibid, p. 248.

<sup>101</sup> K. O’Brien et al. (eds.), *Climate Change, Ethics, and Human Security*, (Cambridge: Cambridge University Press, 2010).

<sup>102</sup> Rehabilitation of the Mau Forest Ecosystem, A project Concept prepared by the Interim Coordinating Secretariat, Office of the Prime Minister, on Behalf of the Government of Kenya, September 2009, p. 5.

the breadbasket for millions of people living in Kenya and in the neighboring states.<sup>103</sup> Each year, through hydroelectric power generation, agricultural performance, and tourism activities, Mau's ecosystem helps to generate more than twenty billion shillings towards Kenya's economy.<sup>104</sup>

Despite the critical importance of the Mau, since Kenya's independence, the Complex is severely degraded and destructed through legal and illegal practices. Both colonial and post-colonial governments lacked the institutions for the protection of forests and reserve lands.<sup>105</sup> Furthermore, without any environmental assessment studies, Kenyan governments tried to resettle landless squatters of the Rift Valley in and around the Mau Forest Complex by excising huge parcels of forest cover. However, much of this land was distributed among the political elites and interested parties who wanted to use the forestland for commercial cultivation. Fundamental issues of land distribution and entitlement also paved a path for the landless people to gradually move inside the forests and clear land for cultivation and housing.<sup>106</sup>

Issues of land tenure in the Rift Valley region have led to violence and conflict cycles in the recent history. These conflicts have usually been among the local communities, government, the NGOs, and the forest conservation groups. Like many other parts of the world, The Mau is also home to indigenous communities such as the Ogiek, who have been living in the Mau Forests for centuries. The Kenya Indigenous Forest Conservation Project (KIFCON) cited the Ogiek community as the key subject of conflict.<sup>107</sup> However, there are views that these communities have nothing to do with the destruction of the forest as they are distinctively dedicated to the environment and intimately associated to a particular ecosystem.

Additionally, if that ecosystem is damaged, their livelihoods would be destroyed.<sup>108</sup> This is because their lives are heavily dependent on the forest resources such as honey gathering, wild fruits and roots, game hunting and traditional bee keeping activities that cannot be practiced

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<sup>103</sup> 'Report of the Prime Minister's Task Force on the Conservation of the Mau Forest Complex', Nairobi, March 2009, p. 17.

<sup>104</sup> T. J. Baldyga, et al., 'Assessing Land Cover Change in Kenya's Mau Forest Region Using Remotely Sensed Data,' *African Journal of Ecology* 46, p. 46-54, 2007.

<sup>105</sup> Fighting for the Mau Forests: Land, Climate Change and the Politics of The Kibaki Succession, Africa Policy Report 2010, Africa Policy Institute, June 2010, p. 2.

<sup>106</sup> Ibid.

<sup>107</sup> Ibid.

<sup>108</sup> 'High Altitude Forest Conservation in Relation to the Dorobo in Kenya: Past, Present and Future', *Swara*, (East African Wildlife Society), August 1978, p. 23.

outside a forest.<sup>109</sup>In February 2001, the Government of Kenya decided to resettle the evicted communities and proposed to excise 61,586 hectares of the Mau Forest Complex.<sup>110</sup>Nevertheless, later it was discovered that most of the land was distributed among the elites instead of the landless people.<sup>111</sup>

In addition, 54,727 hectares of land has been encroached for settlements, charcoal production, and timber extraction. In the east Mau and the south-west Mau, local communities used constant fires to clear land for settlements and cultivation.<sup>112</sup> Heavy encroachment has led to severe forest degradation in various parts of the Mau Forest Complex including the South Western, Eastern, and the Maasai Mau block, threatening the entire ecosystem of the complex.<sup>113</sup>In sum, over the last few decades, approximately 161,871.5 hectares has been destroyed due to settlements and other degradation activities.<sup>114</sup>

Besides the fact that the complex is one of the key water reservoirs for the country, human activities are having detrimental negative impacts on the water supply to the surrounding regions. During the period of 1964 to 2000, For instance, the area of River Njoro headwaters decreased by 9 percent.<sup>115</sup>Likewise, during 1995-2005, a major aquifer in Nakuru lowered by 100 meters, in a record ten years. Sondu-Mairu hydropower plant cannot run to its full capacity due to irregular water flow in the Sondu River, especially during the dry season. Many streams and rivers feeding Lake Nakuru have dried up. Others have become seasonal due to significantly droughts and reduced rainfall.<sup>116</sup>

Degradation and drying up of the complex has led to competition for scarce resources. Local conflict management authorities have often resolved low-level conflicts between the local communities. Simultaneously, apart from regional peace and security, such fights greatly

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<sup>109</sup> S. Joseph K, *The Ogiek in the Mau Forest*, Case Study 3, Kenya, April 2001.

<sup>110</sup> Report of the Inter-Ministerial Committee on Forest Excisions, Nairobi, 2001.

<sup>111</sup> P. Kantai, 'Saving Kenya's Mau Forest', *Africa Report*, 21 September 2009.

<sup>112</sup> M. J. Kinyanjui, *The Effect of Human Encroachment on Forest Cover, Structure and Composition in the Western Blocks of the Mau Forest Complex*, Unpublished Ph. D thesis, Egerton University, p. 114. In: M. J. Kinyanjui, NDVI-based vegetation monitoring in the Mau Forest Complex, *Africa Journal of Ecology*, 49, 2010 pp. 165-174.

<sup>113</sup> 'Rehabilitation of the Mau Forest Ecosystem', A project concept prepared by the Interim Coordination Secretariat Office of the Prime Minister, on Behalf of the Government of Kenya, September, 2009, p. 38.

<sup>114</sup> Ibid. p. 36.

<sup>115</sup> T. J. Baldyga et al., 'Assessing Land Cover Change in Kenya's Mau Forest Region Using Remotely Sensed Data' *Africa Journal of Ecology*, 46, 2007, pp. 46-54.

<sup>116</sup> J. A. Raini, 'Impact of Land Use Changes on Water Resources and Biodiversity of Lake Nakuru Catchment Basin, Kenya', *African Journal of Ecology*, 47 (Suppl. 1), 2009, PP. 39-45.

endanger the livestock and agricultural economy of the region.<sup>117</sup> Areas of biodiversity hotspot such as Transmara, South West Mau, lower parts of Western Mau, Eburu Forest and upper areas of Eastern Mau Forest need special conservation and protection efforts.<sup>118</sup> According to the 1999 Environmental Management and Coordination Act, the complex greatly needed the impact assessment of the land excisions.

#### **e) Knowledge Gap**

The above presented literature review identifies that although climate change is an ever-present phenomenon, however, there are fewer in-depth studies on the historical and contemporary perspectives of climate change and human security debates. In addition, the available literature lacks significant contribution towards conceptual and theoretical linkages between climate change and wider human security dimensions. Most of the IPCC studies focus on future predictions based on speculations, therefore, these issues need in depth research. Secondly, although most of the researchers commend IPCC's work on climate change; data used by IPCC reports demonstrates a vague relationship between climate change and human security; lacking strong empirical evidence.

Africa, being the most vulnerable region to climate change, there is also need to identify the rising threats to human security especially due to new climate change events and processes. In particular, regarding climate change and human security threats in Africa, it is necessary to locate specific policy and legislation development at global, regional, and national levels. Lastly, the literature review suggests that there is no detailed and well-organised data collection on the security implications led by the climatic changes in the area.

In addition, there is little scholarly work on human induced climatic changes and the emerging human security threats in the Mau Forest Complex. Although some of the recent studies in the field identified some threats to animal and plant biodiversity in some parts of the Mau forest, there is a pressing need to document the human impact of large-scale deforestation and land excisions at the local, national, and regional levels. Furthermore, there is an absence of focus on the relationship between human-induced climate change, loss of biodiversity and security in and around the Mau Forest Complex.

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<sup>117</sup> Fighting for the Mau Forests: Land, Climate Change and the Politics of the Kibaki Succession, Africa Policy Report 2010, op cit, p. 22.

<sup>118</sup> H. Oyieke and the National Museums of Kenya Biodiversity Team, *Assessment of Vegetation Cover and Biodiversity Hotspots in the Mau Forest Complex*, Report Submitted to: Prime Minister's Task Force on the Conservation of the Mau Forest Complex, March 2009, pp. 92-93.

## **1.4 Justification of the Study**

There exists plethora of literature on climate change and its effects. This study particularly investigates the interplay between human activities, climate change, renewable resource scarcities, and the resultant human insecurities in Africa. Using the case study of the Mau Forest Complex, this study ended up showing that how human actions can interfere with the natural climate and consequently affect security of human population. In the process, the study theorised the linkages between human security and climate change.

The study also examined the role of the institutions, regimes, and policies at local, regional, and global levels. Thus, this study seeks to develop a deeper understanding of climate change and its negative impacts on the security of human beings with special reference to Africa. The study provides a source of secondary data for researchers especially in the fields of diplomacy and international studies, climatology, development studies, environmental studies etc. Furthermore, the study seeks to fill the gap in the available literature. The conceptual diagram clearly explains how this study seeks to contribute to knowledge, key themes and the relevance of this study from international, regional, and national point of view (see page 28).

The study is important for the researchers of environment and security studies because it will help to understand the critical relationship between climate change and human security, being major challenges of the time. Environmental concerns have also become gravely important for the management of arising human security threats. Therefore, the study will contribute to the existing body of knowledge focusing some key environmental issues threatening national, regional, and international peace, security, and development. In the policy circles, the study should contribute to the design of better policies on climate change mitigation and adaptation for addressing climate change and human security issues leading to violence and crises situations in affected areas. In addition, this study should serve as an important source of information to global, regional and national environmental and climate security agencies.

## **1.5 Hypotheses**

To achieve the objectives of this study and to provide testable variables to guide the type of data collected this study employs the following hypotheses:

- i) Human activities are the key determinants of climatic change in Africa, and as indicated in the Mau Forest Complex study area;

- ii) Climate change has led to scarcity of fundamental resources and human insecurity in Africa, and specifically in the Mau Forest Complex;
- iii) Climate change is a key driver of human insecurity in Africa.

## 1.6 Theoretical framework

The theoretical framework of this study derives from the theories examined under the literature review. For instance, theories of conservationism, environmental security, and renewable resource scarcity are regarded as central models for the understanding of environmental issues. In the 1970s and 1980s, environmental issues became a hot topic for the global politics and as a result, Brown introduced the notion of securitisation of the environment.<sup>119</sup>

Later in the 1980s and 1990s, more prominently Kaplan and Myers further elaborated that the natural and human factors, including the population growth, water and air pollution, diseases, growing crimes, refugee influx, increased deforestation, and the sea level rise can severely depletion and degrade the natural environment.<sup>120</sup> Thus, the environmental security theory emerged, which seeks to protect environmental elements such as land, water, soil, ozone layer, climate and other components that are necessary to sustain life with social, economic, and political activities.<sup>121</sup>

In relation to environment and security, during 1991, Homer-Dixon pioneered the idea of the renewable resource/environmental scarcity theory. The basic notion of this theory was formulated on the broad idea of environmental destruction that can potentially lead to the reduction in the supply of fundamental resources such as forests, fresh water, depletion of the ozone layer and cropland. Homer-Dixon argues that these scarcities commonly affect communities in developing countries where most of the population relies on these resources. Another important factor is the inability of these societies to generate alternate sources of livelihoods.<sup>122</sup>

To develop the theory of environmental scarcity, Homer-Dixon studied a number of cases such as, in South Africa, Pakistan, Mexico, and Chiapas, where scarcities of fundamental resources of land, wood, and water forced millions of local communities to leave their

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<sup>119</sup> L. Brown, 'Redefining Security', World Watch Paper NO, 14, (Washington D.C. World Watch Institute, 1977).

<sup>120</sup> R. D. Kaplan, 'The Coming Anarchy', *The Atlantic Monthly*, February 1994. pp. 44-76. Also, N. Myers, 'The Environmental Dimensions to Security Issues', *The Environmentalist* 6, 1986, pp. 251-257.

<sup>121</sup> O. Brown et al., *Environmental Change and the New Security Agenda*, International Institute for Sustainable Development, Canada, 2008.

<sup>122</sup> T. Homer-Dixon, *Environment, Scarcity, and Violence*, op cit.

homelands and establish new settlements near the cities on environmentally fragile lands. Later, the scarcities of these dwindling resources and lack of provision of basic services led to increased poverty, insecurity, ethnic animosities and spread of violence.<sup>123</sup>

Uncontrolled population growth and increased requirements of consumption potentially lead to greater demand of resources. This is the second measure of resource scarcity where rapidly growing population is dependent on fixed quantity of a resource, or the resource is depleted or degraded faster than it is renewed. Demand induced scarcity, for instance, is evident in the cases of Gaza, Honduras and Philippines, where overuse of aquifers, reduction in the quantity of fish and stripped lands led to huge environmental crises, violence and numerous security dilemmas.<sup>124</sup> Third and the most important factor of environmental scarcity is the structural scarcity, caused by an unjust distribution of a key resource. It occurs when powerful groups of a society try to get hold of a scarce resource or grab more than their share. These three types of scarcities often interact to cause ‘resource capture’ or ‘ecological marginalisation’.<sup>125</sup>

Resource capture occurs when an increased demand of a resource affects the supply and on the other hand, influential groups of the society distort existing laws to get hold of the scarce resource. For instance, in the case of Chiapas, due to growing population and increased land scarcity, the powerful landlords repealed the local land laws to disown the poor peasants from their small farmlands and forced them to move into the deep forests. As a result, these farmers lost means of livelihoods, and became even poorer being unable to sustain themselves. Consequently, violence became unavoidable which led to mass migration and inversely affected community’s social capital.<sup>126</sup>

Similarly, ecological marginalisation occurs when growing demand of a resource interacts with unjust distribution and people are forced to migrate to ecologically sensitive areas.<sup>127</sup> In retaliation, the aggrieved groups collectively rebel against the opportunistic and influential authorities using violence and trigger civil war or rebellion.<sup>128</sup> Today, climate change and global warming are key environmental challenges. Some of the consequences of these problems are evident in reduced food supply and water constraints especially in the developing

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<sup>123</sup> Ibid.

<sup>124</sup> Ibid.

<sup>125</sup> Ibid.

<sup>126</sup> Ibid.

<sup>127</sup> T. Homer-Dixon & V. Percival, ‘Environmental Scarcity and Violent Conflict: The Case of South Africa’, op cit.

<sup>128</sup> Ibid.

countries. According to some studies, more than 2 million deaths annually occur due to inadequate sanitation.<sup>129</sup>

Thus, Homer-Dixon's theory of environmental/renewable resource scarcity best complements the climate change-human security research and particularly in the case study of the Mau Forest Complex. In many regions of Africa, climate change led disasters and resource scarcity are interlinked and pertinent causes of human insecurity.<sup>130</sup> However, these links are complex and usually shaped by various factors depending on the global or local environment, socio-economic factors, and institutional capacities.<sup>131</sup>

In the case of the Mau Forest Complex, in the pre and post independence periods, various groups have excised huge parts of the forestland. Among other issues, the political leaders and weak institutional systems have played more prominent role. Over the years, land use/cover changes have led to an increased depletion and degradation of the forestland with detrimental climate change in the area. Furthermore, climate led disasters have amplified both demand, supply as well as structural scarcity with loss of livelihoods, food insecurity, depletion of watering bodies and episodes of violent conflicts.

Since the 1990s, the environmental scarcity theory has been widely used in the field of international studies especially to explain the events of natural/environmental resource scarcities and the human impacts. Therefore, in examining climate change and human security in Africa and in the case of Kenya's Mau Forest Complex, Homer Dixon's environmental resource scarcity theory best captures the issues and complements key themes of the study.

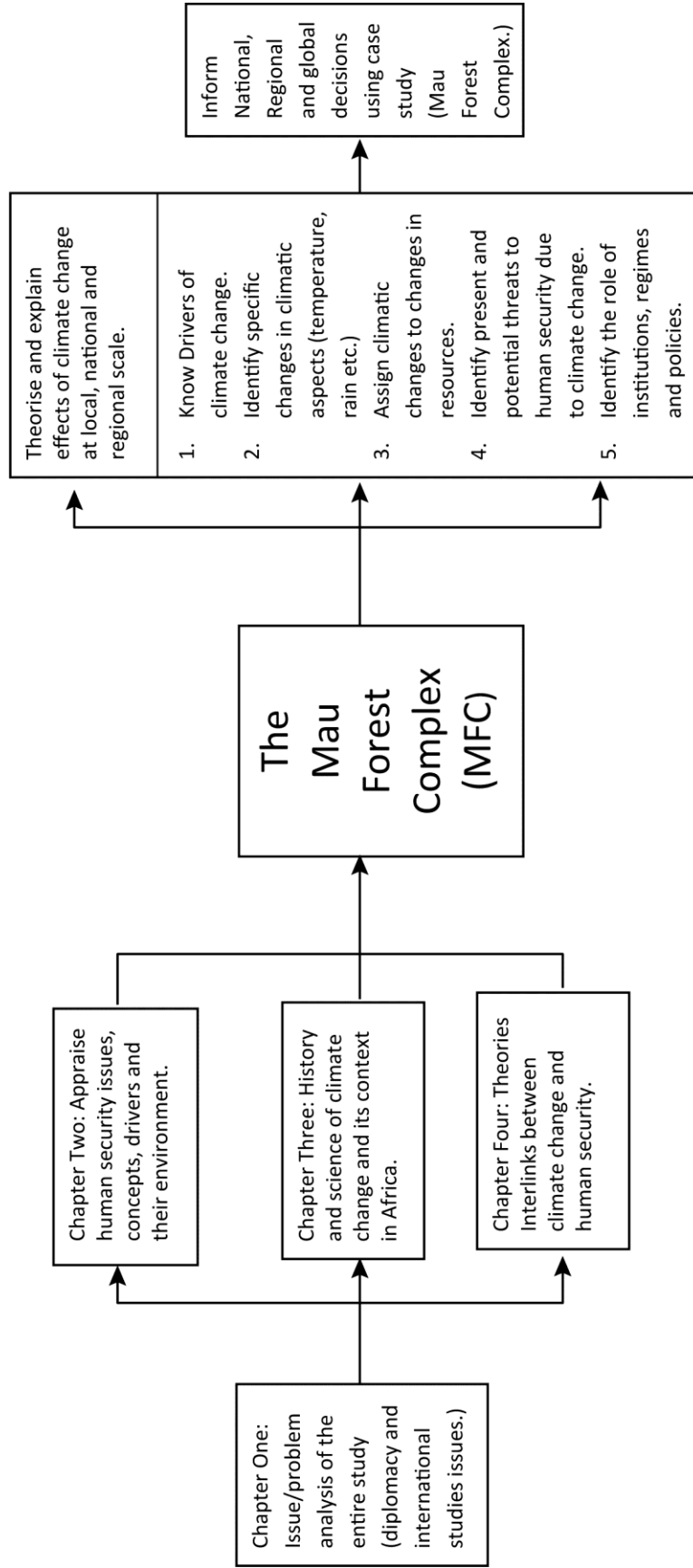
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<sup>129</sup> B. Lomborg, 'Resource Constraints or Abundance?' In: P. F. Deihl and N. P. Gleditsch, (eds.), *Environmental Conflicts*, (Oxford: West view Press, 2001), pp. 125-152.

<sup>130</sup> O. Brown and A. Crawford, *Climate Change and Security in Africa*, International Institute for Sustainable Development, 2009.

<sup>131</sup> M. R. Redclift and M. Grasso, 'Introduction: Human Security in the Age of Carbon' In: M. R. Redclift et al (eds.), *A Hand Book on Climate Change and Human Security*, (UK: Edward Elgar Publishing Limited, 2013), p. 5.

**Figure 1.2** Conceptual diagram based on the Mau Forest Complex as a case study for lessons in Africa



## 1.7 Research Methodology

This study employed both primary and secondary data, which were collected and analysed as explained in the following sections.

### a) Secondary Data

Secondary data constitute observations of various researchers, and scholars of the fields of international relations, human security, climate change, and environmental studies. Such data was collected from the library, academia, and on-line sources. Data was also compiled from published materials especially using online journals, IPCC reports, United Nations Environmental Program (UNEP) reports, Kenya Meteorological department, Tea Research Foundation in Kericho, Kenya Forest Services, Kenya Forestry Research Institute, publications and surveys done by various NGOs and IGOs on climate change and human security issues. Further investigations were done from the documents of international, regional, and sub-regional treaties, and conventions on climate change debate.

### b) Primary data

Both qualitative and quantitative data was collected using the case study method, which provided thorough observation and investigation of the social unit to identify causation.<sup>132</sup> At the same time, case study method acts as ‘the social microscope’<sup>133</sup> because it enables the researcher to carry out exhaustive study of individuals, groups, institutions, communities and events. Therefore, to explore the inter-linkage between climate change and human security, the main area of concentration was southwestern, eastern and the Maasai Mau forest blocks where issues of illegal land excisions and mass deforestation have led to increased greenhouse gas emissions with annual and diurnal temperature rise, severe frost spells, changes in the river flows, and rainfall variability. At the same time, resource scarcity, growing poverty level, loss of livelihoods and decreased crop yields, threaten various aspects of the human security of the local population.

Tea production in Kericho area has particularly been affected and farmers are looking for alternate crops, which do not need as much water supply. Likewise, in the eastern part and the Maasai forests, mass deforestation and land excisions have led to significant ecological and hydrological changes. In the areas around the Mau Complex, access to water, pastures and land

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<sup>132</sup> R. K. Yin, *Case Study Research: Design and Methods*, (California: SAGE Publications, 2009).

<sup>133</sup> C. R. Kothari, *Research Methodology, Methods and Techniques*, (Jaipur: New Age International Publishers, 1985), p. 113

issues often lead to political violence and inter-ethnic conflicts.<sup>134</sup> Thus, the case study of the Mau Forest Complex guided to evaluate the specific objectives and hypotheses and thereby establish the relationship between human security and human induced climate change in Africa and the Mau Forest Complex.

Primary data was derived from semi-structured and unstructured interviews. Based on the non-probability criterion, judgmental/purposive sampling guided to select the interviewees, based on their skills and expertise. In addition, this sampling technique brings results that are more accurate. Thus, for the purpose of primary data collection, cases of subjects were picked because they possessed the required information.<sup>135</sup> In addition, they had phenomenal role in environmental conservation, natural resource conservation, and Kenya's climate change policy making affairs. These interviews helped to do the in depth investigation of the underlying causal factors and impacts of anthropogenic climate change, resource scarcity, and posed threats to human security.

The sample of more than twenty five interviewees included various experts from the Kenya's Ministry of Water, Environment, and Natural Resources, Kenya Wildlife Services, Kenya Forest Services, Kenya Forestry Research Institute Londiani, civil society activists, various government offices, the forest communities (the Ogieks and the Maasai), tea producers, scholars, researchers, and environment related civil society organizations. Kenya Meteorological Department provided quantitative data on temperature and rainfall, which guided to assess the climate changes in and around the Mau Forest Complex during the study period.

Focus Group Discussions (FGDs) were also part of qualitative data collection. Focus groups consisted of various community members and evictees living near the Mau forest. They members of these groups were selected on the basis of age, gender and skills to share their experiences and opinions on the given topics of discussion. Questions asked during the discussions were semi structured and open-ended. Record taking consisted of both note taking and audio recording. In addition, during the fieldwork, the researcher made use of day to day accounts in the form of a 'diary of observations'. This provided additional primary information based on researcher's personal experience and observations. Government documents were an important part of primary data collection.

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<sup>134</sup> Interview with Miss B. Cheserek, (Environmentalist) Tea Research Foundation, Kericho, 14 February 2014.

<sup>135</sup> A. G. Mugenda, *Social Science Research: Theory and Principles*, (Nairobi: Applied Research and Training Services, 20080, p. 196.

### c) **Data Analysis**

The nature of the data analysis for this study was qualitative where key variables were studied in the natural settings. Thematic analysis method has been used where key themes of the study were identified and major subjects and associations between them were discussed. Case study of the Mau Forest Complex helped to examine the mutual inter-relation of causal factors of various dimensions of human security, particularly, where anthropogenic changes in the climate has led to renewable resource scarcity, loss of livelihoods, reduced crop production, food insecurity, health problems, and increased poverty.

Data collected from both the primary and secondary sources was deducted, analysed, and then incorporated to the themes of the study. In the end, critical analysis helped to establish the direct or indirect links between climate change, scarcities of fundamental resources, and human security issues in Africa as well as in the Mau Forest Complex. In addition, the critical analysis and the key findings provided the validity of the objectives and hypotheses of the study.

## **1.8 Chapter outline**

This study is structured around the following seven (7) chapters:

Chapter One provides the introduction and basic structure for this research. Chapter Two highlights the concept of the human security. It discussed various aspects of human security as has been suggested in the UNDP Human Development Report 1994 and other scholarly documents. Additionally, it pinpoints major human security issues in the developing world and more specifically in Africa.

In Chapter Three, the study provides an overview of the historical and contemporary perspectives of climate change debate and discussed climate system and history of climate change since the early sixteenth and seventeenth centuries. Furthermore, the chapter examined major climate change events over the history of humanity including the present day global warming and climate change. Additionally, it points out major outcomes of today's human induced climate change implications.

Chapter Four examines human security issues in the context of climate change debate with a special focus on Africa. It assessed how rapidly changing environmental conditions of the planet are affecting various aspects of human security, particularly in the developing and economically marginalised regions of the world. Chapter Five is based on the case study of the Mau forest Complex where human induced climate changes have led to environmental

destruction and resource scarcities with numerous impacts on the security of the local and regional population. Primary and secondary data was collected using academic materials, interviews, observations and focus group discussions.

Chapter Six presents a critique of this study. Data was analysed and deductions were made to provide the answers to the research questions; while Chapter Seven provides the summary, findings, recommendations and identifies some relevant areas of research, which were beyond the scope of this study.

# CHAPTER TWO

## HUMAN SECURITY: AN APPRAISAL

### 2.0 Introduction

People acknowledge security according to their own perceptions and from their day-to-day circumstances. Although, the concept has been explained and analysed in varied forms and specifications, however, for a layman's understanding, security means being free from any form of danger. For the last few decades, security marks a shifted understanding in the field of security studies and international relations. Especially, since the post Cold War era, security has been broadened and humanised. Thus, the consensus emerged as individuals and communities became new subjects of security.<sup>1</sup>

Against this background, this chapter attempts to provide an overview of conceptual as well as theoretical analysis of security and examines both classical and contemporary debates on human security. In the first section of this chapter, classical approaches to security have been examined while the later sections outline the historical groundings and the motivations involved in the emergence and development of the human security discourse. Furthermore, this chapter focuses on various dimensions of human security as demonstrated by the UNDP's 1994 Human Development Report and seeks to assess key issues of human security in Africa.

### 2.1 Classical Understanding of Security

Traditionally, security has long been explained and understood in the context of realism school of thought. In the realist framework, notion of security refers to the protection of territorial boundaries and sovereignty of the state by means of military forces where states play a pivotal role in the observance of national security.<sup>2</sup> Thucydides, Machiavelli, Hobbes, and Rousseau were among the key scholars of realist perspective who laid the philosophical foundations of this paradigm. The realists based the international system on the condition of anarchy, where there is no central power to hold command.<sup>3</sup>

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<sup>1</sup> A. D. Baldwin, 'Security Studies and the End of the Cold War', Review Article, *World Politics*, 48.1, 1996.

<sup>2</sup> H. Haftendorn, 'The Security Puzzle: Theory Building and Discipline Building in International Security', *International Studies Quarterly*, Volume 35, No. 1, 1991, 3-17, p. 8.

<sup>3</sup> H. J. Morgenthau, Revised by, K. W. Thompson, *Politics Among Nations: The Struggle for Power and Peace*, (New York: Alfred A. Knopf., 1978), pp.4-15.

In this view, states are in an everlasting condition of security dilemma and are constantly struggling to accumulate relative gains.<sup>4</sup> Due to anarchical international system, national security is the highest goal governments want to attain and therefore, sacrifice massive amounts of resources for this purpose.<sup>5</sup> At the same time, realist states do worry about other socio-economic prospects. However, a state needs to function in a milieu of international politics and international economics where the former overshadows the later when both come into coercion. This is the consequence of the condition of anarchy in the international political system where each state is more essentially concerned about its survival, and if there is no survival, economic gains are considered worthless.<sup>6</sup>

The realists viewed international politics in a continuous fear of war that led states to count on the balance of power and deterrence among great powers. In a constant struggle to gain utmost security, states tend to attack each other, causing new insecurities.<sup>7</sup> Therefore, in such a system, states never feel secure and continue to strengthen their military power. For example, during the Cold War, both the super powers (the US and the USSR) were driven by a perpetual antagonism, entangled in a vicious cycle of security.<sup>8</sup>

Realism has other sub branches like neo-realism/structural realism, offensive realism and defensive realism. However, all these schools of thought have common core values such as, competition to gain hegemonic role in the international system, centrality of power, sound military forces, and egoism. In the neo-realist perspective, security is the foremost goal states aim to compete for. In this view, states having more security than others are placed at a higher rank in international politics.<sup>9</sup> The neo-realists believe that the international system is made up of many great powers where each power strives to survive independently. As a result, each state develops an offensive military force to provide power and security.<sup>10</sup>

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<sup>4</sup> M. Doyle, *Ways of War and Peace*, (New York: W.W. Norton, 1997), p. 18.

<sup>5</sup> R. Smoke, *National Security and the Nuclear Dilemma: An Introduction to the American Experience in the Cold War*, 3<sup>rd</sup> ed., (New York: McGraw Hill, 1993), p. 248.

<sup>6</sup> G. Allison and G. F. Treverton (eds.), *Rethinking America's Security: Beyond Cold War to New World Order*, (New York: W. W. Norton, 1992), p. 222.

<sup>7</sup> J. H. Herz, *The Nation State and the Crisis of World Politics*, New York, 1976, p. 10.

<sup>8</sup> *Notions of Security: Shifting Concepts and Perspectives*, COT Institute for Safety, Security and Crisis Management, Netherlands Organisation for Applied Scientific Research, 15 February 2007, pp. 23-24.

<sup>9</sup> C. F. Kenneth Waltz, *Theory of International Politics*, (Reading: MA, 1979) .

<sup>10</sup> C. L. Glaser, 'Realists as Optimists, Cooperation as Self-Help', *International Security*, Vol. 19, No. 3 (Winter), 1994, p. 53.

In neo-realism, there is lack of trust among states, which amplifies acts of overt aggression. However, to promote peace, neo-realists also believe in liberal economies and democratisation of institutions. In addition, neo-realism recognises that security can be attained from the balanced strategies based on stable military capacities.<sup>11</sup> Due to this reason, neo-realism dominated security studies for many decades. All strands of realism concentrated on the centrality of the state. In this context, security was operationalised in terms of state, its military power, and the use of force to deal with any external threat. However, realism failed to give specific explanation to enable one understand the concept of security.

As Baldwin comments that in the neo-realist perspective, security is the primary goal for a state; however, it pays no attention to the meaning of security. Furthermore, realism does not outline any value system while dealing with the questions of survival, and what degree, and how much assurance of security it offers.<sup>12</sup>

## **2.2 Emerging Changes in National Security**

The security studies gained much more prominence during the interwar period. During this period, key emphasis was on social reforms which were primarily based on the stability of states, hence stability of the international system. At the same time, there were arguments to take a global initiative for the basic human rights to preserve the dignity of people.<sup>13</sup> Additionally, scholars asserted that peace and security should be attained by means of democracy, international understanding, arms control, collective security, and the use of arbitration.<sup>14</sup> In the process, the scholars of security studies stressed more on international law and institutional setup instead of gains in military powers.<sup>15</sup>

Considering these revolutionary measures, there was significant emphasis on the building of an international system based on ‘community of power’ where all the states required uniting for common goals, such as achieving global peace, security, and justice.<sup>16</sup> With the aggressions of

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<sup>11</sup> S. Chattarjee, ‘Neo-realism, Neo-liberalism and Security’ *International Studies*, Vol. 40, No. 2, 2003, pp. 143-144.

<sup>12</sup> D. A. Baldwin, ‘The Concept of Security’ *Review of International Studies*, 23, (5-26), 1997, p. 21.

<sup>13</sup> D. Galbi, ‘International Aspect of Social Reforms in the Interwar Period’, Common Security Forum, Center for Population and Development Studies, Harvard University, June 1993, p. 1.

<sup>14</sup> W. T. R. Fox, ‘Interwar International Relations Research: The American Experience’, *World Politics*, 2, pp. 67-79, 1949, p. 69, In: D. A. Baldwin, ‘Security Studies and the End of Cold War’, Review Article, *World Politics* 48.1 (1996), p. 119.

<sup>15</sup> Ibid.

<sup>16</sup> H. Haftendorn, ‘The Security Puzzle: Theory Building and Discipline Building in International Security’, *International Studies Quarterly*, op cit. p. 7.

World War II, national security gained a central position for international relations' scholars. They believed in an 'explicit consideration of force as it related to policy in conflicts among first-ranking nation states'<sup>17</sup> and that was relatively relevant than other issues. This, as a result, emphasised the introduction of courses on war and national policies in various American universities such as Columbia, Yale, Princeton, and North Carolina.<sup>18</sup> By the end of the World War II, the field of security studies significantly prospered as people became more aware of their responsibilities towards each other. This era is best known as the most innovative and sensational period for the development of security studies. At this time, national security was broadly measured in the parameters of international relations and foreign policy.<sup>19</sup>

In 1945, founders of United Nations had their fundamental emphasis on broader meaning of security. The UN Charter puts equal significance on states and people where it has been clearly indicated that international security is only possible when people will be secure in homes and at their jobs.<sup>20</sup> This period was also phenomenal as the research and study of international affairs was initiated in specialised schools of the leading American institutions including Yale, Chicago, John Hopkins University, and Columbia University. In addition, this era led to the foundation of two academic journals; *International Organization* and *World Politics*, which became remarkably popular for the publishing of scholarly discussions and research work on the issues of security.

During this period, security studies had little interest in instrumental concepts of military power such as deterrence and nuclear armament. However, there were four central themes of security studies, especially during the period of 1945-1955. First, for states, national security was one of the primary goals. Second, states did not rely on military techniques to acquire national security but gave equal importance to non-military measures. Third, security was attained through careful consideration and in accordance with military norms and policies. Lastly, there was a lot more concern on scholarly work to discover inter-relations between national security, economic affairs, civil rights, and political procedures.<sup>21</sup>

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<sup>17</sup> W. T. R. Fox, 'A Middle Western Isolationist –Internationalist's Journey towards Relevance', In: Joseph Kruzeland and James N. Rosenau, (eds.), *Journeys Trough World Politics: Autobiographical Reflections of Thirty Four Academic Travelers*, (Lexington, Mass.: Lexington Books, 1989), p. 236.

<sup>18</sup> D. A. Baldwin, 'Security Studies and the End of the Cold War', *World Politics*, Volume 48, No. 1, 1995, p.120

<sup>19</sup> Ibid, p121.

<sup>20</sup> S. Tadjbakhsh and A. M. Chenoy, *Human Security: Concepts and Implications*, (London and New York: Routledge, 2007), pp, 24-25.

<sup>21</sup> D. A. Baldwin, 'Security Studies and the End of the Cold War', *World Politics*, op cit, p. 121.

Due to vast expansion and intensive research during 1955-65, this period is known as the golden age for security studies.<sup>22</sup> During this era, key concerns grew for the controlled use of nuclear arms as policy instruments and other emerging issues such as eruption of wars, while, previously scholars primarily focused on the conceptualisation of security, its fundamental goals and the means to achieve these goals.<sup>23</sup> Deterrence theory was an important development of this time. However, most of the scholarly work overly contributed to the use of military force as means of national security.<sup>24</sup>

During the next fifteen years, tremendous changes took place in the field of security studies as most of the intellectual work shifted the focus to peace studies.<sup>25</sup> One key reason was the involvement of American interests in the Vietnam War. Moreover, it potentially happened due to over emphasising on war as an integral part of national policies while moral and legal aspects of war were overlooked.<sup>26</sup> Another crucial factor was the engagement of the scholars into the policy formulation affairs during 1960s and 70s when they became more of policy makers than the researchers of security studies.

However, in the 1980s, declining interest in security studies was replenished by re-emergence of the Cold War frictions. This era has also been marked as the rebirth of security studies as ideas of the 1950s were recaptured with substantive themes of national security. Conventional topics such as the use and control of military forces, nuclear weaponry, and study of threat were prioritised once again. Research thrived as huge funds were invested and national security studies were replaced with fresh themes of broader understanding of international peace and security. Secondly, there was an urgent need to deal with post Cold War security challenges.<sup>27</sup>

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<sup>22</sup> S. M. Waltz, "The Renaissance of Security Studies", *International Studies Quarterly* 35, June 1991.

<sup>23</sup> R. Smoke, 'National Security Affairs', In: F. I. Greenstein and N. W. Polsby, (eds.), *Hand Book of Political Science*, Volume 8, *International Politics*, (Reading, Mass: Addison-Wesley, 1975, Also F. Kaplan, *Wizards of Armageddon*, (New York: Simon and Schuster, 1983).

<sup>24</sup> E. A. Kolodziej, 'What is Security and Security Studies? Lessons from the Cold War', 13 *Arms Control* (April 1992), p. 2.

<sup>25</sup> J. S. Nye and S. M. Lynn-Jones, 'International Security Studies: A Report on the Conference on the State of the Field', *International Security* 12, Spring 1988, p. 8.

<sup>26</sup> J. Nobel (ed.), *The Coming of Age of Peace Research: Studies in the Development of a Discipline* (Groningen, Netherlands: STYX Publications, 1991).

<sup>27</sup> D. A. Baldwin, 'Security Studies and the End of the Cold War', Review Article, *World Politics* 48.1, 1996, pp. 124.

### 2.3 Contents of the Post Cold War Security

The end of the Cold War meant the end of communism, end of the bipolar system and an end of the arms race. During the Cold War, security had much narrower meaning and it had exclusive focus around national security threatened by external military aggressions. From the early 1990s, the scholars of security studies raised questions when the classical approaches of traditional state-centric security failed to deal with the increased frequency of civil wars and intra-state conflicts, especially in the underdeveloped states. During this period, use of military force, the strategies for the use of weapons of mass destruction and conflicts between the super powers were some key areas of criticism.<sup>28</sup> The scholars further noted that in the post-Cold War era, domestic issues such as increased poverty, education, environmental destruction, low investment in infrastructure and production endangered security.<sup>29</sup>

Additionally, changing trends towards a globalised world gave rise to new international norms of economic and technological interdependence. Global trends helped to break the national barriers and eased the transfer of goods and services across borders. Consequently, due to the engagement of new actors, the international political system faced new challenges. These changes also limited the role of the state as a grantor of security.<sup>30</sup> At the same time security specialists argued that the state being the sole unit of analysis, left no room to analyse the threats posed by the state to its citizens.<sup>31</sup> Another key concern was the emptiness of the traditional state security approach as it recognised and legitimised only external threats to the national security. While in the changing state of security, it was noted that in cases of political oppression, the state itself posed biggest threat to the security of its citizens.<sup>32</sup>

More importantly, in the classical understanding, state security took precedence within regime security which was a concept taking roots in the provision of socio-economic security. Likewise, for regime legitimacy, key emphasis was to address primary concerns of individuals and societies, as regime security is highly dependent on well-protected societies who form the

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<sup>28</sup> J. S. Nye and S. M. Lynn Jones, 'International Security Studies: A report of a Conference on the State of the Field', *International Security* 12, op cit, pp. 5-27.

<sup>29</sup> P. G. Peterson, 'The Primacy of the Domestic Agenda' In: G. Allison and G. F. Treverton (eds.), *Rethinking America's Security: Beyond Cold War to New World Order*, (New York: Norton, 1992), In: D. A. Baldwin, 'Security Studies and the End of The Cold War', Review Article, *World Politics* 48.1, 1996, pp. 131.

<sup>30</sup> S. Tadjbakhsh and A. M. Chenoy, *Human Security: Concepts and Implications*, op cit, pp. 1-2.

<sup>31</sup> C. E. St Jean, 'The Changing Nature of "International Security": The Need for Integrated Definition', Norman Paterson School of International Affairs, Carleton University, *Paterson Review* – Volume 8 2007, pp. 22-34.

<sup>32</sup> D. A. Baldwin, 'Security Studies and the End of The Cold War', Review Article, *World Politics*, op cit.

backbone of the state security.<sup>33</sup> Thus, to deal with emerging issues of security, the contemporary security themes also involved the role of institutions, with security regimes to set norms and rules of conduct between states.

## **2.4 The Third World and Post Cold War Security Issues**

As discussed above, the end of the Cold War also marked a dramatic shift in the international politics, as growing incidents of intrastate conflicts became a central theme of interest for the policy makers, media, and the scholars of security studies. To deal with shifting patterns of security, it was argued that ‘the new security agenda was increasingly composed of more intangible and diffuse risks and challenges’.<sup>34</sup> This led to a profound attention of scholars to study the social factors for growing number of internal conflicts, posing numerous internal threats to national security. For instance, in many developing and underdeveloped countries, more often than not state security is threatened by internal issues such as weakening of the state, poor governance, collapse of governance system and dictatorship<sup>35</sup> where oppressive regimes pose the biggest threat to the security of its citizens.<sup>36</sup>

In this context, Holsti argues that today in most cases, state security is highly dependent on the security within the state itself.<sup>37</sup> Additionally, it was noticed that in majority of the decolonised states, the nations were having stronger ties with their ethnic, linguistic, cultural, and traditional identities than the state. This commonly leads to fights for the purpose of self-determination, secessions, or unification.<sup>38</sup> Thus, looking through this lens, discussions of broader contemporary security looked at security from distinct perspectives. As a result, governments, non-governmental organisations, international organisations, scholars, and policy makers endeavored to extend the sphere of the traditional state-centric mode of security.<sup>39</sup>

With an increased intensity of domestic conflicts and the involvement of international community in the intra-state conflicts, the United Nations Security Council also viewed security

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<sup>33</sup> R. Little, ‘International Regimes’ In: J. Baylis et al, *The Globalisation of World Politics*, (USA: Oxford University Press), 2011, pp. 294-308

<sup>34</sup> A. Hyde-Price, ‘Beware the Jabberwock!’ Security Studies in the 21<sup>st</sup> Century, In: H. Gartner, A. Hyde-Price and E. Reiter, *Europe’s New Security Challenges*, (eds.), (Boulder: Lynne Rienner Pub, 2001), pp. 27-54.

<sup>35</sup> C.E. St. Jean, ‘The Changing Nature of International Security’ op cit.

<sup>36</sup> D. A. Baldwin, ‘Security Studies and the End of The Cold War’, op cit.

<sup>37</sup> K. J. Holsti, *The State, War and the State of War*, (Cambridge: Cambridge University Press, 1996), p. 15.

<sup>38</sup> S. E. Sachs, *The Changing Definition of Security*, International Relations, Merton College, Oxford, 2003.

<sup>39</sup> D. A. Baldwin, ‘Security Studies and the End of The Cold War’ op cit.

in a broader framework.<sup>40</sup> On the other hand, there was growing emphasis on the linkages between security and economic development. During the 1970s, and 1980s, some basic needs and social development movements voiced for the poorer and most distressed people, where the primary stress was on the provision of fundamental needs to achieve basic living standards for all.<sup>41</sup> These movements especially provided a platform to underdeveloped nations such as Cuba, China, India, Costa Rica and Sri Lanka where the issues of long life expectancy at birth and lower levels of per capita income clearly indicated that incomes, though an important component of welfare cannot necessarily promote other essentials of human wellbeing.<sup>42</sup>

In a similar endeavor, UNICEF observed the impacts of structural adjustment programmes on children's health, nutrition, and education in the developing countries of Latin America and Sub Saharan Africa. This study recommended that alternative policies with a key focus on human welfare be articulated. Another study aimed at observing effects of world recession during the period of 1980-1985, concluded that economic decline had noticeable repercussions on human welfare. Therefore, it was suggested that welfare programmes must be part of national plans, even in the face of economic crisis.<sup>43</sup>

With growing concerns for human welfare, the 1990 Human Development Report introduced a new development paradigm. The report argued that development must have a core theme of peoples' security as well as wellbeing instead of territorial security. More importantly, the concept of human development was broadened as health, education and political freedoms were included as integral elements along with issues concerning economic development.<sup>44</sup> Following this, there was a plethora of novel suggestions to re-establish the boundaries of national security.<sup>45</sup> For instance, recommendations were made to re-direct the resources to fight the non-military threats, once spent to deal with military threats. Furthermore, there was a pressing need to attend to economic and social threats such as poverty reduction, provision of

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<sup>40</sup> C. E. St. Jean, 'The Changing Nature of International Security: The Need for an Integrated Definition', Norman Paterson School of International Affairs, Carleton University, *Paterson Review*, op cit, p. 22.

<sup>41</sup> S. Knowles, 'The Evolution of Basic Needs and Human Development', *Revisita Internazionale di EconomichiceCommerciali*, 60, (1993), pp, 513-542.

<sup>42</sup> S. B. Halstead, J. A. Walsh and K.S. Warren (eds.), *Good Health at Low Cost* (New York: Rockefeller Foundation, 1985).

<sup>43</sup> R. Jolly, A. Giovanni, F. Stewart (eds.), *Adjustment with a Human Face: Protecting the Vulnerable and Promoting Growth*, Volume 1, (New York: Oxford University Press, 1988).

<sup>44</sup> M. Ul Haq, *Reflections on Human Development*, (Oxford: Oxford University Press, 1995).

<sup>45</sup> J. J. Romm, *Defining National Security: The non-military Aspects* (New York: Council of Foreign Relations, 1993).

educational facilities, technological development, diplomacy, control of unlawful drugs and illegal migration, environmental conservation and so forth.<sup>46</sup>

Thus, the multi-dimensionality of security gave rise to many questions. One of the arising issues was that the new concerns would be listed under domestic or international security. Secondly, the proponents of the renewed concept of security argued on a new definition of security where external or internal sources of threats needed to be distinguished. Another question was how to set new goals of national security and the possible means to achieve them. More importantly, questions were raised on how to link domestic security with national security and especially, at the point where the field of national security means international security.<sup>47</sup>

## **2.5 Emergence of Human Security**

The genealogy of human security evolved due to growing concerns with narrower notion of national security and economic development during 1960-1980s. World Order Models Project (WOMP) first launched the idea of securitisation of human well-being during mid 1970s while eagerly aspiring for an equitable international system.<sup>48</sup> During the same period, the Club of Rome published a set of volumes entitled as *World Problematique*, which drew special attention on some common concerns for all states. These reports explicitly raised the issues of growing poverty, environmental degradation, resource depletion, untrustworthy institutions, growing urbanisation, unemployment, youth decay, loss of cultural and moral values, growing inflation, and other economic disabilities.<sup>49</sup>

In addition, it was observed that these issues exert pressure on individuals to look for options to fulfill their fundamental needs such as the provision of basic food and means of living. Likewise, people also worry about future wars, which may put their personal security at stake. Simultaneously, humans weigh their own and national powers to deal with such cataclysms.<sup>50</sup> During the 1980s, two independent commissions expressed similar views on the changing trends in the fields of security and development. The first report stressed the united action of the north and the south 'to overcome dangerous tensions and to produce significant and

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<sup>46</sup> G. Allison and G. F. Treverton (eds.), *Rethinking America's Security: Beyond Cold War to New World Order* (New York: Norton, 1992), p. 479.

<sup>47</sup> D. A. Baldwin, 'Security Studies and the End of the Cold War', op cit, p. 122.

<sup>48</sup> S. B. Mendowitz, (ed.), *On the Creation of the Just World Order*, (New York: Free Press, 1975).

<sup>49</sup> D. H. Meadows, D. L. Meadows, J. Randers and W. W. Behrens III, *The Limits to Growth* (New York: Universe Books, 1972), p. 10.

<sup>50</sup> *Ibid*, pp. 17-18.

useful results for nations and regions but, foremost, for human beings, in all parts of the world'.<sup>51</sup>The second report stressed on disarmament and national security issues. Additionally, it was argued that in the third world countries, economic disparities were the root causes of poverty and distress.<sup>52</sup>

In 1991, the Stockholm Initiative on Global Security and Governance called for the prioritisation of wider security challenges. The main themes of the initiative were to curb key threats to development, such as uncontrolled population growth, migration, and environmental destruction.<sup>53</sup> The reports further indicated that these concerns needed to be understood in the wider perspective of emerging global trends and the consequent impacts on humanity. After four years, the Commission on Global Governance published a report *Our Global Neighborhood* that specifically proposed to broaden the security referent and 'focus on the security of states to include the security of people and the security of the planet'.<sup>54</sup> Thus, it became obvious that conventional approaches to security and development, needed to address the sources of growing threats to individuals.

Looking into these issues, some ambitious attempts gave birth to the concept of human security with explicit emphasis on the physical and psychological well-being of individuals and societies.<sup>55</sup> The new security paradigm looked at security by answering three critical questions. Security of whom? Security from what? And, security by what means?<sup>56</sup> The United Nations Development Program, under the close association with Haq and Sen, laid the formal foundation of the human security concept. This unifying concern for security of humans raised alarm for the need to prioritize people-centered security. Firstly, UNDP elaborates on the fundamental requirements of food, health, education, independence, and livelihoods. Secondly, it raises concerns for peoples' dignity, their personal identity, safer environment, and security against

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<sup>51</sup> The Independent Commission on International Development Issues, *North-South: A program for Survival* (Cambridge MA: The MIT Press, 1980), p. 13.

<sup>52</sup> The Independent Commission on Disarmament and Security Issues, *Common Security: A Blueprint for Survival* (New York: Simon and Schuster, 1982), p. 172.

<sup>53</sup> *The Stockholm Initiative on Global Security and Governance*, 'Common Responsibility in the 1990's', A paper published by the Prime Minister's Office, Government of Sweden, Stockholm, 1991, pp.17-18.

<sup>54</sup> The Commission on Global Governance, *Our Global Neighborhood*, (New York: Oxford University Press, 1995), p. 338.

<sup>55</sup> S. Tadjbakhsh and A. M. Chenoy, *Human Security: Concepts and Implications*, op cit, pp. 12-13.

<sup>56</sup> Ibid.

gender and domestic violence.<sup>57</sup> At the same time, human security provides means and opportunities towards greater responsibility and self-respect. Human security is also a transition towards self-motivation.

**a) Security of whom?**

For Buzan, concept of security is incomplete without specification of the referent object.<sup>58</sup> Therefore, human security was introduced with a renewed apprehension of the concept of security, by essentially focusing on the welfare of individuals, communities, and nations living in all parts of the globe. Unlike the neo-realist conception, the newly built security replaces the referent object from the state or territory to people or individuals.<sup>59</sup> Similarly, Haq argues that human security is devised 'to reflect in the lives of people not in the weapons of a country'.<sup>60</sup> However, this does not repeal state security and that still contains the right to protect its citizens.<sup>61</sup>

Although individuals are given central role in the human security paradigm, but more importantly, the concept aims to create necessary conditions for a value system based on equality, nobility of character and unanimity. This means that key concerns of human security are to develop harmony and a just system for individuals and societies where they are independent and have freedom in all spheres of life. Concurrently, in international relations, the position of an individual changes from the tiniest object to an important subject as a whole. Fundamentally, he or she is an actor who is a primary unit of analysis and whose security is the most decisive issue for the entire system.<sup>62</sup>

**b) Security from what?**

Classical mode of security was premised on the values to safeguard territorial integrity, political autonomy, sovereignty and any kinds of external aggression.<sup>63</sup> With respect to this, occasionally, security was vitalised to establish economic relations, nuclear deterrence, and promotion of

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<sup>57</sup> United Nations Development Program (UNDP), *Human Development Report 1994*, Chapter 2, New Dimensions of Human Security, op cit, pp. 22-47.

<sup>58</sup> B. Buzan, *People, States and Fear: An Agenda for International Security Studies in the Post Cold War Era*, (Boulder, CO, 1991), p. 26.

<sup>59</sup> M. Ul Haq, *New Imperatives of Human Security*, RGICS Paper No. 17 (New Delhi: Rajiv Gandhi Institute for Contemporary Studies, 1994), p. 1.

<sup>60</sup> Ibid.

<sup>61</sup> S. Tadjbakhsh and A. M. Chenoy, *Human Security: Concepts and Implications*, op cit, p.13.

<sup>62</sup> Ibid.

<sup>63</sup> D. A. Baldwin, 'The Concept of Security', op cit, p. 13.

foreign policy interests<sup>64</sup> that generally discounted the security of individual citizens. On the contrary, physical and psychological well being, safety, and dignity are some core values of human security, linked to daily lives of ordinary individuals. The basic notion of human security is to add value to the lives of people; to concentrate on their fundamental rights, from their freedom of choices, their access to markets, provision of social opportunities, and above all, to the peaceful environment where they can live and breathe freely.<sup>65</sup>

As human security is a global challenge, therefore, these values must be achieved universally, for all men, women, and children living in any corner of the planet.<sup>66</sup> Other human security values include absence of varied kind of threats. These threats can be overt, caused by deliberate human actions such as drug dealing, human migration, and other types of organised crimes such as genocide and terrorism.<sup>67</sup> At the same time, there may be structural threats that would potentially be manifest due to skewed use of political, economic, and social means. Examples of structural threats are political oppression, inequity in education facilities, gap between the rich and the poor, corruption and high unemployment rate etc.<sup>68</sup>

Few threats to human security remain local or regional while several threats to human security cross territorial borders and become internationalised. For instance, environmental threats such as pollution of the air, climate change due to global warming, mass deforestation, and land degradation are affecting the global climatic conditions triggering severe flash floods and frequent drought cycles. Similarly, human security threats can be felt objectively such as less income, or acute shortages of food, lack of health facilities and poor quality education. Subjective threat elements include the fear of criminal acts, violence triggering a war, social, political, or economic injustice, and environmental degradation. These threats arise directly, organised by human actions, or occasionally may even take an indirect root.<sup>69</sup> The *1994 Human Development Report* identifies seven dimensions of human security; economic, food, health, political, personal, community, and environmental.<sup>70</sup>

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<sup>64</sup> H. Brown, *Thinking about National Security: Defense and Foreign Policy in a Dangerous World*, (Boulder, CO, 1983), p. 4.

<sup>65</sup> UNDP, *Human Development Report 1994*, op cit, p. 23.

<sup>66</sup> M. Ul Haq, op cit.

<sup>67</sup> C. Gesteyger, 'Old and New Dimensions of International Security', In: K. R. Spillmann and A. Wenger, *Towards the Twenty First Century*, (Bern: Peter Lang, 2000), pp. 69-108.

<sup>68</sup> S. Tadjbakhsh and A. M. Chenoy, *Human Security: Concepts and Implications*, op cit, p. 14.

<sup>69</sup> Ibid.

<sup>70</sup> *Human Development Report 1994*, Chapter 2, 'New Dimensions of Human Security', op cit

## 1) Economic Security

In the context of human security, economic security means that all people have stable financial income resources to maintain present and future living standards.<sup>71</sup> According to International Labor Organisation (ILO), economic security is built on seven key pillars; income security, representation security, job security, labor market security, work security, skill reproduction security and employment security. Income security means that people are provided with sufficient opportunities and reliable resources to generate income for the sustenance of their daily needs.<sup>72</sup>

Representation security is the assurance of individual and collective rights in the form of laws or institutions where they can represent themselves. Work and employment security assures that peoples' employments are secure without any fear of future redundancy. Additionally, the workers have their rights relying on a fair system to redress incase of any unjust treatment. Alternately, in case of self-employment, they need to have opportunities to earn enough without any fear of financial loss or business failure. Key threats to economic security are recession in the job market, poverty, lack of social safety networks, conflicts, and poor governance.<sup>73</sup>

Economic security has significantly been challenged by the recurring financial crisis especially in Europe and the US. Due to spillover effects, there were massive job cuts and income reductions in other parts of the globe. An ILO report indicated that by the end of 2012, there were 197 million jobless people globally. Study reveals that, since 2007, 39 million people were left out from the labor market due to unfeasible job prospects. The report further predicts that during 2013-14, the global rate of unemployment would potentially rise and as a result, the number of unemployed will increase by 5.1 million in 2013 and another 13 million will add during 2014. A quarter of these unemployed people will be from industrialised economies while the rest from the South and East Asian and Sub-Saharan African countries.

The compounding results of rising unemployment are growing inequalities between the poor and the rich, migration, psychological and mental health issues, homelessness and rise of conflicts.<sup>74</sup> Women, disabled and the minority groups are among the most marginalized

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<sup>71</sup>Ibid, p. 25.

<sup>72</sup> International Labor Organisation, *ILO Socio-economic Security Programme*, Retrieved online, 19 April 2012.

<sup>73</sup> Socio-Economic Security Programme, *Economic Security for a better world*, International Labor Organisation, Geneva, 2004.

<sup>74</sup> *Global Employment Trends 2013: Recovering from a Second Job Dips*, International Labor Organization, Geneva, 22 January 2013, p. 8.

concerning their economic security and wage allocation. With special education, these groups need skills and training to secure jobs. However, in most of the underdeveloped world, there are fewer facilities for specialised training especially in cases of the disabilities. With no incomes and least social welfare services, they are pushed towards severe poverty. Likewise, number of global youth (ages between 5-22 years) constitutes for 1.2 billion globally, which is nearly 18 per cent of the total world population.<sup>75</sup> According to an ILO survey, worldwide and particularly in Africa, there is high rate of youth unemployment. As a result, they make up for the 43.7 per cent of the total unemployed people.<sup>76</sup> In Sub-Saharan Africa, the situation is more precarious as the number of unemployed youth constitute for the 60 per cent of the total unemployed population and 72 per cent of the total youth lives below the poverty line who rely on less than two dollars a day.<sup>77</sup>

In the developing and underdeveloped world, and especially in Africa, a majority of the unemployed rely on primary economic activities such as agriculture, grazing, fishing, forestry, mining and drilling. Likewise, jobs in the manufacturing sector have gradually been taken over by the services industry. Due to small size of domestic and regional markets for their local commercial products, these jobs are neither secure nor generate adequate incomes compared to the manufacturing sector. Secondly, in the international market, there is no stability of demand for these products. Industrialised countries make their economic policies in a way that leave poorer countries least advantaged hence economically insecure.

## **2) Food Security**

Food security exists when ‘all the people have physical and economic access to sufficient, safe, and nutritious food that fulfills the dietary needs and food preferences for living an active and healthy life’.<sup>78</sup> According to World Health Organisation, food security is built on three main pillars; availability, access and use of food.<sup>79</sup> Food and Agriculture Organisation (FAO) adds that consistency of the above three aspects over time is also important for food security.<sup>80</sup> All people

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<sup>75</sup> ‘Global Employment Trends for Youth 2006’, International Labor Organisation, Geneva, 2006.

<sup>76</sup> ‘African Employment Trends 2007’, International Labor Organisation (ILO), Geneva, 2007.

<sup>77</sup> *Youth and Employment in Africa: The Potential, the Problem, the Promise*, Africa Development Indicators 2007/2008, The World Bank, Washington D. C., 2009, p. 1.

<sup>78</sup> *World Food Summit 1996*, World Food Programme, Geneva, 1996.

<sup>79</sup> *Food Security*, Food and Agricultural Organisation, FAO Agricultural and Development Division June 2006.

<sup>80</sup> Ibid.

should have an equal access to food by purchasing it or growing it or through an organised public distribution system.<sup>81</sup>

Food security forms the basis for survival while food insecurity causes malnutrition, hunger, famine and multiple health problems. According to Commission on Human Security, key problem of food insecurity is how to address the issue of maintaining the continuity of sufficient food supply at national level and how to reach those people who are in the greatest need.<sup>82</sup> Presently global food productions amounts to 4 billion metric tons per year, however, nearly 30-50 per cent of it is wasted due to poor methods of harvesting, storage, and transport and distribution.<sup>83</sup>

In the year 2000, international community committed itself to eradicate hunger, poverty, and disease by setting Millennium Development Goals (MDGs). However, the number of hungry and undernourished people in the world is still unchanged. FAO identifies that 870 million people stay hungry on daily basis. According to an estimate, 850 million of these belong to the developing countries. Food security is especially problematic in the arid and semi arid regions in the Horn of Africa where pastoral communities rely on the livestock keeping. These communities have fewer livelihood options due to persistent droughts, cattle rustlings, inter and intra-community conflicts, absence of social support and poor infrastructure which often compound and lead to undernourishment and famine.<sup>84</sup>

Greater poverty and income insecurity adds to food insecurity. Therefore, at times, availability of food is not a problem but due to fewer or no income, people cannot afford to buy nutritious food. Lower incomes create serious problems for food security, especially in the developing and underdeveloped states although there is plenty of food available in the market.<sup>85</sup> For instance, India is self-sufficient in food production; however, there is high percentage of malnourished children. Reasons can be chronic poverty, uneven distribution and least social security cushioning.<sup>86</sup> Apart from income, pandemics like HIV/AIDS, wars,

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<sup>81</sup> Human Development Report 1994, UNDP, op cit.

<sup>82</sup> Commission on Human Security, *Human Security Now*, New York: 2003, p. 14.

<sup>83</sup> *Global Food, Waste Not, want Not*, Institute of Mechanical Engineers, London, January 2013.

<sup>84</sup> L. Cheruiyot and K. Sabala, 'Human Security and the Control of Small Arms' In: M. Mwangi, (ed.), *Human Security: Setting the Agenda for the Horn of Africa*, (Nairobi: Africa Peace Forum, 2008), p. 81.

<sup>85</sup> *Human Security Now*, op cit, p. 14.

<sup>86</sup> *Food Security in Developing Countries*, Parliamentary Office of Science and Technology (POSTnote),UK, December 2006, No. 274, p. 2.

environmental degradation, over-reliance on agriculture, natural disasters, poor policies, and bad governance are some common factors that contribute to food insecurity.

In 2010, the total number of undernourished was 925 million globally where majority belonged to Sub-Saharan Africa (SSA), Asia and the Pacific.<sup>87</sup> FAO 2012 report suggests that globally the situation of food security is improving as the number of undernourished people has declined in most of the severely affected regions like in South-Eastern Asia, Eastern Asia, and Latin America. However, trend of growing hunger and malnutrition is still on the increase in the SSA, Northern Africa, Western, and South Asia.<sup>88</sup> Underlying reasons include less agricultural productivity, rapid growth in the African population, poor infrastructure, and road net work, lack of functional markets and trade barriers.<sup>89</sup>

### **3) Health Security**

Health security assures the minimum protection from diseases, injuries and other unhealthy behaviors and lifestyles. In addition, health security provides an all time health care and family planning services at an affordable cost. Good health is both indispensable and vital to achieving human security because the ‘very heart of security is protecting human lives’.<sup>90</sup> Good health means an absence of any mental, physical, and social illness as it takes an individual towards development and prosperity.

Generally, global health conditions have been improving for the past few decades. However, poor people especially living in the rural and underdeveloped areas are still at greater risk of health issues. Historically, every year, millions of deaths occurred due to infectious and parasitic diseases such as severe respiratory infections, diarrhea, and tuberculosis. However, today cancer, spread of HIV/AIDS, and various lifestyles related chronic diseases threaten most of the population living in the low and middle-income countries.

Women and children are more vulnerable to health risks and have a higher mortality rates.<sup>91</sup> Women living in the developing and underdeveloped countries experience relatively greater issues related to complications in childbirth and pregnancy. For instance, maternal deaths are closely associated to poor health during pregnancy, lack of antenatal and post natal facilities.

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<sup>87</sup>*The State of Food Security in the World 2012*. Economic Growth is Necessary but not sufficient to accelerate Reduction of Hunger and Malnutrition, (Rome: FAO, 2012), p. 3.

<sup>88</sup> Ibid, pp. 8-9.

<sup>89</sup> *Food Security in Developing Countries*, Parliamentary Office of Science and Technology, op cit, pp. 3-4.

<sup>90</sup> *Human Security Now: Protecting and Empowering People*, Commission on Human Security, op cit, p. 96.

<sup>91</sup> World Bank, *World Development Indicators 2006*, (New York: WB, 2006).

A study reveals that incidents of 8 million stillbirths and neonatal deaths happen every year. In addition, annually, 50 million women are exposed to various maternal health issues.<sup>92</sup> Due to constrained incomes, majority of women can neither afford expenses of medical care nor are they provided with adequate public health coverage by the social services.<sup>93</sup>

HIV/AIDS is another grave health security threat especially in Africa. The continent has 11 per cent of the world's population with 60 per cent living with AIDS. Key factors include lack of adequate access to newly developed health facilities, modern drugs, immunisation services, availability of the medical staff and medical equipment. An outbreak of Ebola virus is another arising human security threat worldwide but especially in West Africa. It has led to hundreds of deaths within a short period of few weeks. Its causes are still under investigation, however, among other factors, it has been associated with poverty, growing food insecurity, increased deforestation, and climate change.<sup>94</sup> Lack of safe drinking water and hygiene is another root cause of health insecurity. For instance, 40 per cent of the African population cannot get access to safe drinking water and basic hygiene facilities.<sup>95</sup>

#### **4) Environmental Security**

Environmental security entails protection of people from all types of natural and manmade environmental hazards.<sup>96</sup> Human survival relies on clean and healthy environment. However, factors like industrial development, intensive use of fossil fuels and population growth have grave impacts on the natural environment of the planet earth. Environmental factors such as, degradation of ecosystems, air, water and sea pollution, environmental degradation, resource scarcity, desertification, deforestation, global warming, depletion of the ozone layer and climate change additionally threaten environmental security.<sup>97</sup> Considering these issues, during 1980s, concept of environmental security initiated major discussions among policy makers, politicians, scholars, and international community.<sup>98</sup>

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<sup>92</sup> A. Bener et al., 'Maternal Complications and Neonatal Outcome in Arab Women of a Fast Developing Country', *Journal of Family and Community Medicine*, Vol. 20, Issue 1, April 2013, p. 27.

<sup>93</sup> *Human Development Report 1994*, 'New Dimensions of Human Security', op cit, pp. 27-28.

<sup>94</sup> E. Wolfson, 'Ebola and Climate Change: Are Humans Responsible for the Severity of the Current Outbreak?' *News Week*, 12 August 2014, Retrieved online, August 2014.

<sup>95</sup> *World Development Indicators 2006*, World Bank, op cit.

<sup>96</sup> *Human Development Report 1994*, 'New Dimensions of Human Security' op cit, pp. 29-30.

<sup>97</sup> Ibid, pp. 28-29.

<sup>98</sup> R. Ullman, "Redefining Security", *International Security* 8, No. 1, 1983, pp. 129-53.

Due to the growing demand, clean water scarcity is one of the major environmental threats faced by majority of people living in the developing and developed countries. A World Bank report suggests that 700 million people in 43 countries are affected by severe water scarcity.<sup>99</sup> More than one billion people are suffering from the deficiency of clean drinking water supply due to lack of sanitation facilities. In addition, water security is vital for the upkeep of food security, health security, economic security, and energy security.<sup>100</sup> For instance, due to severe drought during 2005-06 in Australia, water scarcity in the continent contributed to 1 per cent loss in the GDP of the country. Likewise, countries in the Sub-Saharan Africa are losing 5 per cent of their annual GDP due to water stress and lack of sanitation.<sup>101</sup> Water scarcity also poses major threat to peace and stability of many regions. For instance, the Nile water has been a constant source of conflict between the riparian states.<sup>102</sup>

Changes in the land use and land cover are having detrimental effects on environmental security. According to Intergovernmental Panel on Climate Change (IPCC), during 1970-2004, emissions of the greenhouse gases (GHGs) such as carbon dioxide, methane, and nitrous oxide rose by 70 per cent. These GHGs are causing global warming and ozone depletion as each year thousands of tons of harmful pollutants are produced due to an overuse of fossil fuels in industries, transportation, and increased use of fertilizers for agricultural growth.<sup>103</sup> For instance, during 2010, global carbon dioxide emissions sharply rose by 4.6 per cent, mainly due to greater demand for higher growth in the developing states of Russia, Asia, and Latin America.<sup>104</sup>

Growing pollution in the air damages the natural environment and deteriorates human and animal health. It is also damaging to plant health as it causes acid rain and slows the plant growth. For the purposes of agricultural growth and other developmental projects, millions of acres of forestland are cleared every year. Additionally, over grazing and poor conservation techniques are turning arid and semi arid land into huge deserts. For instance, southern and

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<sup>99</sup> *Human Development Report 2006*, Beyond Scarcity-Power, Poverty and the Global water Crisis, United Nations Development Programme, (New York: Oxford University Press, 2006), p. 33.

<sup>100</sup> World Economic Forum 2009, *Global Water Security – An Engineering Perspective*, (London: The Royal Academy of Engineering, 2010), p. 10.

<sup>101</sup> *Ibid*, p. 18.

<sup>102</sup> S. Bahta, 'Equitable Resource Management and Regional Security in the Horn of Africa', In: M. Mwangi (ed.), *Human Security: Setting the Agenda for the Horn of Africa*, (Nairobi: Africa Peace Forum, 2008), p. 167.

<sup>103</sup> B. Metz et al. (eds.), *Climate Change 2007: Mitigation of Climate Change*, (Cambridge: Cambridge University Press, 2007), p. 27.

<sup>104</sup> *Carbon Dioxide Emissions From Fuel Combustion Highlights*, International Energy Agency, 2012, pp. 9-10.

western Africa, and the Sahel are becoming drier and may become part of the dry lands bordering the deserts.<sup>105</sup>

These environmental changes are contributing to increased human migration, as people have to move due to dwindling resources for the upkeep of life. Especially in the case of pastoral communities, scarcity of environmental resources, coupled with weak ecosystem, poor coping techniques and reduced livestock productivity increases their vulnerability.<sup>106</sup>

## **5) Personal Security**

The aim of personal security is to protect humans from physical and psychological violence. Violence can either erupt suddenly from inside the state in the form of physical torture organised by security agencies such as police or military forces. Other critical threats to personal security can be an onset of inter or intra-state war and conflicts. Rising violent crimes such as unlawful killing, robberies, piracy attacks, and growing terrorism are some major risks to today's societies. In addition, domestic violence, gender discrimination, physical abuse, rape, hostage taking, and unpaid or underpaid labor are major threats to the personal security of women and children.<sup>107</sup>

No society is free from social and economic impacts of illicit drug trade. Drugs destroy human health and wealth simultaneously. It is one of the greatest threats to the personal security of people. According to United Nations Office on Drugs and Crime (UNODC) 2005 World Drug Report, the value of global drug trade amounts to 320 billion US dollars.<sup>108</sup> Profits from drug trade are channeled into two streams. First, in the perpetuation of other organised crimes like murders, human trafficking, arms trade and forced prostitution which helps to breed the criminals who organise and develop the network of other criminals. Second, the drug trafficking money is used to bribe the corrupt state officials to violate the laws in their favor. At other times, drug profits are invested in the campaigns for the future electoral candidates so that criminals can become part of the state apparatus to continue the vicious cycle of organised crimes.<sup>109</sup>

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<sup>105</sup> W. Maathai, *The Challenge for Africa*, (London: William Heinemann, 2009), p. 251.

<sup>106</sup> L. Cheruiyot and K. Sabala, 'Human Security and the Control of Small Arms' In: M. Mwagiru (ed.), *Human Security: Setting the Agenda for the Horn of Africa*, op cit, p. 83.

<sup>107</sup> *Human Development Report 2006*, UNDP, op cit, pp. 30-32.

<sup>108</sup> 'World Drug Report 2005', United Nations Office on Drugs and Crime (UNODC), 2005, p. 2.

<sup>109</sup> J. Haken, *Transnational Crime in the Developing World*, Global Financial Integrity, February 2011, p. 6.

Individuals in all social setups are common targets of violent crimes such as organised murder or homicide. In 2010, there were 468,000 cases of homicide internationally.<sup>110</sup> In a recent study, UNODC reveals that during 2010, most incidents of homicide took place in Africa where murder rate was 36 per cent of the global total value. In other regions like the US, Asia, Europe, and the Oceania, rate of homicide was 31, 27, 5, and 1 per cent respectively. Since 1995, the occurrence of homicide has relatively decreased in Asia, Europe, and the US while there is an increasing trend in South and Central America and the Caribbean. In the US, most of these cases are activities of organised criminal groups and street gangs.<sup>111</sup> In Europe, nearly one third of the cases involve murders of women, which usually take place inside the houses by their intimate partners or ex-husbands.<sup>112</sup>

Key factor for the growing crime rate is the availability of small arms and light weapons. In many cases, state and its security apparatus poses the greatest threat to the peoples' personal security. For instance, since March 2011, the Syrian government has been openly involved in the arbitrary arrests, detentions, unlawful killings, and physical torture of the ordinary citizens who were protesting for their political rights.<sup>113</sup> Likewise, in Kenya's 2007-08 elections, armed gangs and the police killed more than 1500 people.

## **6) Community Security**

Cultures and traditions provide means to people by which they express themselves. Through culture, people can confidently portray their inherent creative and productive abilities. Traditional values also give individuals their characteristic identity, self-respect, strength to grow physically and spiritually. Cultural and social norms provide harmony to bind together families and communities. Without culture, a community loses its identity, self-fulfillment and becomes vulnerable and insecure.<sup>114</sup>

Community security aims at the safety of people belonging diverse traditional and cultural values. In addition, this protects people from racial and ethnic based violence. During war times, families and communities are divided as men usually go to the battlefields while women and children are left alone and displaced for security concerns. As a result, the traditional

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<sup>110</sup> *Global Study on Homicide 2010*, UNODC, 2010.

<sup>111</sup> *Global Study on Homicide 2011*, UNODC, Manila, 2011, pp. 9-10.

<sup>112</sup> *Ibid*, p. 13.

<sup>113</sup> *Torture Archipelago: Arbitrary Arrests, Torture, and Enforced Disappearance in Syria's Underground Prisons since March 2011*, (US: Human Rights Watch, 2012).

<sup>114</sup> W. Maathai, *The Challenge for Africa*, op cit, pp. 160-183.

system of societal authority and cohesion erodes. In many African and Asian societies, western ways of life are replacing the traditional value systems. Authority of the elders and rules of customary laws are slowly elapsing. For example, in cases of pastoral conflicts in Africa, traditional institutions and norms of conduct are usually ignored, which is leading to the breakdown of community security.<sup>115</sup>

In several cases, ethnic hatred has led to mass atrocities in order to wipe out one ethnic group. For instance, in the case of Rwandese genocide during 1994, members of Hutu group killed approximately 20 per cent of the country's population, mostly belonging to the Tutsi origin. During 1980s, in former Yugoslavia, ethnic cleansing led to the killing of more than 40,000 innocent lives while 40,000 women were raped.<sup>116</sup> These incidents were the culmination of longstanding hatred, ethnic tensions and for the control of power as one group had perception that the opposing group was more dominating and trying to enslave them. Community security relieves societies from suppressive traditional practices especially against gender based injustices. In addition, community security rids any discrimination against minority groups such as refugees.<sup>117</sup>

In the name of culture, girls and women have been victims of the practice of female genital mutilation in many Arab and African communities. Likewise, in few parts of the globe, due to preference of male child over female, there is high rate of gender imbalance especially in India and China. As a result, there are cohorts of men who have reached their marriage age but cannot find suitable female partners. Therefore, increased prevalence of HIV/Aids, growing crime rate, as well as rape and antisocial behavior are few of the inter-related issues that arise due to lack of community security.<sup>118</sup> However, such traditional practices are strongly being opposed to protect women from the brutality of such acts. Based on community security, today's women are encouraged to get modern education and raise voices for their fundamental rights and freedoms.<sup>119</sup>

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<sup>115</sup> L. Cheruiyot and K. Sabala, 'Human Security and the Control of Small Arms' In: M. Mwagiru (ed.), *Human Security: Setting the Agenda for the Horn of Africa*, op cit, p. 81.

<sup>116</sup> 'Dimensions of Human Security', Human Development Report 1994, UNDP, op cit.

<sup>117</sup> S. Tadjbakhsh and A. M. Chenoy, *Human Security: Concepts and Implications*, op cit, p. 16.

<sup>118</sup> Z. Jin et al., *Gender Imbalance, Involuntary Bachelors and Community Security: Evidence from a Survey of Hundreds of Villages in Rural China*, Institute for Population and Development Studies, School of Public Policy and Administration, Xi'an Jiaotong University, Xi'an, China, 2012, p. 3.

<sup>119</sup> *Eliminating Female Genital Mutilation: An Interagency Statement*, World Health Organization, Geneva, 2008

## 7) Political Security

The foremost goal of political security is to raise the respect for the basic human rights. Political security guarantees that people are free from any kind of state or political repression. It aims to protect individuals from dictatorship, military rule, politically instigated violence, torture, political detention, imprisonment, or any kind of inhumane treatment. Political security encourages the establishment of democratic institutions where people can enjoy their basic human rights to use their ideas and information.<sup>120</sup> Therefore, advancement of political rights is necessary for sustainable economic development, equitable wealth distribution, and social order. Most states have ratified the Universal Declaration of Human Rights, which aims at safeguarding the fundamental human rights such as the observance of civil and political rights, economic, cultural, and social rights. However, incidents of brutalities and atrocities in the civil wars, dictatorship, growing violence, and armed conflicts are occurring more than ever before.

The majority of the states in Sub-Saharan Africa are in the situation of apathy and extreme misery. Across these regions, based on ethnicity, religion, gender, or clan many groups are denied from active political participation. Very often, they are targets of state driven threats, and violence. However, at times, institutions such as the judicial system, prisons, electoral process, or civil society play key roles to rid the violation of civil and political rights.<sup>121</sup> For instance, democracy still has not been able to take roots in many African states. The blame partially goes to the colonial legacy that entirely ignored one region while centralising government in the other, such as in Sudan. This has led to political fragmentation, clanism, years of corruption, political unrest, and massive killings.<sup>122</sup>

Political instability is the major contributor to human rights violations as can be witnessed in the case of many ongoing conflicts in the world. In this context, former Secretary General of the United Nations Boutros Ghali stated that ‘not a day goes by without scenes of warfare or famine, arbitrary arrest, torture, rape, murder, expulsion, transfer of population and ethnic cleansing. Not a day goes by without reports of attacks on the most fundamental

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<sup>120</sup> *Human Development Report 1994*, Chapter 2, ‘New Dimensions of Human Security’, op cit, pp. 33-34.

<sup>121</sup> A. Hamilton, ‘Political oppression in Sub-Saharan Africa’, *Topical Review Digest: Human Rights in Sub-Saharan Africa*, p.39, Retrieved online 12 May 2013.

<sup>122</sup> A. G. M. Ahmed and E. H. El Nagar Samia, “When Political Parties Fail: Sudan’s Democratic Conundrum” In: *African Political Parties: Evolution, Institutionalism and Governance*, Edited by M. A. M. Salih, (London: Pluto Press, 2003).

freedoms'.<sup>123</sup> The role of police and military intervention has been cited prominent as they are being used to perpetrate violence against the civilians. The UNDP 1994 report clearly indicates that states having higher military expenditures than education and health are usually in serious trouble<sup>124</sup> as the world has witnessed in Iraq, Afghanistan, Somalia, and Syria.

**c) Security by what means?**

In the human security approach, the use of force is not an adequate instrument to deal with threats. However, sanctions can provide an alternate of force<sup>125</sup> under the scrutiny of an international body. Therefore, human development and institutional setup are two necessary means of human security. Collaboration and association among states, NGOs and the civil society is an integral element of human security that can channel various ways to address the threats and enforce appropriate policies and norms.<sup>126</sup>

Human security emerged with various optimistic ideas and policy prescriptions. Haq proposed five steps to build the basis of new 'human world order'.<sup>127</sup> First step is to introduce a milieu of security and development that can raise the value of human lives. It has been stressed that the means of economic growth could be there but must be sustainably utilised for growing demands of present and future generations. The focus of economic growth must be to eradicate poverty. Therefore, the distribution of development opportunities be based on efficiency, sustainability, justice, and equality so that people can explore their capabilities. Thus, one significant purpose of development should be to give people open choices. However, to acquire this, it is obligatory to introduce reforms for the just allocation of resources such as lands and credits, access to free markets and favorable environments for employment generation.

Second step is to take a serious move to cut down expenditures on strengthening the armed forces. In particular, the developing and third world countries must reduce their budget allocation of billions of dollars on the imports of arms to reinforce the military bases. Instead, the new focus should be on the development of research, education, and health plans for more

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<sup>123</sup> B. Boutros-Ghali, *An Agenda for Peace*, (New York: United Nations, 1993), In: A. Nkabahona, 'Improving Human Security in the Horn of Africa through the Observance of Human Rights', In: M. Mwangi (ed.), *Human Security: Setting the Agenda for the Horn of Africa*, op cit, p. 32.

<sup>124</sup> Human Development Report 1994, p cit, p. 33.

<sup>125</sup> *Human Development in South Asia 1999: The Crisis of Governance*, Human Development Centre, (Karachi: Oxford University Press, 1999).

<sup>126</sup> K. Bajpai, *Human Security: Concept and Measurement*, Kroc Institute Occasional Paper # 19:OP:1, August 2000, pp. 29-31.

<sup>127</sup> M. Ul Haq, *New Imperatives of Human Security*, op cit, p. 5.

productive individuals. There should be a new collaboration among developed and developing nations to make this move from dependency syndrome towards independence and self-sustained societies.<sup>128</sup>

Third step should lead towards the re-establishment of north-south cooperation based on equality and mutual benefits, especially in the international markets, facilitation of aid and lending and borrowing policies. Rich or poor, all countries should benefit equally from the emerging trends of globalisation. The fourth step should focus on changing the global governance where the international financial institutions need to introduce reforms. Fifth step should facilitate the formation of a global civil society so that governments are accountable for their activities.<sup>129</sup>

In traditional models of security, the state had a sole responsibility to administer its peoples' security. Simultaneously, in case of any aggression, a sovereign state had the supremacy to use all kind of force within its political boundaries. However, in today's world, having an oppressive ruler, or in cases of state failure, the concept of state-centered security can no longer be trusted.<sup>130</sup> Research indicates that during the 20th century, 'far more people have died at the hands of their own governments than have been killed by foreign enemies'.<sup>131</sup> Therefore, human security advances the concept of Responsibility to Protect (RtP) that authorises the International Commission on Intervention and State Responsibility (ICISS) to intervene in cases of gross human rights violations. This concept is only applicable when states are no more able to protect the lives of citizens, therefore, the international community is responsible to respond and interfere to 'prevent, to react in the event that prevention failed, and to rebuild societies where protection had failed'.<sup>132</sup>

Thus, human security promotes the security of individuals as well as territories. This leads to the assumption that in the human security perspective, the status of an individual is raised from an ordinary citizen to an important actor of international relations whose security lies in the security of international system and vice versa. Any interference in the security of individuals can disturb security of the whole system, as due to interconnectedness, any small

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<sup>128</sup> Ibid, p. 2.

<sup>129</sup> Ibid, pp, 2-8.

<sup>130</sup> Ibid, p. 18.

<sup>131</sup> A. Mack, 'A Signifier of Shared Values', In: P. Burgess and T. Owen (eds.), What is Human Security? Comments by 21 authors, *Security Dialogue*, 35, September 2004, pp. 366-7.

<sup>132</sup> N. S. MacFarlane, and Y. F. Khong, *Human Security and the UN: A Critical History*, (Bloomington, 2006), p. 178.

threat to his/her security may travel to the entire system. Hence, in the human security approach, an individual plays the fundamental role of an envoy whose efforts can add up to fabricate these threats, or alternatively, he can help to achieve the goals in mitigating them.<sup>133</sup>

## 2.6 Contending Debates on Human Security

Human security provides an opportunity to a state to elevate its status in the international realm.<sup>134</sup> Therefore, since the official launch of human security, many states and international organisations have adopted the concept as an integral part of their foreign policy mandates. Paris states that human security has worked like a glue to hold the association of ‘middle power’ states, NGOs, and developing agencies to harmonise their policies towards the achievement of goals aimed at international development.<sup>135</sup> At the same time, human security has been adopted to enhance governments’ diplomatic relations to pursue their national interests as it has been observed in the cases of Canada, Japan, and Norway.

These states adopted the concept of human security according to their needs and in coordination with their national goals. For example, in Canada and some other middle powers’ approach, human security ‘includes security against economic deprivation, an acceptable quality of life, and a guarantee of fundamental rights’.<sup>136</sup> Japanese human security approach lies in ‘Asian values’ and ‘freedom from wants’. For the Japanese former Prime Minister Keizo Obuchi, key strategy to build human security lies in ‘seizing all the menaces that threaten the survival, daily life, and dignity of human beings and strengthening efforts to confront threats’.<sup>137</sup>

Japan launched a Commission on Human Security and took a leading role for initiating funding for human security. In particular, Japan’s grant of \$170 million for the Human Security Trust Fund has strengthened its position as an economic power and a principal donor for the Overseas Development Assistance (ODA).<sup>138</sup> In the 1997 Asian economic crisis, Japan played a significant role by initiating a long-term agenda that was fashioned within the values of human security concept.

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<sup>133</sup> J. Nef, *Human Security and Mutual Vulnerability, The Global Political Economy of Development and Underdevelopment*, 2<sup>nd</sup> Edition, Canada: International Research Development Centre, 1999.

<sup>134</sup> A. Suhrke, ‘Human Security and the Interest of States’, *Security Dialogue*, 30(3), 1999, p. 268.

<sup>135</sup> R. Paris, ‘Human Security: Paradigm Shift or Hot Air?’ *International Security*, 26(2) (Fall 2001), p. 88.

<sup>136</sup> L. Axworthy, “Canada and Human Security,” An Address by the Canadian Foreign Minister to the 51<sup>st</sup> UN General Assembly on behalf of his Government, 1996, p. 184.

<sup>137</sup> K. Obuchi, ‘Opening remarks by Prime Minister Obuchi at the Intellectual Dialogue on Building Asia’s Tomorrow’, Tokyo, 2 December 1998.

<sup>138</sup> S. Tadjbakhsh and A. M. Chenoy, *Human Security: Concepts and Implications*, op cit. p. 29.

During this period, Japan's special role helped the region to deal with the economic crisis. Due to these ambitious activities, Japanese human security has gained great success within the Japanese public.<sup>139</sup> However, at the same time, Japan has faced criticism due to its foreign aid policies that have greatly relied on mutual benefits and a way to gain credibility as a greater economic power. In addition, since North Korea's involvement in the nuclear activities, Japan's old-fashioned security interests have also grown which contradict its human security based foreign policy. Thus, Japanese human security does not completely replace the old-fashioned security; however, it goes hand in hand with both.<sup>140</sup>

The underlying focus of human security is the plight of the developing and underdeveloped states. Unfortunately, most of the southern countries have not been able to adopt human security. There are concerns that the human security concept might be used by powerful countries to enforce their western values upon the poor nations. For instance, Libyan former President Muammar Ghaddafi argued that the integration of human security into the AU's agenda is to advocate traditional western culture.<sup>141</sup> Secondly, southern nations perceive human security as a threat that can be used to invade states as an excuse of humanitarian purpose while violating state sovereignty.<sup>142</sup> Thirdly, some countries also foresee that the donors of financial aid would maltreat the human security paradigm and development funds while the concept might provide new criteria for the distribution of aid.

Lastly, the concept of Responsibility to Protect (RtP) poses added fear to the south, as they perceive that human security is perilous and imperialistic policy. However, in the 2005 World Summit, three key pillars of the RtP were recognised to set a criterion for the member states of the United Nations. These included to explicitly recognise the responsibility of the sovereign states to protect their citizens; to assure the building up of institutions to prevent gross killings or occurrence of genocide; to affirm that the Security Council holds an absolute authority to intervene in extreme circumstances.<sup>143</sup> Again, during 2009, when the implementation of RtP

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<sup>139</sup> R. Yeo, 'Wither Human Security? An Argument for Complementarity and Co-operation in Canadian and Japanese Human Security Policies', Unpublished Paper, Human Security Class, Sciences-Po, Paris, 2004.

<sup>140</sup> S. Tadjbakhsh and A. M. Chenoy, *Human Security: Concepts and Implications*, op cit. p. 30.

<sup>141</sup> Ibid, p. 37.

<sup>142</sup> S. Tadjbakhsh, *Human Security: Concepts and Implications*, With an Application to Post-Intervention Challenges in Afghanistan, Center for Peace and Conflict Resolution, Sciences Po, Les Etudes du CERI No, 117-118, September 2005, p. 10.

<sup>143</sup> M. Gottwald, *Humanizing Security? The EU's Responsibility to Protect in the Libyan Crisis*, FIIA Working Paper 75, April 2012, p. 10.

was debated in the General Assembly, third pillar was severely contested. Here key stress was to opt for the use of peaceful measure instead of using the military force to protect people, especially in cases of humanitarian intervention.<sup>144</sup>

At the same time, a majority of the non-western states greatly criticise this doctrine. There are arguments that the concept will undermine the state's autonomy, as powerful states will misuse the concept to use their military forces in the poorer states. Others urge that RtP does not truly offer any protection to weaker groups as happened in the case of Darfur.<sup>145</sup> In addition, Buzan pointed out earlier that the expansion of security will authorise the international community for a greater use of force.<sup>146</sup> Although, human security was built by juxtaposing the developmental issues and global security concerns, however for southern countries, it is still a sequel of the old security paradigm.

## **2.7 Human Security Threats in Africa**

Africa is one part of the globe where human security is most threatened by many insidious factors such as chronic poverty, inter and intra-state wars, unchecked population growth, human migration, human rights violations, diseases, environmental degradation, chronic poverty, frequent natural disasters, climate change, bad governance, terrorism, piracy and so forth. Following are the contents of some key human security threats to the lives and dignity of the African people.

### **a) Conflicts**

Civil wars and violence devastate peace and stability of states and risk people's lives, prosperity and self-respect, and hence human insecurity. Africa is home to weak, underdeveloped, failed, and collapsed states due to multiplex and interrelated issues of political, social, and economic insecurities. Over the years, millions have died due to civil conflicts. According to a study, during 1994-2003, 13 million total deaths occurred due to conflicts and out of these, 9,210,000 people belonged to Sub-Saharan Africa.<sup>147</sup>

In the 18<sup>th</sup> and 19<sup>th</sup> century slave trade, followed by brutalities of colonisation and the western imperialistic domination in the post independence period, the Horn of Africa in

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<sup>144</sup> A. J. Bellamy, 'The Responsibility to Protect – Five Years On', In: *Ethics and International Affairs*, Volume 25, No. 2, 2010, pp. 143-169.

<sup>145</sup> Ibid.

<sup>146</sup> B. Buzan, 'A Reductionist, Idealistic Notion that Adds little Analytical Value', In: Comments by 21 Authors, Special Issue of *Security Dialogue*, Vol. 1, No. 2, 2004, pp. 396-700.

<sup>147</sup> *The Millennium Development Report 2005*, United Nations, New York, 2005.

particular has rarely seen a peaceful time. For instance, due to civil wars in Northern Uganda, Somalia, and Sudan, millions have lost lives and much more have lived as refugees. Among others, border areas between Ethiopia and Eritrea, and, Eritrea and Djibouti have constantly been in the situation of turmoil.<sup>148</sup> In addition, issues based on inter-ethnic division have very often led to epic tragedies in Africa.

Conflicts in Africa at times are rooted in extreme poverty and skewed resource distribution. Contest over resources, particularly in the African societies emanate in riots, violence bloody coups and coercion when oppressive and tyrant fiefdoms try to take maximum chunk of the state resources. For instance, conflicts in Nigeria, Sierra Leon, and Liberia had direct association with natural resource distribution such as oil and minerals. For instance, during 1989, more than 250,000 people were killed in Liberia's civil war. Likewise, most conflicts in the postcolonial East African states originated over the division of water and forest resources.<sup>149</sup> Cattle rustling and quest for watering points and pastures often lead to clashes in the pastoral communities in the Horn of Africa.<sup>150</sup>

Other factor that account for conflicts in Africa include, imports of small arms and light weapons, refugee and IDP pressure, food insecurity and, political and social exclusion or inclusion. Such conflicts end up in complete collapse of socio-economic arrangement and structure of communities that once provided basis for handling crises. Furthermore, conflicts destroy primary social services and deprive people from their fundamental needs such as provision of food, water supply, clothing and shelter, health care, education and markets. Collier's calculations reveal that an average civil war renders losses of \$64 billion for a country and its neighbours. Additionally, lower growth and compromised income levels contribute to civil wars and coups<sup>151</sup> as has been the case in most African conflict prone zones.

Conflict cycle once start, it spills over across borders causing human agony and distress. The situation is obvious in Democratic Republic of Congo, Rwanda, Somalia, and Sudan. Due to

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<sup>148</sup> K. Sabala, 'Towards a Regional Security Architecture for the Horn of Africa: A Framework Analysis', In: M. Mwangi, *Human Security: Setting the Agenda for the Horn of Africa*, op cit, pp. 15-19.

<sup>149</sup> M. O. Odhiambo, *Addressing Natural Resource Conflicts through Co-Forestry: The Case of East Africa*, Centre for Environment Policy and Law in Africa, Nakuru, Kenya, Paper prepared for an E. Mail Conference, 'Addressing Natural Resource Conflicts Through Community Forestry', March 1996.

<sup>150</sup> I. Farah, 'Human Security and the Livelihoods of Pastoral Communities in the Horn of Africa', In: M. Mwangi (ed.), *Human Security: Setting the Agenda for the Horn of Africa*, op cit, pp. 181-199.

<sup>151</sup> P. Collier and A. Hoeffler, *The Challenge of Reducing the Global Incidence of Civil War*, Centre for the Study of African Economies, Oxford University, 2004.

increased number of recruitment of men, death toll, disappearance, and imprisonment, women, and children are left alone to face critical challenges for their survival.<sup>152</sup> Conflicts leave many children homeless and orphaned, who grow up in an environment of violence and gun culture. These children are often recruited as child soldiers even before reaching the age of adulthood. More than half of the world's child soldiers belong to African states such as, DRC, Rwanda, Burundi, Uganda, Somalia, Zimbabwe, Sierra Leon, Liberia, Central African Republic, Sudan, and South Africa.<sup>153</sup>

In wars, apart from physical and psychological abuse, women usually become victims of sexual harassment and are subjected to various kinds of rape by the militias, invading soldiers and guards.<sup>154</sup> For example, during the 1994 genocide in Rwanda, rape was used as a war strategy against women. Men belonging to the opposite ethnic group raped more than 250,000 women. In Darfur conflict, rape was used to degrade the women of non-Arab identities. Apart from this, during military operations, young girls and women are subjected to enslavement, prostitution and sex trafficking.<sup>155</sup>

Terrorism being a transnational problem is new security threat in Africa. Various groups and violent movements use it to achieve coercive and political motives. These groups are usually linked with local militia and rebel groups having access to weaponry and other illegal activities.<sup>156</sup> In the recent past, most regions of Africa have experienced increased incidents of terrorist attacks, jeopardising many aspects of human security. Among other cases of terrorism, the September 2013 terrorist attack on the Westgate shopping mall in Nairobi had serious death toll with massive loss of property.

## **b) Migration**

During recent years, factors such as internal wars, gross human rights violations, discrimination, expatriation, and climatic catastrophes, have led to profound number of refugees and internally displaced people around the world and especially in Africa. Refugees and displace people face

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<sup>152</sup> *Human Security in Africa*, United Nations Office of the Special Advisor on Africa (OSAA), December 2005, pp. 7-8.

<sup>153</sup> Office of the Special Representative of the Secretary General for Children and Armed Conflict, Working Paper, Number 3, *Children and Justice during and in the Aftermath of Armed Conflict*, New York: UN, 2011).

<sup>154</sup> M. Turshen, 'The Political Economy of Rape: An Analysis of Systematic Rape and Sexual Abuse of Women during Armed Conflict in Africa', In: C. Moser and F. Clarke (eds.), *Victors, Perpetrators or Actors: Gender, Armed Conflict and Political Violence*, (London: Zed Books, 2001), pp. 55-68.

<sup>155</sup> S. Ssali, 'Human Security, Conflict, and Women in the Horn of Africa', In: M. Mwagiru (ed.), *Human Security: Setting the Agenda for the Horn of Africa*, op cit, pp. 101-126.

<sup>156</sup> *Human Security Now*, op cit, p. 23.

innumerable human security challenges once they are driven out of their homes. They are common targets of the enemy; have least access to water, food, shelter, health services, education facilities, and sources of income, as their survival is greatly dependent on the provisions of the camp.<sup>157</sup>

In the Horn of Africa, intensity and severity of this situation is additional as women and children are often without any protectors when they are moving from one place to the other. For example, many women asking for food were subjected to sexual abuse in the IDP camps of Northern Uganda. Likewise, many young girls and women experienced sexual exploitation in the camps of Kakuma and Dadaab while they moved around for casual activities such as gathering wood, water, and food commodities.<sup>158</sup> The women in Darfur and Chad also experienced such incidents when Janjaweed gangs and members of the state security forces raped them.<sup>159</sup> Migration of people needs to be looked at from the human security approach, as there are broad gaps in taking measures for social, political, economic, and civil aspects of the refugees and internally displaced people.

### **c) The issues of governance**

Governance addresses the administration of the political, social, and economic public realm. It leads to the process of decision-making and its implementation. It is a pursuit of decision making by the interaction of the state and society for the good of the citizens. Good governance is characterised by the promotion of the rule of law, equity, transparency, accountability, management of the public revenues. More importantly, good governance is conducive to human well fare, peace, and security.<sup>160</sup> Governance issues are closely related to the authority of individuals and societies. Effective governance system helps to empower people and lets them be heard and engaged in the decision making process.<sup>161</sup>

Since Africa's independence from colonial rule, apart from few countries there has been severe crisis of good governance. Some of the states are still gripped by the first generation of African freedom fighters, while others are scrambled with looters of national wealth. Thus, in much of Africa, poor governance, dictatorial regimes, and lack of democratic institutions are

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<sup>157</sup> T. Moses, 'Developing a Refugee Sensitive Framework for the Horn of Africa' In: M. Mwangi (ed.), *Human Security: Setting the Agenda for the Horn of Africa*, op cit, p. 130.

<sup>158</sup> Ibid.

<sup>159</sup> Ibid, pp. 135-136.

<sup>160</sup> O. Sana, 'Good Governance as a Building Block towards Improved Human Security in the Horn of Africa', In: M. Mwangi (ed.), *Human Security: Setting the Agenda for the Horn of Africa*, op cit, p. 34.

<sup>161</sup> *Human Security Now*, op cit, p. 68.

three fundamental factors of human misery. Though democratic governments are taking roots in Africa, however, much of them are offered during the voting period alone. For example, in Kenya, corruption, human rights violations, negative ethnicity in the power convergence and nepotism in the distribution of key government posts have been few aspects of democratic rule.

Role of police and national intelligence is to protect the citizens from every day crimes and injustices. However, in Africa, these institutions often misuse their authority. As a result, conflicts have been common in rural and urban areas. Political instability took roots due to weak enforcement of rules and poor security surveillance. These factors have triggered organized crimes, theft, rape, and carjacking. Civil society is usually oppressed if they try to raise their voices against these corrupt leaders.<sup>162</sup> Due to poor governance, cattle rustling and resource-based conflicts are inherent in pastoral areas of the arid and semi-arid lands in the Horn of Africa. These are driven by adverse factors including the involvement of the state apparatus and political bodies.<sup>163</sup>

Small arms and light weapons are often used to settle disputes as role of police is negligible in such regions. For instance, the Borana community of Kenya lives in expansive but poor terrain where the security forces usually clash with them. The Boranas tend to employ their traditional self-defense strategies. However, to protect their livestock illegal arms are abundantly available through the porous borders with other neighboring countries.<sup>164</sup> These arms are also used in violent robberies and cross border attacks, as the provision of state security is negligible in these areas.<sup>165</sup>

In the sub-Saharan Africa, state authority is sometimes involved in the provision of lucrative funding channels for criminal groups such as breeding of terrorists, kidnappers, pirates and militia groups. For example, in northern Mali, the role of criminals intensified during the period when the country was a major aid recipient from the US and many European donors. These donors apparently aimed to boost the state capacity to combat terrorism and other

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<sup>162</sup> O. Sana, 'Good Governance as a Building Block towards Improved Human Security in the Horn of Africa', In: M. Mwagiru (ed.), *Human Security: Setting the Agenda for the Horn of Africa*, op cit, p. 40.

<sup>163</sup> C. Mwaura and S. Schemidl, *Early Warning and Conflict Management in the Horn of Africa*, (Lawrenceville, NJ: Red Sea Press, 2002).

<sup>164</sup> A. O. Victor, N. Anthony and H. Mario, *Pastoral Livelihood Adaptation to Drought and Institutional Interventions in Kenya*, Geneva, Human Development Report, 2007/2008.

<sup>165</sup> O. Sana, 'Good Governance as a Building Block towards Improved Human Security in the Horn of Africa', In: M. Mwagiru (ed.), *Human Security: Setting the Agenda for the Horn of Africa*, op cit, pp. 40-41.

organised crimes in the entire region. However, later it was discovered that the state officials were involved in hosting these crimes.<sup>166</sup>

Similarly, poor governance has also been one of the causes leading to rise of ethnic based violence during and after the national election periods. For instance, after the disputed results of the 2007 elections in Kenya, country wide ethnic violence broke out which claimed more than 1500 deaths and over 10,000 displaced people from their homes. Likewise, in the last few years, electoral violence also occurred in Nigeria and Zimbabwe that undermined the definition of fair electoral process and then the establishment of democratic regimes in Africa.<sup>167</sup>

#### **d) Food scarcity**

Food security is one of the most pressing issues in Africa. Growing population, misguided policies, poor institutions, corrupt leaders, chronic poverty, diseases, and wars are significant factors that undermine all four aspects (accessibility, availability, utilisation, and consistency) of food security in the continent. These factors contribute at the household and community levels as powerless people such as subsistence farmers, the landless, majority of women and children are among the most disadvantaged, food insecure and least developed.

In the sub-Saharan Africa, agricultural sector has been poorly developed which provides the breadbasket for majority of the population. However, for the last few decades, food production is slowly growing but due to poor technological advancement, yields are still constrained. Low purchasing power and high transport costs isolate people from the food markets. Even if they acquire some food, low level of education and limited knowledge of food utilisation leads to poor health and nutrition.<sup>168</sup>

Africa has to bear the consequences of natural calamities and global warming. Compound impacts of natural disasters, such as persistent droughts and flash floods severely hamper the food productivity in Africa. Studies indicate that due to above mentioned factors, over 70 million people in the greater Horn of Africa are affected by food insecurity.<sup>169</sup> For instance, in the pastoral areas of Kenya, 70 per cent of the land is barren and due to frequent droughts, people

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<sup>166</sup> W. Lacher, *Organised Crimes and Conflict in the Sahel-Sahara Region*, The Carnegie Papers, Middle East, September 2012.

<sup>167</sup> M. Mwagiru and N. Karuru, 'Human Security in the Horn of Africa' In: M. Mwagiru (ed.), *Human Security: Setting the Agenda for the Horn of Africa*, op cit, p. 258.

<sup>168</sup> 'Persistent Challenges and Emerging Threats to Food Security', *Towards a Food Secure Future*, Africa Human Development Report 2012, pp. 2-3.

<sup>169</sup> *A State of Food Insecurity in the World: Addressing Food Insecurity in Protracted Crises*, WFP, FAO, Rome, 2010.

often suffer from persistent food shortages. Such conditions limit the livestock keeping and farming activities of the pastoralist communities that further inflicts food security in the region.<sup>170</sup>

In addition, wars in Africa have constantly been affecting food security. For example, due to intra-state conflicts, number of malnourished exceeded from 53 per cent to 70 per cent during the period of 1995-2005.<sup>171</sup> People in war torn states suffer from numerous impacts of food insecurity, whereby food shortages and hunger are common tools used in civil wars. For instance, in 1990s, all the conflicting groups in Somalia, southern Sudan, and Angola instigated food crises as political tools.<sup>172</sup> Traditional system of seasonal movement in food scarce areas restricts people into longer-term displacement, causing labor shortage at the times of harvest. Poor infrastructure often constrains the transportation system and affects regular supply of food from rural to urban areas. Furthermore, looting of foodstuff by the rebels or the opposite groups increases the uncertainty for consistent availability of food.<sup>173</sup>

#### **e) Education**

Attainment of basic primary education is a right of every human being. Education empowers people, helps to fight for their basic legal rights, and enhances their role in the societies.<sup>174</sup> Education enlarges their choices to live longer and stay healthy; hence, education helps individuals to attain health security. For example, education helps to gain awareness against diseases like HIV/AIDS.<sup>175</sup> Education has been essentially effective to improve maternal health and significantly reduce the child mortality rate. Education provides ways to gain access to secure incomes and livelihoods<sup>176</sup> thereby seek economic security with increased opportunities for jobs by skill development and creativity. Consequently, education helps societies to achieve economic development so that all sectors of life can be secured and an individual can move towards a life of dignity.

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<sup>170</sup> Ibid.

<sup>171</sup> J. T. Morris, *Abundant Food, Abundant Hunger: Why are 1 in 8 People Still Hungry?* Sustainable Development International, Fifth Edition, (United Kingdom: Henley Media Group Ltd, 2005), In: *Human Security in Africa*, United Nations Office of the Special Advisor on Africa (OSAA), December 2005, p. 30.

<sup>172</sup> E. Messer, Conflict as a cause of Hunger, UN University website, Retrieved on 6/19/2013.

<sup>173</sup> UNDP, 'Persistent Challenges and Emerging Threats to Food Security', *Towards a Food Secure Future*, op cit.

<sup>174</sup> A. Sen, A Background Paper prepared for the Workshop on 'Basic Education and Human Security', Jointly Organised by the Commission on Human Security, UNICEF, The Pratichi Trust (India) and Harvard University, Kolkata, 2-4 January, 2002.

<sup>175</sup> *Realising the Right to Education for All*, Global Campaign for Education, Discussion Paper on Education Post-2015, March 2013, p.3.

<sup>176</sup> *Human Security Now*, op cit, 2003, p. 116.

In addition, education helps in acquiring peace by introducing people to the conflict management procedures leading to better attainment of political security.<sup>177</sup> In addition, education provides awareness for ways to seek environmental security. Since the adoption of the Millennium Development Goals, literacy rate improved in many developing states. For instance, during 1990-2005, enrollment in the pre-primary schools increased by 61 per cent in the sub-Saharan Africa. Likewise, 52 per cent of the African children were enrolled for primary education, however with high rate of gender disparities. In Africa, there are more than 40 million children and by 2005, there were 33 million children of primary school age who were never enrolled to attend school.<sup>178</sup>

In 2002/2003, 4 out of every 10 children did not complete primary school education. Some of the sub-Saharan countries like Burkina Faso, Cote d'Ivoire, Ethiopia, Kenya, Mali, Niger and Nigeria still have more than one million children each who are out of school.<sup>179</sup> Among other issues, the overall quality of education is not good enough to attain desired standards of development and human security. Various factors account for lower trend of education in Africa. In most cases, poverty hinders the affordability for the majority of parents to send their children to school. There is lack of political will to support higher degree of education attainment.

Political instability, conflicts, and strikes worsen the conduciveness of the environment and educational progress as such conditions reduce study hours, leading to closure of educational institutions. For higher education, there is lack of technical staff and well-trained teachers. Education programs are under-funded as educational materials such as computers; modern teaching and learning resources are either unavailable or limited in supply. Unavailability of teaching staff worsens the situation especially in the under-developed areas. For instance, there is a dire need for at least an extra 4 million teaching staff in the sub-Saharan Africa if the region has to meet the MDGs by 2015.<sup>180</sup>

In rural areas, low enrolment and high dropout rates are serious issues. Due to financial constraints parents cannot afford to pay the school fees and other necessities. Gender issues and

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<sup>177</sup> 'Regional Overview: sub-Saharan Africa: Education for All, Global Monitoring Report 2008', In: *Education For All by 2015, Will We Make it?* United Nations Educational Scientific and Cultural Organisation, 2008, p. 3.

<sup>178</sup> Ibid, p. 1.

<sup>179</sup> Ibid, p. 2.

<sup>180</sup> K. Matura, *Education – The Software of Human Development*, Sustainable Development International, Fifteenth Edition, (UK: Henley Media Group Ltd. 2005).

cultural practices also matter when girls are often left at home to fetch water, collect wood and help in the households. Lack of transport facilities, long distance, and poor infrastructure development are other obstacles that limit the progress of education especially in the less developed regions of Africa.

## **2.8 Human Security Institutions in Africa**

Since the inception of the human security concept, many international, regional, sub-regional and national efforts have been put together to empower and protect individuals and communities. For instance, since 2001, the Commission on human security (CHS) has acted to formalise various norms of action and aims to develop institutions that can shield people from all forms of physical and psychological violence. The Commission also seeks to develop peoples' potential necessary for their participation in the decision-making procedures that involve their daily lives.<sup>181</sup>

In the African continent, human security becomes most relevant and imperative as only a few decades back, the African nations gained autonomy. Secondly, Africa has been marginalised due to slow economic growth and technological development. Lastly, given the regional situations of wide spread poverty, political instability, disease, forced migration, and conflicts; people of Africa are in the most vulnerable state of human insecurity.<sup>182</sup>In Africa, status of state boundaries has been problematic, as the European rulers did not consider territorial and ethnic divides. Due to lack of adequate security measures, most state boundaries in Africa are porous, therefore, security problems often spillover rapidly and become internationalised. At times, hunger and famine derives people out of their countries.

Lastly, in cases of state failure, there is no protective body to cushion the human security of citizens. Therefore, looking into the complexity of these issues, the African human security focuses on the collaboration of states and it tends to work in various forms of continental, regional, and sub-regional integrations.<sup>183</sup>In particular, during the recent years, the role of regionalism has gained prominence in the discourse on African human security. For instance, the AU has played a constructive role in gaining peace and security to some degree in the Horn of Africa, and especially in resolving conflicts in Somalia and Sudan. It has been possible due to the cooperative efforts between Africa and its development partners by the establishment of the

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<sup>181</sup> *Human Security Now*, Commission on Human Security, op cit.

<sup>182</sup> M. Mwangi, (ed.), *Human Security: Setting the Agenda for the Horn of Africa*, op cit.

<sup>183</sup> Ibid.

African Standby Force (ASF) and the Peace and Security Council (PSC) of the AU.<sup>184</sup>The ASF framework is provided with the Common Africa Defense and Security Policy, particularly in cases of civil wars and genocide.<sup>185</sup>

Other regional and sub regional arrangements like the ECOWAS, SADC, IGAD and EAC have taken keen interest to develop strategies to deal with key human security issues. Much effort has been devoted to initiate strategies especially aimed with the mandate of African responses to African problems. In 2009, with the aid of thirteen regional states and the UN partnership, the East African Community launched a broad regional programme to promote rule of law and human security in the East African states. This integrated effort aims at combating threats such as illicit trafficking, organised crime, criminal justice, aimed at human development.<sup>186</sup>

Likewise, the Intergovernmental Authority on Development (IGAD), established in 1986, deals with ecological and humanitarian issues in the Horn of Africa. IGAD, over the years, has expanded its vision to free the region from conflicts and promote peace and security. Despite, the establishment of these regional and sub-regional institutions, the state of human security in Africa seems to be marginally improved. Attaining the African human security is still an uphill task and faces challenges as the role of human security institutions needs cooperation and good will of states and the governing apparatus. At the same time the role of civil society, which is a building block of human security, needs to be enhanced.

## **2.9 Conclusion**

Human security advances a universal theme for the development of individuals and societies by the provision of just opportunities and helps individuals to explore their capabilities, regardless of their origin. In addition, the concept of human security promotes a milieu of positive peace and guides to re-establish the relationship between a state and its citizens. At the same time, human security provides political voice to the politically marginalised people whereby the concept promotes democracy with enhanced role of individuals concerning security, human rights, development, and international relation.

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<sup>184</sup> Ibid

<sup>185</sup> Report of the “4<sup>th</sup> Meeting of African Chiefs of Defense Staff and Experts on the Establishment of the African Standby Force and the Common African Defense and Security Policy”, Addis Ababa, 17<sup>th</sup> January 2004, Retrieved online, 4 March 2014

<sup>186</sup> *Promoting the Rule of Law and Human Security in Eastern Africa*, Regional Programme 2009-12, United Nations Office on Drugs and Crime, Retrieved online, 12 March 2014

In the academic arena, human security is a framework, which guides to reassess common understanding of security and basic rules of sovereignty. It opens many doors for researchers of international studies and takes a multidisciplinary approach. In the policy area, it is a logical retort for the globalisation of international policy. The analysis of human security situation in Africa suggests that the people of the continent severely lack safety from fear and want. There is not a single part of Africa, where the people are leading lives with dignity. Thus, for Africa and other developing regions, the human security concept provides a rationale to look beyond economic and political development, and territorial security.

## CHAPTER THREE

### CLIMATE CHANGE: A HISTORICAL PERSPECTIVE

#### 3.0 Introduction

Climate change has become an increasingly pressing issue of the contemporary times and Opere states that climate change is a reality now and one cannot hide from it. It is imperative to understand it, the causes, its evolution, and the impacts. In addition, there is need to know how to mitigate and adapt to it because the people have to live with it.<sup>1</sup> In line with this argument, historical investigations reveal that the earth's climate has never been static; however, the present day climatic changes are rapid, dramatic and erratic.

Therefore, to grasp the climate change phenomenon, this chapter seeks to discuss the earth's climate system, and its elements. In addition, it provides an overview of the historical as well as contemporary climatic changes. This chapter examines the climate change debate, which led to an organised study of climate science and helped to trace out major factors of today's global warming. Thereby, study focuses on major impacts of climate change and the uncountable biological and physical implications for the most affected regions and sub-regions of the globe. Lastly, the chapter highlights the role of various global, regional, and national institutions established to address climatic changes. The chapter also assesses the scope of key measures and the policy frameworks, enacted to deal with the impacts of the changing climate.

#### 3.1 Climate Change: A Conceptual Analysis

Climate represents seasonal patterns and general weather conditions prevailing in a particular place over a long period of decades to centuries.<sup>2</sup> According to the Intergovernmental Panel on Climate Change (IPCC), climate change refers to 'a variation in the state of the climate that can be identified by changes in the mean and/or the variability of its properties and that lasts for an extended period of decades or even longer than that'.<sup>3</sup> Generally, it is an average change in the climatic conditions, such as temperature, precipitation, and wind, which may continue for considerably longer than usual period. Climate variability refers to climate patterns such as *El Nino* and *La Nina*. The United Nations Framework Convention on Climate Change, human

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<sup>1</sup> Interview with Dr. A. Opere, Head of the Department of Meteorology, University of Nairobi, 3 April 2014.

<sup>2</sup> W. J. Burroughs, *Climate Change, A Multidisciplinary Approach*, 2<sup>nd</sup> Edition, (Cambridge: Cambridge University Press, 2007), p 2.

<sup>3</sup> B. Metz, O. Davidson, P. Bosch et al (eds.), *Climate Change 2007, Mitigation of Climate Change*, (Cambridge: Cambridge University Press, 2007), p. 812.

activity is the prime cause of climate change while origins of climate variability lie in natural factors. In addition, the scientists base these changes according to the external and internal variables. External variables include orbital cycles, solar variability, volcanic activities, and human actions.<sup>4</sup>

The orbital scale climate change occurs due to the changes in the earth's orbit around the sun and due to the changes of earth's tilt. Three types of changes occur regularly in earth's orbital cycle around the sun. Firstly, the orbit of the earth is elliptic in shape, and the variation in the eccentricity takes around 100,000 years. Secondly, the earth spins on its axis that tilts with respect to the axis of the orbit at varying angles, between 21.6 degrees to 24.5 degrees. The earth takes nearly 41,000 years to complete the cycle, known as the Milankovic cycle.<sup>5</sup> The change in tilt causes long-term variations for radiations received on earth, particularly at the higher latitudes. An increase in the tilt also increases the seasonal differences.<sup>6</sup>

Similarly, if the tilt decreases, the seasonal differences decrease accordingly. However, the Milankovic cycle takes thousands of years to change the climate.<sup>7</sup> The third measure of variation is the perihelion of the earth, which is the change in the time during a year when the earth is closest to the sun. This moves through all the months of a year with a period of 23,000 years.<sup>8</sup> The tilt of the earth has a more phenomenal role in climate change than the distance to the sun. If the tilt is towards the sun, the earth experiences warming, and if the tilt is away from the sun, it becomes cooler. Lastly, the solar variation is the change for radiations emitted by the sun in its spectral distribution, which usually takes place over the period of thousands of years. Observations show that most of the change takes place in the ultra violet radiations, absorbed by oxygen and ozone particles in the upper atmosphere. Studies reveal that there has been considerable increase in the sun's energy output; however, the process takes place over billions of years and has no direct impact on the current climate change.<sup>9</sup>

Variations in the weather patterns such as *El Nino*, *La Nina* and other interactions in the atmosphere are internal variables, which are changes within the atmosphere.<sup>10</sup> *El Nino* is warm

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<sup>4</sup> UNEP Year Book 2010, 'Climate Change' An attribution by NOAA, National Oceanic and Atmospheric Attribution, (Nairobi: UNEP, 2010), p, 34.

<sup>5</sup> W. J. Burroughs, *Climate Change, A Multidisciplinary Approach*, op cit.

<sup>6</sup> Ibid.

<sup>7</sup> Ibid, p. 56.

<sup>8</sup> Ibid.

<sup>9</sup> Ibid, pp. 31-33.

<sup>10</sup> NOAA, National Oceanic and Atmospheric Administration Climate Attribution, 2009.

water current, triggered by a warm pool of water present in Indonesia. It heads east towards the west coast of Ecuador and Peru, and after a series of interconnected atmospheric phenomena, the process warms the world. However, when the pool moves back to normal, it cools the world.<sup>11</sup> This particular weather pattern frequently happens, and is known as the *El-Nino Southern Oscillations* due to its association with a fluctuation of the inter-tropical surface pressure pattern and circulation in the Indian and Pacific oceans.

Another important aspect of this phenomenon is that it weakens the prevailing trade winds and strengthens the equatorial counter-currents. Consequently, it moves the flow of warm waters in Indonesian region eastward to overlap the cold waters of the Peru currents. This event greatly affects the winds, sea surface temperature, and precipitation patterns in the tropical Pacific and some other parts of the globe. The opposite of *El-Nino* is the *La-Nina* phenomenon.<sup>12</sup>

### **3.2 The Climate System**

The climate system plays a vital role to explain various aspects of climate science such as precipitation, temperature, energy transfer between atmosphere and the earth, and the balance of radiation. The climate system is a complex multitude of five interactive components; the atmosphere (the casing or coverage of gasses surrounding the earth), the hydrosphere (mass of water in, on, and under the earth), the land surface, the cryosphere (glaciers, ice caps, and snow covers), and the biosphere (zone of life on earth).<sup>13</sup>

The climate system usually remains static due to the balance in internal and external forces of the earth. However, any external force led by any change in one part of the system can be felt in the rest of the system. The sun and the earth's rotational cycles provide energy for the climate system and exert external forcing on the climate system. The two important processes including evaporation and precipitation, carry the winds and ocean currents, and eventually distribute them back in various forms of energy.

It is crucial to note that human activities such as emissions of greenhouse gases and changes in the land cover and land use also bring external forcing for the climate system.<sup>14</sup> Most

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<sup>11</sup> G. Walker and D. King, *The Hot Topic, The Hot Topic, How to Tackle Global Warming and still Keep the Lights on*, (London: Bloomsbury, 2008), p. 28.

<sup>12</sup> M. L. Parry et al, *Climate Change 2007: Impacts, Adaptation and Vulnerability*, (Cambridge: Cambridge University Press, 2007), pp. 874-875.

<sup>13</sup> *Grappling with Greenhouse: Understanding the Science of Climate Change*, National Greenhouse Advisory Committee, Departments of Arts, Sports, the Environment, and Territories, Australia, 1992, pp, 1-2.

<sup>14</sup> A. P. M. Baede, E. Ahlonsou, Y. Ding, and D. Schimel, *The Climate System: An Overview*, In: Third Assessment Report of the IPCC (TAR), 2001, op cit, p. 88.

of the earth's energy comes from the sun, through the atmosphere, in the form of light and short wave radiations. Earth absorbs some of these radiations and the rest is thrown back into the atmosphere as infrared radiations. Ninety nine per cent of the earth's atmosphere is composed of oxygen (20.9 per cent), Nitrogen (78.1 per cent) and argon (0.93 per cent). These gases have very distinct properties; therefore, do not interact with the passing by radiations.

Water vapours, and other greenhouse gases, such as carbon dioxide (CO<sub>2</sub>), nitrous oxide (N<sub>2</sub>O), methane (CH<sub>4</sub>), ozone (O<sub>3</sub>) and halo-fluorocarbons (HFCs) have special properties. These gases are present in very minute quantities and play a key role to maintain earth's average temperature. Apart from these gases, there are aerosols present in the atmosphere.<sup>15</sup> Natural aerosols are tiny particles of dust, sand, volcanic ash, and liquid droplets of sea salt, found in liquid and solid form. Key role of aerosols is to reflect the sunlight back into the space and this process tends to lower the atmospheric temperature level. Most of these particles stay for a very little time in the air and then fall back onto the ground.<sup>16</sup>

Since the industrial revolution, an increase in the burning of fossil fuel (containing sulfur) has considerably enhanced the concentration of aerosols in the atmosphere.<sup>17</sup> Particularly, after the World War II, the emission of sulfur dioxide has increased from 40 million to 100 million metric tons per year. Their concentration is generally present in the northern hemisphere compared to the southern hemisphere, as revealed by the glacial ice cores of the regions. Soot is black carbon and comes from industrial pollution, traffic, out-door fires, burning of coal and biomass. In addition, black carbon is produced by incomplete combustion of coal and burning of diesel fuels, bio-fuels, and outdoor biomass.

Particles of soot absorb sunlight, and as a result, heat the air.<sup>18</sup> The greenhouse gases and the water vapors present in the atmosphere provide a partial blanket for earth, trap some of the infrared radiations, and re-radiate them in all directions, causing a warming of the earth. This phenomenon is known as the greenhouse effect, which an entirely natural process to keep the earth warm and habitable for the sustenance of life.<sup>19</sup>

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<sup>15</sup> Ibid, p. 87-88.

<sup>16</sup> G. Walker and D. King, *The Hot Topic: How to Tackle Global Warming and still keep the lights on*, op cit. p. 26.

<sup>17</sup> *Climate Change 2007: The Physical Science Basis*, Contribution of the working group I to the Fourth Assessment report of the IPCC, Chapter 6, Section 6.6, (Cambridge: Cambridge University Press, 2007).

<sup>18</sup> Ibid.

<sup>19</sup> S. Solomon et al., *Climate Change 2007: The physical Science Basis*, (Cambridge: Cambridge University Press, 2007), p. 115.

### 3.3 Historical Background of Major Climate Change Events

The Earth's climatic conditions have always been fluctuating between episodes of glacial and interglacial periods. Around 20,000 years ago, ice ages ended and succeeded by the era of interglacial period.<sup>20</sup> Records collected from the analysis of drilling of the ice caps reveal that these historical changes in the climate were led by the volcanic activities and some other natural causes. However, to some ecologists, there might be some uncertainty in the reliability of the evidence.<sup>21</sup> During this period, huge ice sheets covered massive areas of North America and Europe; sea ice was much closer to the equator; temperatures of oceans were cooler; and the tropics were relatively drier than what they are at present time.<sup>22</sup>

13,000 years ago, an unusual climate change, the Younger Dryas Event took place, advancing towards a warmer world. There was an abrupt warming of 4 degrees in North Atlantic, Greenland, and Europe. However, data reveals that it was a global shift in the earth's climate.<sup>23</sup> Overpeck et al argues that 'the climate system translated the relatively gradual astronomical characteristic of the past 18,000 years, into an interrelated sequence of abrupt climate events over an extensive area of the globe'.<sup>24</sup> The exact cause of the Younger Dryas event is still unknown, however, the trend of warming ended around 10,720 years ago.<sup>25</sup>

Various scientific studies demonstrate that the warmer, wetter period provided perfect conditions for the establishment of agricultural activities. The following period is known as the postglacial optimum or hypsithermal period when earth's climate became relatively cooler and drier. This also marked the beginning of the Egyptian and Middle Eastern civilisations and provided the basis of physical and historical record of the climatic changes in the Sahara, Middle East and the Far Eastern regions. Records indicate that this era marked the onset of milder monsoon summer circulation that had severe effects in the Sahara and Arabia. This was the time when arid conditions for the desert began.<sup>26</sup>

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<sup>20</sup> J. Houghton, *Global Warming: The Complete Briefing*, op cit.

<sup>21</sup> T. Theis and J. Tomkin (eds.), *Sustainability: A Comprehensive Foundation*, Rice University, Houston, Texas, 2013, pp. 62-70. Retrieved online, 30 August 2014.

<sup>22</sup> D. M. Gates, *Climate Change and its Biological Consequences*, (MA: Sunderland, 1993), p. 52.

<sup>23</sup> *Ibid*, pp. 57-58.

<sup>24</sup> J. T. Overpeck et al., 'Climate change in the circum-North Atlantic region during the last deglaciation' *Nature* 338, 1989, pp. 553-557.

<sup>25</sup> W. Dansgaard et al., 'The Abrupt termination of the Younger Dryas Climate Event' *Nature* 339, 1981, pp. 532-534.

<sup>26</sup> W. J. Burroughs, *Climate Change: A Multidisciplinary Approach*, 2<sup>nd</sup> Edition, op cit, pp. 233-248.

Another remarkable climatic change was recorded around 4,300 years ago when the rainfall significantly declined in the Middle East and North Africa. After the continuous warming of 2,000 years, the glacial conditions changed with a drop of 6 degrees in average global temperature. However, the climate remained cooler until the fifteenth century, and again a spell of warming followed up.<sup>27</sup> During 900-1300 AD, the Medieval Climate Optimum, or Medieval Warm Epoch<sup>28</sup> brought moderate climatic conditions in winters as well as in summers, compared to the little ice age.<sup>29</sup>

World data center for Paleoclimatology concludes that the rise of temperature started from 600 AD and peaked during the early twelfth century.<sup>30</sup> During this period, Europe and the adjacent regions of North Atlantic experienced anomalous warmth. Agriculture flourished at higher latitudes as well as in the mountainous regions. For instance, this warming led to grape production in England while olives and fig trees were harvested in northern Italy and parts of Germany. The Norse settlers in Greenland invested in dairy farms and did livestock rearing such as sheep.<sup>31</sup>

Followed by the little ice ages, during 1430-1850, there was massive snowfall and formation of glaciers in Alaska, Scandinavia, and Alps. Europe also experienced more than average cold winters while summers were also wetter than usual. Some Dutch traders noticed that during 1634-1700, canals froze and consequently, the trade exchange significantly affected. Last decade of the seventeenth century, harvesting was impossible in Finland and some other European states, which led to crop failure, famine, and hunger. The results were massive flow of migrants from well-established villages.<sup>32</sup> Comparison from various data sources concludes that cold period of the sixteenth to nineteenth centuries was always followed by an episode of a warmer climate. However, there were some regions where winters were longer and severe than the usual weather pattern, while the climate remained moderately cold in other regions.<sup>33</sup>

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<sup>27</sup> Ibid, pp. 249-255.

<sup>28</sup> H. H. Lamb, 'The Early Medieval Warm Epoch and its Sequel', *Palaeogeogr, Palaeoclimatol, Palaeoecol* 11, 1965, pp. 13-37.

<sup>29</sup> L. Keigwin, 'The Little Ice Age and Medieval Warm Period in the Sargasso Sea', *Science* 274, 1996, pp. 1504-1508.

<sup>30</sup> W. J. Burroughs, *Climate Change: A Multidisciplinary Approach*, 2<sup>nd</sup> Edition, op cit, pp. 252-255.

<sup>31</sup> M. E. Mann, *Medieval Climate Optimum*, Volume 1. 'The Earth System: Physical and Chemical Change', In: *Encyclopedia of Global Environmental Change*, (Chichester: John Wiley and Sons, Ltd, 2002), pp. 514-516.

<sup>32</sup> T. M. Cronin et al., 'Medieval Warm Period, Little Ice Age and 20<sup>th</sup> Century Temperature Variability', *Global and Planetary Change* 36, 2003, pp. 17-29.

<sup>33</sup> W. J. Burroughs, *Climate Change: A Multidisciplinary Approach*, op cit, pp. 256-260.

Scholars such as Bradley and Jones observed the climate of sixteenth to nineteenth centuries and concluded that during this period, the coldest episodes did not synchronise in most of the regions.<sup>34</sup> However, climatologists such as Eddy assert that solar insolation (a measure of solar radiation energy on specific surface area taken during particular period) triggered the Little Ice Age.<sup>35</sup> On the contrary, Robock argues that the volcanic dust had a more significant influence on the climate change.<sup>36</sup> However, causes of the ‘Little Ice Age’ remains a mystery.

From a geological point of view, the major climate change events that took place millions of years ago, led to strategic reserves of oil, gas and coal that are the key energy sources of present time. Climatologists demonstrate that historical changes in the global climate have led to the evolution of new and diverse variety of flora and fauna. Severity of either cold or warmth helped some species to survive and adapt to new conditions, with some characteristic changes. However, many species could no longer survive the harsh conditions and became extinct.

### **3.4 The Climate Change Debate**

History of climate change debate is as old as the human civilisation. The Medieval philosophers, geographers, and historians devoted continuous efforts to investigate the changing climate and especially the cultural aspects of the phenomenon. However, human induced climate change evolved during the 17<sup>th</sup> and 18<sup>th</sup> centuries, and focused to build an understanding of the concept of climate in the geographical as well as social terms. In addition, climate was also perceived to relate with human health and welfare. Scholars of this period such as de Montesquieu, Abbe Du Bos, David Hume, T. Jafferson, Aristotle and Hippocrates, studied human societies, their behaviours, and cultural associations and the negative impacts of the changing climate.

Du Bos, for instance, examined the relationship between nature of air, soil, land, and climate, corresponding to the creative excellence in humans.<sup>37</sup> Du Bos’s analysis depicts that there are three key routes for air to reach humans; food, water and respiration. Through breathing, air directly reaches the lungs, which then translates into various moods, depending on the quality of air.<sup>38</sup> Likewise, air temperature had instant and unequivocal repercussions, such

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<sup>34</sup> R. S. Bradley and P. D. Jones (eds.), *Climate Since 155 AD*, (London: Routledge, 1995).

<sup>35</sup> A. J. Eddy, ‘Climate and the Changing Sun’, *Climate Change* 1, 1977, pp. 173-190.

<sup>36</sup> A. Robock, ‘The “Little Ice Age”: Northern Hemisphere Average Observations and Model Calculations’, *Science* 206, 1979, pp. 1402-1404.

<sup>37</sup> A. Du Bos, *Critical Reflections on Poetry, Painting and Music*, Translated by Thomas Nugent, Volume 1, London, 1942, In: J. R. Fleming, *Historical Perspectives on Climate Change*, (Oxford and New York: Oxford University Press, 1998), pp. 10-11.

<sup>38</sup> Ibid.

that an ‘access cold congeals the imagination of some and absolutely changes the temper and humor of others. From sweet and good humored in other seasons, they become almost savage and insupportable in violent frosts’.<sup>39</sup>

In relation to this argument, many scholars believed that countries with suitable climate and average temperature in the range of 22°C to 25°C, produced people of morals, artistic and genius personalities. Further assessments concluded that climatic studies of an area could help to examine people’s psychological responses towards their environment, including their modes of dressing, eating, housing, industrial setup and cultural attitudes.<sup>40</sup> Montesquie and Hume further established that the progress of European culture was led by climatic changes, especially increased warming and deterioration of land. In the later years, studies determined that land use changes, for instance, deforestation and cultivation in North America would potentially accelerate regional climate change.<sup>41</sup> However, due to lack of evidence and climate data, these views were greatly contested by the scholars of the mid nineteenth century, such as Smauel Fory.

In the following years, the Royal Society kept records of climate change in America and parts of Europe. In the early 1870s, the International Meteorological Organisation was established and studies led to trace out the origins of climate change. Since 1875, the organisation initiated the *Bulletin of Simultaneous Observations*, which published regular charts, based on global observations. In the meanwhile, the climatologists continued their debate to assess climate change especially in Europe and America. However, there was lack of concrete evidence that human activities such as urbanisation, deforestation, and industrial development were responsible for the changing climate especially in the Americas.<sup>42</sup>

During the late nineteenth century, John Tyndall studied the greenhouse effect and established that water vapors were the major factors in trapping gas. These ideas advanced the research on the climate science.<sup>43</sup> In 1895, Svante Arrhenius presented his pioneer work (specifically based on the climate science) to the Stockholm Physical Society and explained the ice ages phenomenon. Furthermore, he argued that 40 per cent change (positive or negative) in the carbon dioxide (CO<sub>2</sub>) concentration could cause glacial accumulation or retreat. Similar

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<sup>39</sup> A. Du Bos, *Critical Reflections on Poetry, Painting and Music*, Translated by Thomas Nugent, Volume 1, London, 1942.

<sup>40</sup> J. R. Fleming, *Historical Perspectives on Climate Change*, op cit, p. 16.

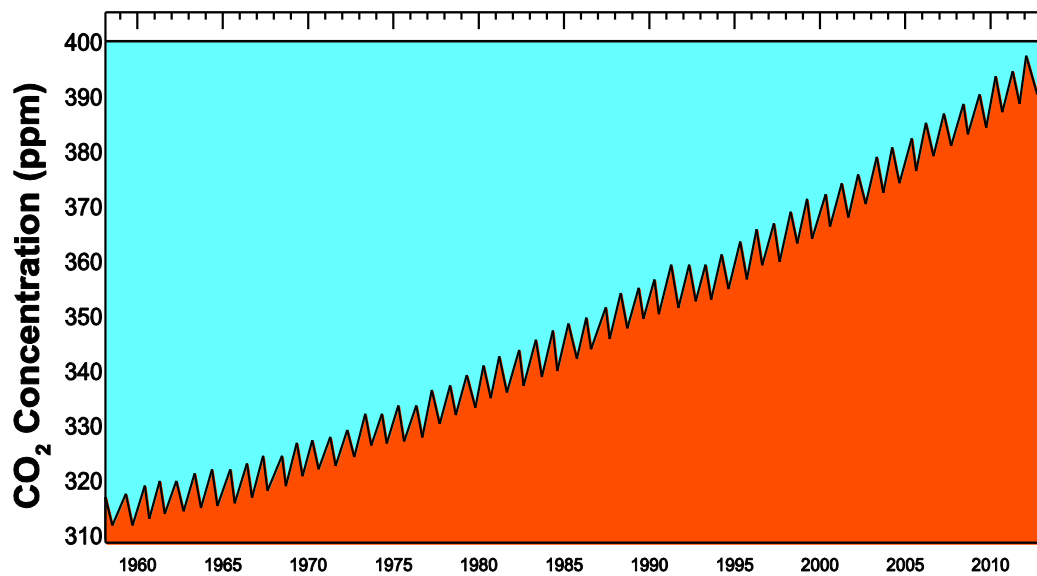
<sup>41</sup> M. Carr, *Science Policy and the History of Climate Change*, November 2006, Retrieved online, 20 March, 2014.

<sup>42</sup> Ibid.

<sup>43</sup> J. R. Fleming, *Historical Perspectives on Climate Change*, op cit, p. 82.

arguments led to the studies on climate change and gained popularity as carbon dioxide concentration increased by 10 per cent in the first half of the 20<sup>th</sup> century. Especially in 1957-58, being the International Geophysical Year, some remarkable developments discovered the function of organic carbon present in sedimentary rocks, especially in maintaining climate and weather of the oceans and the atmosphere.<sup>44</sup>

Thereafter, under the authority of Charles Keeling, the US weather Bureau agreed to monitor CO<sub>2</sub> concentration and the graphical drawings of these results confirmed previous works on climate change science. The drawings of Keeling's pioneer work mark the growing trends of atmospheric CO<sub>2</sub> concentration (see Figure 3.1). The figure clearly indicates that since the 1950s, there has been a steady rise in the atmospheric CO<sub>2</sub>. The rise of CO<sub>2</sub> concentration has been attributed to human activities, including the industry, agriculture, mining, deforestation, transportation, construction, and habitation.<sup>45</sup>



**Figure 3.1** Atmospheric concentration of carbon dioxide (the Keeling Curve).

Source: Mauna Loa Observatory records, Scripps Institution website

For instance, industrial growth has led to increased release of pollutants and dust particles into the atmosphere, which has significantly raised the levels of air and water pollution and ultimately caused environmental degradation. Likewise, conversion of natural forests into cultivation, logging, and slashes and burn techniques affect surface and ground waters. Likewise, for increased productivity of crops, use of fertilizers and pesticides pollutes soil and water.

<sup>44</sup> M. Carr, *Science Policy and the History of Climate Change*, November 2006, Retrieved online, 20 March, 2014.

<sup>45</sup> Ibid.

Uncontrolled population growth has led to growing concentration of human settlements in ecologically sensitive areas, causing land degradation.<sup>46</sup>

In the course of technological and transportation growth, fossil fuels have heavily polluted the environment. In addition, new roadways divert surface water flow. Thus, looking at these issues, in the early 1970s there were growing alarms about the global warming, referring to the gradual increase in the earth's mean temperatures.<sup>47</sup> The Mauna Loa Observatory in Hawaii made the most recent observations during 2013 and early months of 2014 (see figure 3.1). These records indicate the greatest ever levels of atmospheric concentrations of CO<sub>2</sub>, exceeding 400 parts per million (ppm), which the human history has never experienced in the past many thousands years.

### **3.5 Trends of Contemporary Global Warming and Climate Change**

As indicated in earlier section, for the last few decades, the scientists have noticed considerable changes in the global climate, mainly due to an abrupt disturbance in the steadiness of the earth's atmospheric temperatures. According to National Aeronautical and Space Administration's observational data, there was a phenomenal rise in the average global temperature between the periods of 1880-2010.<sup>48</sup> Table 3.1 indicates that year 2010 was the warmest so far, followed by 2005 and 2003 being the three hottest years over the recorded history beginning since 1880.<sup>49</sup>

The first episode of the warming period was recorded between 1910 and 1945, while the second spell of warming began from the mid 1970s and the trend is still going on.<sup>50</sup> Data reveals that since the mid twentieth century, the coldest years recorded were warmer than the hottest years before 1998. Since 1850, the global surface air temperature rose at an average rate of 0.154 per decade.<sup>51</sup> According to the IPCC, the global temperature has increased by 0.74 degrees centigrade since the middle of last century.<sup>52</sup>

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<sup>46</sup> The history of Atmospheric Carbon Dioxide, Retrieved online, 15 April 2014.

<sup>47</sup> Ibid, pp. 8-9.

<sup>48</sup> National Climatic Data Centre, *Global Analysis---Annual 2012*, Retrieved online, 10 June 2013.

<sup>49</sup> Goddard Institute for Space Studies (GISS), NASA Goddard Space Flight Centre, Earth Sciences Directorate, Retrieved online, 20 April 2012.

<sup>50</sup> D. W. J. Thompson et al., 'An Abrupt drop in Northern Hemisphere Sea Surface Temperature Around 1970', *Nature*, Volume 467, September 2010, pp. 444-446.

<sup>51</sup> Ibid.

<sup>52</sup> Goddard Institute for Space Studies (GISS), NASA Goddard Space Flight Centre, op cit, p.33.

**Table 3.1** Top ten warmest years since 1880.

Rank 1= warmest	Year	Anomaly (°C)
1	2010	0.66
2	2005	0.65
3	1998	0.63
4	2003	0.62
5	2002	0.61
6	2006	0.59
6	2009	0.59
6	2007	0.59
9	2004	0.58
10	2012	0.57

Source: National Climatic Data Centre

First decade of the twenty first century has been the warmest period on record.<sup>53</sup> Since 1979, the land air temperature has been rising at the rate of 0.25 degrees centigrade per decade while rise in the average ocean temperature is 0.13 degrees centigrade per decade. The warming has considerably decreased the land areas of extremely cooler regions. Consequently, the warmer land areas are constantly spreading. Another remarkable change is the rapid increase in the minimum night temperature whereas the maximum day temperature increase has been gradual.<sup>54</sup>

Data reveals that the northern hemisphere experienced few cooler spells; however, the southern hemisphere has continuously been warming up. During the last few decades, the north-west Atlantic has experienced slightly more cooling during the winter months of December to February. However, the central northern Pacific has been comparatively less cold during the winter months. In terms of precipitation, there has been an increase in the high latitudes while in the mid-latitudes there has not been any noticeable change. The most striking change is the desiccation in the northern subtropics but there is negligible long-term variation in the tropics and the subtropics.<sup>55</sup> Another important consequence of the present day warming is an increased intensity and frequency of tropical cyclones. For the last twenty years, tropical storms in the

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<sup>53</sup> Ibid.

<sup>54</sup> W.J. Burroughs, *Climate Change: A multidisciplinary Approach*, op cit. pp. 261-262.

<sup>55</sup> Ibid, p, 263.

North Atlantic basin has been more intense and longer lasting, while the northeast Pacific is experiencing the opposite. Other basins do not indicate any specific change in the tropical-cyclone activity.<sup>56</sup>

### 3.6 Key Effects of Climate Change

Nations of primitive societies had fewer people and worked manually or used simple tools, which did no harm to their environment. However, over the years, the human population increased, and with the technological developments, humans greatly extended the usage of fossil fuels for industrial and domestic purposes. Secondly, because of massive deforestation, environment is no longer safe. For greater economic gains, most of the developed and developing world polluted the seas and rivers, and dug the earth to acquire natural resources.<sup>57</sup>

The greatest impact of the human activities is an enhanced emission of the greenhouse gases (GHGs), aerosols, chlorofluorocarbons and other chemicals containing chlorine and bromine. These emissions not only affect the radiative forcing but also pollute the air and deplete the stratospheric ozone layer that protects the earth from the ultraviolet radiations of the sun. In addition, these gases cause acidification of the oceans, an increased warming of the earth and acid rains, leading to the destruction of crops, marine life, and fresh water supplies.<sup>58</sup>

More importantly, there are numerous physical impacts of the global climate change that cannot be ignored. With the rising temperatures, precipitation has increased in the eastern region of North and South America, northern Europe, northern and central Asia. At the same time, rainfall has significantly decreased in the Sahel, the Mediterranean, Southern and eastern parts of Africa as well as in the southern Asia. More intense storms, droughts, heat waves and heavy rains occur more frequently than the normal pattern.<sup>59</sup>

The fourth assessment report by the IPCC explains that for the past few decades weather patterns have considerably become unpredictable with significant change in locality and timing of the events. Today, the world is facing more frequent and intense rainfall and more extreme heat waves.<sup>60</sup> During the last two decades, the number of weather related disasters has more than

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<sup>56</sup> Ibid, pp. 266-267.

<sup>57</sup> D. D. Kemp, *Global Environmental Issues: A Climatological Approach*, (London: Routledge, 1990), pp. 2-5.

<sup>58</sup> M. L. Parry, et al (eds.), *Climate Change 2007: Impacts, Adaptation and Vulnerability*, (Cambridge: Cambridge University Press, 2007), pp. 7-22.

<sup>59</sup> *Climate Change, The Anatomy of a Silent Crisis*. Global Humanitarian Forum, Geneva, 2009, p. 12.

<sup>60</sup> R. Allan and B. Soden, 'Atmospheric Warming and the Amplification of precipitation extremes', *Science*, September 12, 2008, Volume 32, No. 5895, DOI: 10.1126/Science.1160787, in Ibid, P. 12.

doubled. There are estimates that nearly 400 weather-related disasters are occurring per year. Most common disasters include droughts, flash floods, and hurricanes. As a result, millions of people are affected every year.<sup>61</sup> Majority of these people belong to under developed regions particularly the Sub Saharan Africa.

Following is the brief explanation of some key physical and biological impacts of the global climate change and the emerging problems for the human societies.

#### **a) Cyclical Droughts**

There is no precise definition of drought; however, the term is widely used to express an unexpected long dry period of climate. There are four main categories of droughts. A meteorological drought is ‘a measure of moisture deficiency against normal or average conditions, established over long term observation’.<sup>62</sup> In simple terms, meteorological drought determines the dryness (compared to some normal or average amount) and the total duration of the dry period in certain regions. This type of drought varies from region to region due to precipitation levels.

The second type of drought is known as hydrological drought that occurs due to drastic reduction of water availability.<sup>63</sup> Thirdly, agricultural drought occurs due to decreased moisture and scarcity of water supply during the growing season.<sup>64</sup> Lastly, a socio-economic drought has an association with the demand and supply of economic goods in relation to hydrological, metrological, and agricultural droughts. This type of drought occurs due to an increased demand of goods whereby the supply is affected by a drastic shortfall of water supply, triggered by abrupt weather conditions.<sup>65</sup>

Drought gets severe if it continues for a prolonged period. Droughts negatively affect the living environment, tend to destroy productive land, leading to crop failure, and complete drying of water reservoirs. People living in the arid or semi-arid areas of the poorer countries often face severe shortage of water and declined food production. Led by reoccurring drought periods, during the past four decades, very dry land surface areas of the globe have increased from 12 per

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<sup>61</sup> Ibid.

<sup>62</sup> R. W. Katz and M. H. Glantz, ‘Rainfall Statistics, Droughts and Desertification in Sahel’, In: M.H. Glantz (ed.) *Desertification: Environmental degradation in and around Arid Lands*, Boulder, (Colorado: Westview Press, 1977).

<sup>63</sup> *Drought and Agriculture*, WMO Technical Note No. 392, 1975, Geneva, p. 127.

<sup>64</sup> F. K. Hare, *Climate Variations: Drought and Desertification*, Revised by L. J. Ogallo, WMP Publ. No. 653, 1993, p. 45.

<sup>65</sup> D. A. Wilhite and M. H. Glantz, ‘Understanding the Drought Phenomenon: The Role of Definitions’, *Water International* 10(3), 1985, pp. 111-120.

cent to 30 per cent.<sup>66</sup> Studies reveal that droughts have been occurring more frequently especially in Africa, South Asia, Southern Europe, and eastern Australia.

The IPCC 2007 report indicates that part of this increase is either due to decreased precipitation in most of these areas, or due to increased temperature and evaporation during the 1980s.<sup>67</sup> For instance, during this period, most parts of Africa, United States, Pakistan, India, and Bangladesh experienced severe droughts leading to water crisis, food shortages, hunger, malnutrition, and numerous vector diseases.<sup>68</sup> Affected by this drought period, America's national corn yields were 40 per cent less than the average.<sup>69</sup> Likewise, during 1988, Italy and Eastern China experienced the worst dry period of the last 114 years.<sup>70</sup>

Being mainly arid, Sub Saharan Africa, and particularly the western, eastern, and southern parts of region have been the hot spots of drought. For instance, during 2011, the Eastern Horn of Africa experienced one of the worst droughts since 1960s. This drought period threatened the lives of millions of people in Somalia, Ethiopia and Kenya as majority of the population relies on rain-fed agriculture being their key source of livelihood. Due to continuous drought led food shortages and lower productivity; region was facing famine and humanitarian crisis and more than 10 million people needed food assistance.<sup>71</sup>

Future projections for the 21<sup>st</sup> Century indicate decreased seasonal rainfall patterns across southern Europe, North America, Central Asia, Southern Africa, and other drier regions of the world. Uncontrolled climate change may lead to more intense drought cycles especially in the Mediterranean, central North America, Southern parts of America and Africa (see figure 3.2). Figure 3.2 depicts future drought trends in various parts of the globe. It shows how the world will look like under the medium case scenario when some level of mitigation measures will be put forward to control the GHG emissions. Similarly, the IPCC warns that during early years of the 21st Century, Eastern Europe, South East America, much of Australia, eastern Africa and large parts of China will be at greater risks of droughts.<sup>72</sup>

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<sup>66</sup> A. Dai et al., 'A Global Dataset of Palmer Drought Severity index for 1870-2002: Relationship with Soil Moisture and effects of Surface Warming', *Journal of Hydrometeorology*, 5(6), 2004, pp. 1117-1130.

<sup>67</sup> *Climate Change 2007: System Thesis Report*, Contribution of the Working Groups of I, II and III to the 4<sup>th</sup> Assessment Report of IPCC, Geneva, 2007.

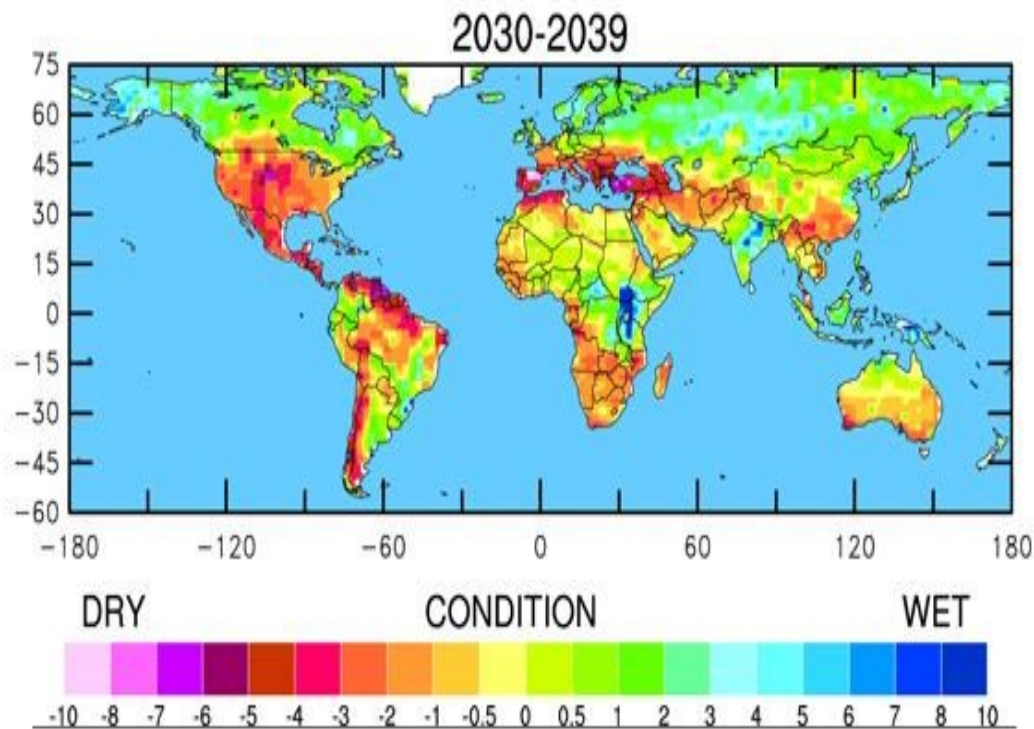
<sup>68</sup> D. M. Gates, *Climate Change and its Biological Consequences*, op cit. pp. 238-239.

<sup>69</sup> Ibid.

<sup>70</sup> Ibid.

<sup>71</sup> '10 Million at Risk from Eastern Africa Drought', *CNN News*, July 9, 2011, pp. 1-3.

<sup>72</sup> N. W. Arnell, *Climate Change and Drought*, Walker Institute for Climate Change system research, Department of Meteorology, University of Reading, UK, 2009.



**Figure 3.2** Future drought trends.

Source: National Centre for Atmospheric Research

Furthermore, dry land area under drought will increase from 10 percent to 40 percent.<sup>73</sup> By 2050s, approximately 670-1500 million people may experience increased water stress in the Mediterranean, Middle East, Central Asia, and various parts of Africa.<sup>74</sup> However, the severity and intensity of future droughts strongly depends on the management of land use and land cover practices.<sup>75</sup>

**b) Rapid desertification**

Desertification is a natural process, which is triggered by land degradation and the inter-related factors such as climate variability, poor agricultural production, population growth, and loss of

<sup>73</sup> E. J. Burke et al., ‘Modeling the Recent Evolution of Global Drought and Projections for the 21<sup>st</sup> Century with the Hedley Center Climate Model’, *Journal of Hydrometeorology*, 7(5), 2006, pp. 1113-1125.

<sup>74</sup> B. Lehner et al., ‘Estimating the Impact of Global Change on Floods and Drought Risks in Europe: A Continental, Integrated Analysis’, *Climate Change*, 75(3), 2006, pp. 273-299.

<sup>75</sup> G. A. Meehl et al, ‘Global Climate Projections’, In: *Climate Change 2007: The Physical Science Basis*, Contribution of the working group I of the 4<sup>th</sup> Assessment report of the IPCC, S. Solomon et al., (Cambridge: Cambridge University Press, 2007), pp. 747-845.

vegetation cover, especially in the arid, semi-arid, and dry sub-humid areas.<sup>76</sup> Desertification is often related to drought, seen as disappearing of seasonal rains for a very long period in arid, semi-arid, or dry sub-humid areas adjacent to the tropical deserts that eventually form desert.<sup>77</sup> Desertification does not allow sufficient evapo-transpiration; therefore, the day temperature rises dramatically.<sup>78</sup>

Desertification causes additional warming. For example, progressive warming has led to widespread desertification in the arid areas of Sonoran, Sahara, Turkestan, and Gobi. It has been estimated that over the period of each decade of the twentieth century, the areas undergoing desertification are getting 0.5 degrees centigrade warmer, compared to the nearby non-desert areas, causing extra warming to the region.<sup>79</sup> Studies suggest that among natural factors, irresponsible human actions and adverse climatic conditions are two key elements for rapid desertification.

Human activities cause land degradation in the dry land regions, which involves soil erosion, deforestation, and destruction of natural vegetation. Multitudes of these activities tend to decline the biological productivity of the land under use and permanent desertification over time.<sup>80</sup> For example, practices such as the use of poor farming methods and over grazing have amplified the expansion of Sahara desert into the northern Nigeria and northern Kenya.<sup>81</sup> Figure 3.3 indicates some of the very high-risk areas of Africa where human activities are significantly attributing to land degradation and rapid desertification. Studies indicate that nearly 6 million square kilometers of the African land area is under low to moderate risk, while 7.5 million square kilometers of Africa's land area falls under high to very high risk of desertification.

Figure 3.3 shows that majority of states in Africa are at some level of risk for desertification, ranging from low to very high. For instance, the Sahelian countries lying on the southern belt of the Sahara are the most vulnerable to dryer conditions. For example, 81 per cent of Niger has already become parched desert and the remaining 19 percent is under high risk of

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<sup>76</sup> P. F. Reich et al., 'Land Resource Stresses and Desertification in Africa', In: E. M. Bridges et al., *Responses to Land Degradation*, (New Delhi, Oxford Press, 2001).

<sup>77</sup> G. Pickup, 'Desertification and Climate Change: The Australian Perspective', *Climate Research*, Volume, 11, December 1998, pp. 51-63.

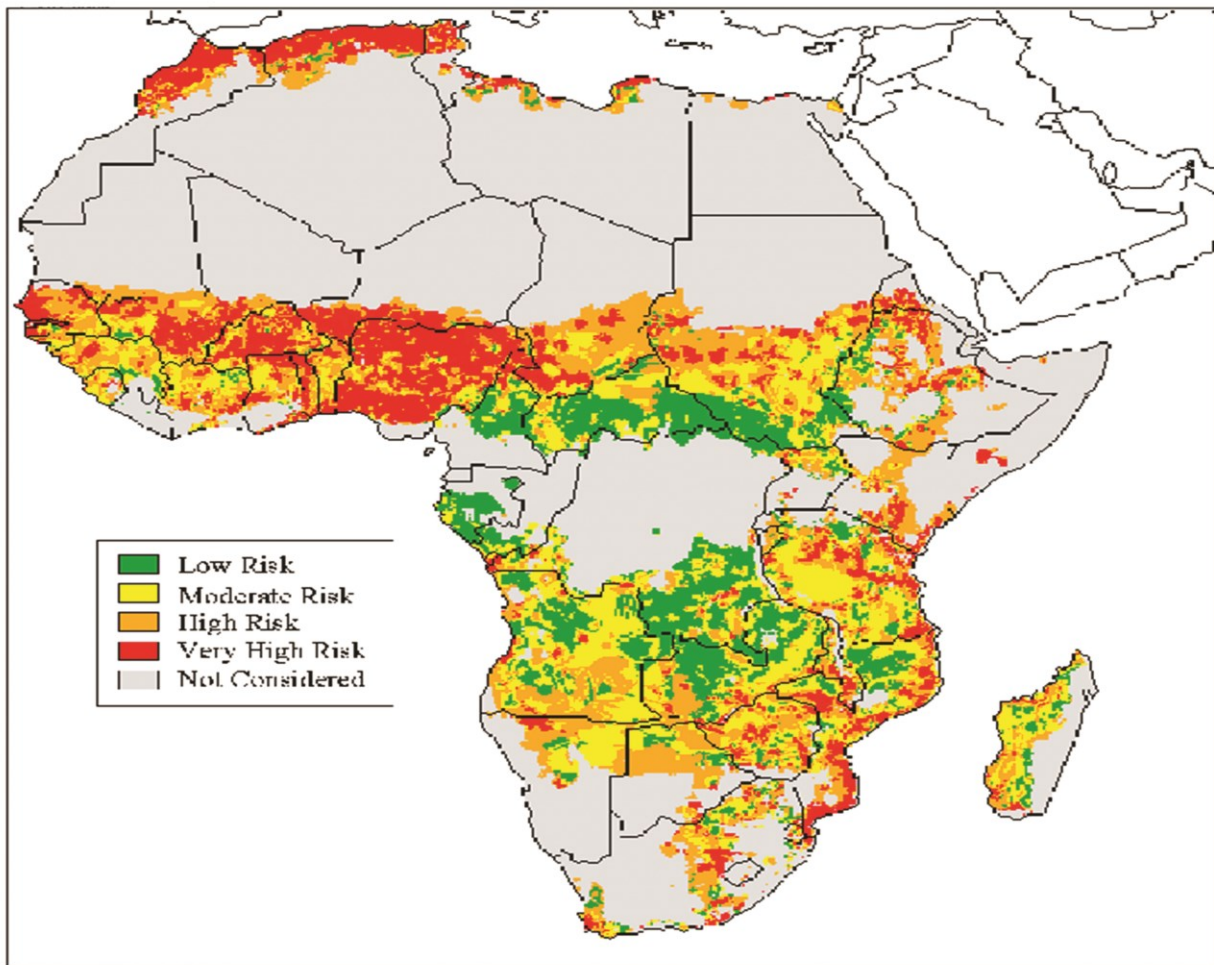
<sup>78</sup> Ibid.

<sup>79</sup> R.C. Balling, *Impacts of desertification on regional and global warming*, Bull. Am. Meteorol. Soc. 72, pp. 232-234, In: D. M. Gates, *Climate Change and its Biological Consequences*, op cit, pp. 241-242.

<sup>80</sup> S. Erikson, 'Linkages between Climate Change and Desertification in East Africa', Part 1: Physical and Social Linkages, *Arid Lands*, No. 49, May/June 2001.

<sup>81</sup> W. Maathai, *The Challenge for Africa*, op cit, p. 250.

desertification. Observations indicate that the spread of the Sahara desert was linked to rainfall variability, and the changes in the global climate.<sup>82</sup>



**Figure 3.3** Risks of desertification in various parts of Africa.

Source: Land Resource Stresses and Desertification in Africa, US Natural Resource Conservation Service

In addition, it was concluded that the atmospheric dust present in the region, plays an additional role in global warming that has significantly led to further the process of desertification.<sup>83</sup> Figure 3.3 indicates that many of the North Africa's Mediterranean countries and along the fringes of the Kalahari are vulnerable to rapid desertification.<sup>84</sup> In the eastern Africa, parts of Kenya and Tanzania are also under moderate to very high risk of desertification.

<sup>82</sup> W. J. Burroughs, *Climate Change: A Multidisciplinary Approach*, op cit. pp. 206-208.

<sup>83</sup> Ibid.

<sup>84</sup> P. F. Reich et al., 'Land Resource Stresses, and Desertification in Africa', In: E. M. Bridges et al., *Responses to Land Degradation*, (New Delhi, Oxford Press, 2001).

During the 1960s-1970s, reoccurring cycles of drought were experienced in the Sahel region and more than 100,000 people died and the affected arid regions experienced massive losses in terms of pastoralist economy. Desertification affects socio-economic development.

According to Millennium Ecosystem Assessment 2005, dry lands have the lowest Gross Domestic product (GDP) per capita and the people living in dry lands have to survive under the worst economic conditions and the highest infant motility rates. Soil degradation worsens the conditions and considerably declines the land fertility and crop yields, leading to poor incomes.<sup>85</sup> Studies reveal that each year, 60,000 sq. km of land turns to deserts and endangers the lives of nearly 50 million people.<sup>86</sup>

### c) *El-Nino and La-Nina*

*El-Nino* and *La-Nina* are key indicators of climate variability and change. These two events describe weather conditions especially in the Southwest regions of the Earth. These events are also part of *El-Nino Southern Oscillation (ENSO)*, termed as natural sea saw occurring in the Oceanic Sea. These events take place due to difference in sea surface temperatures and surface air pressure between east and west of the Oceanic Sea. Therefore, ENSO events refer to a prolonged high and low sea surface temperatures when compared to the mean. Historically, *El-Nino* has been an irregular weather pattern, which occurred after every 2-7 years and did not last more than a period of twelve to eighteen months. However, for the last three decades, the *El-Nino* cycle has been reoccurring more frequently and with a longer duration, compared to the historical patterns.<sup>87</sup>

Figure 3.4 indicates that during the last decade of the 20<sup>th</sup> Century, with the temperature rise, *El-Nino* and *La Nina* occurred more consistently during 1991-1992, 1993-1994 and 1997-1998 unlike in the period before the 1980s. Scientists believe that it is unusual for both the phenomena to occur so frequently and in consecutive years. Figure 3.4 also suggests that since the beginning of 21<sup>st</sup> Century, *El Nino* has repeatedly occurred in seven cycles, where-as, during the period of 1950-1960, *El-Nino* was recorded three times only.<sup>88</sup> Due to the *El-Nino* phenomenon, sea surface temperature rises along the South American coast. The natural phenomenon not only shifts the weather patterns in the Pacific, it negatively affects the global

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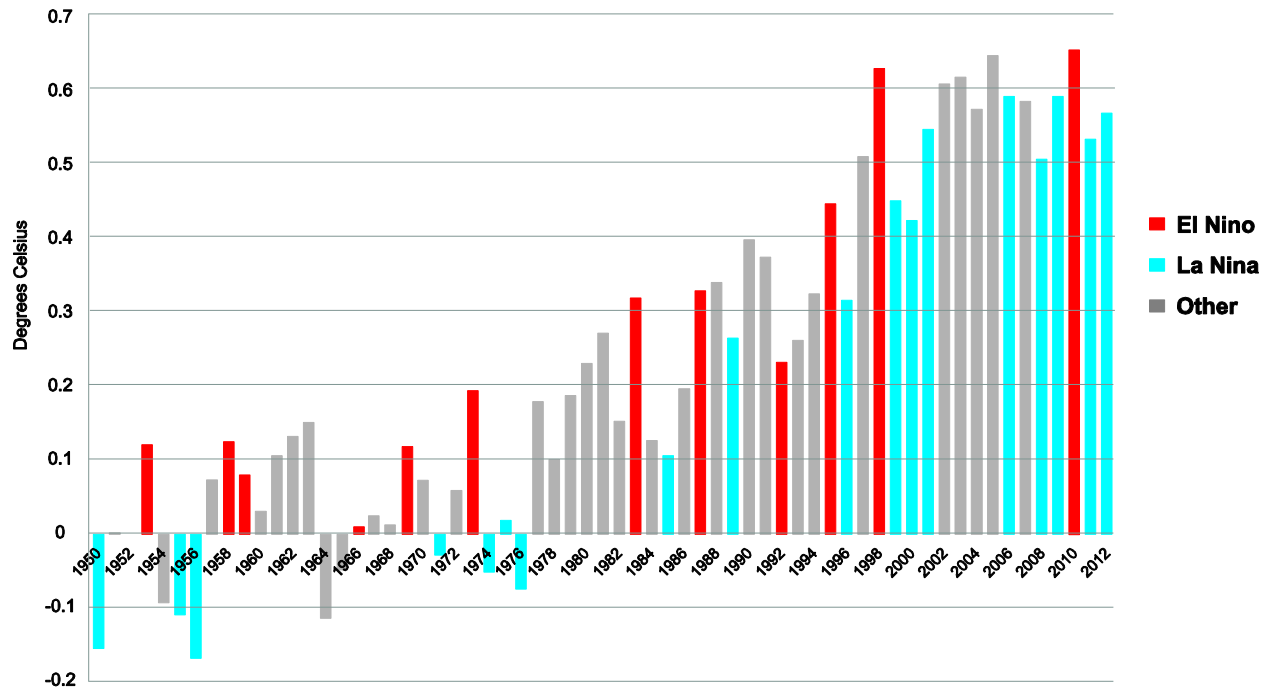
<sup>85</sup> 'Climate Change and Desertification', *UNCCD Thematic Fact sheet Series No. 1*, June 2007.

<sup>86</sup> D. D. Kemp, *Global Environmental Issues: A Climatological Approach*, op cit, pp. 54-57.

<sup>87</sup> 'Cold and Warm Episodes by Season' National Weather Services Climate Prediction Centre, National Oceanic and Atmospheric Administration (NOAA), 2009.

<sup>88</sup> Ibid.

climatic conditions by triggering flash floods, storms and droughts. Other possible consequences are famine, losses of livelihoods, and the spread of malnutritional diseases including malaria, cholera, measles, and dengue fever.<sup>89</sup>



**Figure 3.4:** Increased warming and growing occurrences of *El-Niño* and *La Niña*.

Source: National Oceanic and Atmospheric Administration (NOAA)

Very often, South America, South East Asia, Horn of Africa, and southern part of Africa experience the most serious implications of *El-Niño*. For instance, during the 1997-1998 *El-Niño*, Ecuador suffered from massive economic losses. Agriculture and fisheries are two key economic pillars of the country, which lost earnings of US\$ 112 million. Mainly due to the direct damages of the infrastructure, crop failure, and loss of employments, most people lost their livelihoods. As a result, the country's poverty level increased by 11 percent.<sup>90</sup>

Likewise, during the period of 1980-2001, *El-Niño* droughts extensively affected the Southern African states. It was recorded that after every *El-Niño*, the potential for drought increased by 120 percent, compared to other times.<sup>91</sup> For instance, the Northeast African region

<sup>89</sup> M. Boko et al., 'Africa', *Climate Change 2007: Impacts, Adaptation and Vulnerability*, Contribution of the Working Group II to the Fourth Assessment Report of the IPCC, M.L. Parry et al., (eds.), (Cambridge: Cambridge University Press, 2007), p.435.

<sup>90</sup> R. Vos, S. Velasco, and E. de Labastida, 'Economic and social effects of "El-Niño" in Ecuador, 1997-1998', Inter-American Development Bank, 1999, p.10.

<sup>91</sup> M. C. Thomson et al, 'El-Niño and Drought in southern Africa' *The Lancet* Volume 361, Issue 9355, pp. 437-438, 1 February 2003.

has continuously been affected by severe droughts, led by *La-Nina*. Most commonly, arid and semi arid lands of Somalia, Kenya, Ethiopia and Djibouti are threatened by food shortages and onset of famines. Research indicates that due to the ongoing climate change, *El Nino* and *La Nina* phenomena will continue to occur more frequently even if the global climate change stays stable.<sup>92</sup>

#### **d) Acid rains**

Acid rain is caused by increased atmospheric pollutants such as sulfur dioxide and nitrogen oxide released by electricity generation, vehicular traffic, and industrial sector. Livestock production also releases huge amounts of ammonia. The absorption of carbon dioxide in the atmospheric water vapors produces carbonic acid while nitric acid is a by-product of thunderstorms. Likewise, volcanic activities and forest fires produce sulfur dioxide that together with water vapors turns into sulfuric acid.

These acids in the air form acid rain and help to cleanse the atmosphere naturally. Nitrogen and sulfur are important soil nutrients and return to the soil with acid rain.<sup>93</sup> Most of the acid rain sources are present in the industrialised zones including North and northeastern America, Western and Eastern Europe. However, the fastest growing economies such as, Japan, China and India are rapidly becoming industrialised and consequently, releasing increased quantities of the acidic pollutants.<sup>94</sup> Initially, acid rain was only a local or regional concern, however, in the near future, it is likely to spread all over the globe as many developing states are trying to plant more industry and acquire higher economic status.

Acid rain has numerous damaging effects on soils, freshwaters, forests, and aquatic life.<sup>95</sup> During the last few decades, fish population has considerably declined from the lakes and streams of eastern North America, Britain, and Scandinavia. Observations indicate that surface water in the areas of New York State, Nova Scotia, Norway and Sweden has become harmful for

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<sup>92</sup> X. Rodo & F. A. Comin (eds.), *Global Climate, Current Research and Uncertainties in the Climate System*, (Berlin: Springer-Verlag, 2003), pp. 1-25.

<sup>93</sup> D. D. Kemp, *Global Environmental Issues: A Climatological Approach*, op cit. p. 68.

<sup>94</sup> Ibid. pp. 68-75.

<sup>95</sup> P. Mehta, 'Science behind Acid Rain: Analysis of its Impacts and Advantages on Life and Heritage Structures', *South Asian Journal of Tourism and Heritage*, (2010), Volume 3, No. 2, pp. 123-131.

fish production.<sup>96</sup> Many varieties of fish, such as rainbow trout, smallmouth bass, the salmonid group, and perch are at a great risk of extinction in the affected areas.<sup>97</sup>

For instance, due to acid rain, there is no more brook trout found in the streams and lakes of Adirondack Mountains of the US.<sup>98</sup> Acid rain slows down the growth of forest trees and as an after-affect, leaves turn yellow or brownish. A survey performed in the Vermont area reveals that acid rain progressively reduced the growth of fir and birch forests between 1965 and 1979.<sup>99</sup> Since 1980, maple groves are greatly suffering from dieback in Ontario, Quebec and Vermont.<sup>100</sup> Similarly, in East and West Germany, Czechoslovakia, Poland and in Britain, acid rain is not only damaging the existing forests, there is no guarantee that the future of forests is safe anymore.<sup>101</sup>

In 1989, scientists observed traces of acid rain in the rain forests of equatorial Africa, along the Ivory Coast, across Central Africa, including Gabon, Congo, and Zaire.<sup>102</sup> Observations revealed that the level of acidity found in the African forests was 10 times greater than the normal acidity level. Scientists associated these high levels of acidity to human activities such as forest fires, which continue throughout the year. The accumulation of high level of acidity in fog, mist, cloud vapors and in rainwater significantly damages the tree leaves. In the soil, high acidity damages roots and changes the root system, and the ability of roots to absorb nutrients from the soil.<sup>103</sup>

More importantly, acid rain indirectly harms human health. An increased amount of sulfur dioxide and nitrogen oxide (being fine chemical particles in the air) is dangerous for human heart and may cause problems like asthma and bronchitis.<sup>104</sup> Acid rain contributes to the destruction of the built environment and causes cracking, flaking, crumbling, and discoloration to limestone and marble. Acid rain also causes severe damage to steel and other metals used in

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<sup>96</sup> J. P. Baker and C. L. Schofield, 'Acidification Impacts on Fish Population: A Review', In D.D. Adams and W.P. Page (eds.), *Acid Deposition: Environmental, Economic and Political Issues*, (New York: Plenum Press, 1985).

<sup>97</sup> A. LaBastille, 'Acid Rain – How great the menace?' *National Geographic* 160, 1981, pp. 652-681.

<sup>98</sup> 'Effects of Acid Rain-Surface Waters and Aquatic Animals', US Environmental Protection Agency, Retrieved online, 27 May 2011.

<sup>99</sup> A. H. Johnson and T. G. Siccama, 'Acid deposition and forest decline' *Environmental Science and Technology* 17, 1988, pp. 294-305.

<sup>100</sup> P. Norton, 'Decline and Fall', *Harrowsmith* 9, 1985, pp. 24-43.

<sup>101</sup> F. Pearce, 'The Menace of Acid Rain', *New Scientist* 95, 1982d, pp. 419-423. Also C. C. Park, *Acid Rain: Rhetoric and Reality*, (London: Methuen, 1987).

<sup>102</sup> M. Simons, 'High Ozone and Acid Rain Levels Found over African Rain Forest', *New York Times*, 19 June 1989, Retrieved online, 9 June 2013.

<sup>103</sup> Ibid.

<sup>104</sup> Food and Agriculture Organisation, 'Livestock impact on the environment', *United Nations*, November 2006.

structures. During The last fifty years, acid rain has greatly affected historical buildings in Greece and Italy that were as old as 2000-3000 years.<sup>105</sup> As a mitigation measure, the International treaties such as Sulfur Emissions Reduction Protocol and the Air Quality Agreement between Canada and America will help to reduce the amount of atmospheric pollutants that are primary causes of acid rain.

#### e) Heat waves

Heat waves are influenced by ‘progressive and prolonged period of excessive heat and humidity’.<sup>106</sup> Rising temperatures and the changing climate are causing an increased intensity of heat waves throughout the globe. Severe heat waves can cause illnesses such as heat cramps, fainting, heat exhaustion, heat stroke, and death. Heat waves are known to kill more people in a shorter period than any other climate related event.<sup>107</sup> Studies of large cities show that during the days of an extremely high temperatures, death rate doubles or triples than the average.<sup>108</sup> For instance, during the European 2003 heat wave, approximately 35,000 people died due to dehydration and heat stroke. There were also reports of cardiovascular, cerebrovascular, and respiratory illnesses due to increased ozone levels.<sup>109</sup>

Studies held by National Center for Atmospheric Research (NCAR) in Boulder observed that due to increased heat absorption of the greenhouse gases, a strange pattern of atmospheric circulation takes place, as was noticed during the 1993 Chicago and 2003 Paris heat waves. In future, warmer climate with increased average temperature, heat waves would become more intense, longer lasting, and more frequent.<sup>110</sup> There is a prediction that by 2040, the occurrence of heat waves in Europe and many other regions of the world will become more common.<sup>111</sup> The

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<sup>105</sup> C.C. Park, *Acid Rain: Rhetoric and Reality*, op cit.

<sup>106</sup> ‘Cold and Warm Episodes by Season’, National Weather Services Climate Prediction Centre, National Oceanic and Atmospheric Administration (NOAA), 2009.

<sup>106</sup> M. Lippmann, ‘The effects of inhaled acid on Human Health’ In: *Conference Proceedings: Intergovernmental Conference on Acid Rain*, Quebec, Quebec City, Ministry of Environment, 10-12 April 1985.

<sup>107</sup> E. M. Kilbourne, ‘Heat waves and Hot Environments’, In: E. K. Noji (ed.) *The Public Health Consequences of Disasters*, (Oxford University Press, New York, 1997).

<sup>108</sup> I. S. Kalkstein. ‘Direct Impact in Cities’, *Lancet*, 342, 1993, pp. 1397-1399.

<sup>109</sup> P. R. Epstein, *Climate Change Futures: Health, Ecology and Economic Dimensions*, The Center for Health and the Global Environment, Harvard Medical School, 2006.

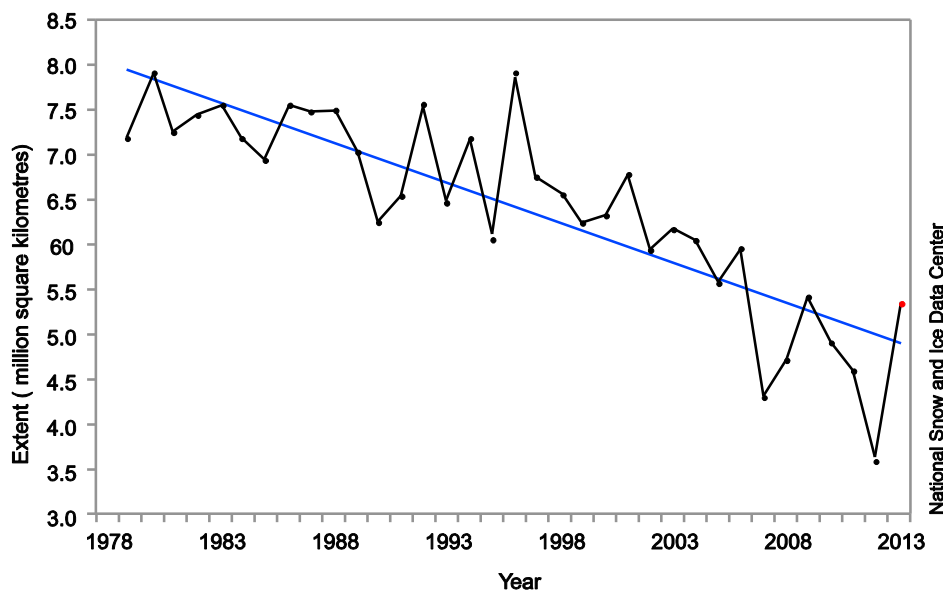
<sup>110</sup> G. A. Meehl and C. Tebaldi, ‘Heat Waves of the 21<sup>st</sup> Century: More intense, more frequent and longer lasting’, *Science* 13, Volume 304, August 2004, pp. 994-997.

<sup>111</sup> P. A. Scott, D. A. Stone and M. R. Allen, ‘Human Contribution to the European Heat wave in 2003’, *Nature*, volume 432, December 2004, pp. 610-614.

IPCC declares that over the next four decades, the potential for heat waves will increase by 100 times.<sup>112</sup>

**f) Changes in snow cover, ice sheets, and the rise of sea levels**

In recent years, climate variability has led to dynamic changes in the size of icebergs, glaciers, and snowcaps. Satellite data indicates that since 1978, sea ice has been decreasing at an average rate of nearly 2.7 per cent per decade (see figure 3.5) and reached the lowest ever in 2012. Likewise, in the Central Arctic, the average sea ice thickness reduced by one meter during 1987-1997.<sup>113</sup>



**Figure 3.5** Changes in the Arctic Sea ice.

Source: National Snow and Ice Data Center

Figure 3.5 demonstrates that the changes in the Arctic Sea ice that have been progressively receding since the late 1990s. During 2007-2009, the International Council for Science and the World Meteorological Organization carried out more than 200 research projects to study the changes in the oceans, ice covers, and atmosphere. Studies indicate that during the first decade of the 21<sup>st</sup> Century, the Arctic ice cover has been melting and thinning significantly. It was revealed that during November 2009, the ice cover was the minimum ever recorded.<sup>114</sup>

<sup>112</sup> M. L. Parry et al., *Climate Change 2007; Impacts, Adaptation and Vulnerability*, Contribution of the working group II to the 4<sup>th</sup> Assessment report of the IPCC, op cit.

<sup>113</sup> P. Lemke et al., ‘Observations: Changes in Snow, Ice and Frozen Ground’, In: IPCC 2007, *Climate Change 2007: The physical Science Basis*, (Cambridge: Cambridge University Press, 2007), p. 339.

<sup>114</sup> *2010 Global Environmental Outlook*, (Nairobi: UNEP 2010), p. 35.

Similar trends have been observed in the later years as the ice covers continued to recede (see figure 3.5 above).

The IPCC observes that warmer global temperatures are increasing the ocean temperatures up to 3000 meters deep. Oceans are also absorbing nearly 80 per cent of the global heat and ultimately causing the thermal expansion of the upper layers of the sea with increased volumes.<sup>115</sup> Another source of the rising sea levels is the water mass from the melting of the alpine glaciers and snow from the mid-latitudes. In addition, warmer temperatures are either melting or sliding the ice sheets in Antarctica and Greenland, with significant expansion of the volumes of the oceans.<sup>116</sup> Studies suggest that during the 42 years period of 1961-2003, sea levels rose by 2.1 centimeters at an average rate of 0.52 millimeters per year.<sup>117</sup>

Over the past 100 years, average global sea level rise is occurring at the rate of 1.7 mm per year. Studies predict that by 2025, it may further rise from 10-21 centimeters and by the end of 21<sup>st</sup> Century, average global sea rise may reach 57 to 368 cm.<sup>118</sup> Small islands, countries with long coastlines, coastal towns, and low-lying areas are the most vulnerable to the disasters led by the sea-level rise. For example, a sea rise of less than a meter can bring enormous destruction in Netherlands, Bangladesh, Nile Delta region of Egypt, eastern coastline of China and Mississippi in North America.<sup>119</sup> Coastal areas having agricultural land are most likely to suffer extensively from sea level rise and storms. For instance, on the Islands of Caribbean and the Pacific, majority of the population is living within the distance of 1.5 kilometers from the sea line. These nations are powerless against the rising seas and do not find any viable adaptive solutions, therefore, migration to the uplands is the only way out for them.<sup>120</sup>

#### **g) Storm surges and floods**

Storm surge is a temporary increase in the sea level in a particular location, caused by extreme meteorological conditions such as low atmospheric pressure or strong winds.<sup>121</sup> Hurricanes,

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<sup>115</sup> P. Lemke et al., *Climate Change 2007: The physical Science Basis*, op cit.

<sup>116</sup> *2010 UNEP Year book*, (UNEP, Nairobi, 2010), p. 33.

<sup>117</sup> C. M. Domingues et al., 'Improved estimates of Upper Ocean Warming and Multi-Decadal Sea-level Rise' *Nature* 453, 2008, pp. 1090-1093.

<sup>118</sup> J. G. Titus, (ed.), *Greenhouse Effect, Sea Level Rise and Coastal Wetlands*, U.S. Environmental Protection Agency, Washington, D.C., 1988.

<sup>119</sup> J. Houghton, *Global Warming: A complete Briefing*, (Cambridge: Cambridge University Press, 1997), pp. 111-115.

<sup>120</sup> *Climate Change: The Anatomy of A Silent Crisis*, Global Humanitarian Forum, Geneva, 2009, p. 51.

<sup>121</sup> *Climate Change 2007: The Physical Science Basis*, IPCC, Summary for Policy Makers, (Cambridge: Cambridge University Press, 2007).

typhoons, and tropical cyclones are different kinds of storms that usually strike crowded coastal towns and settlements with huge power and devastating social and economic impacts. A tropical cyclone generally occurs in the North Atlantic, South Pacific, or North-East Pacific Ocean, while a typhoon occurs in the North-West Pacific Ocean, west of the dateline. In other parts of the world, these storms are simply known as severe tropical cyclones. All storms have different wind strengths and categories, measured to the Saffir Simpson Scale.<sup>122</sup>

During the past two centuries, 2.6 million people have lost their lives due to severe storm surges.<sup>123</sup> The disastrous effects of hurricanes Ivan in 2004 and Katrina, Rita, and Wilma in 2005 illustrate the vulnerability of the people of North America.<sup>124</sup> Over the years, such disasters have had overwhelming impacts in many developing countries. For instance, due to its unique geographical location, Bangladesh suffers from frequent cyclones. In November 2007 cyclone Cidr killed 3,000 people and 50,000 people were injured, while millions lost their shelters.<sup>125</sup> During May 2008, in the Irrawaddy Delta in Myanmar, 80,000 were killed, and 7 million lost their livelihoods due to cyclone Nargis.<sup>126</sup>

Studies indicate that the climate change may not increase the number of storms; however, it will increase the intensity of storms due to thermal expansion and the resulting sea level rise.<sup>127</sup> In addition, the warmer oceans intensify the cyclone activities and the potential for greater destruction. For the last thirty years, the strength of hurricanes has increased by 70 percent, especially in the North Pacific, Indian, and South Pacific Oceans.<sup>128</sup> The IPCC predicts that ‘experiments with climate models with sufficient resolution to depict some aspects individual hurricanes tend to project some increase in both peak wind speeds and precipitation intensities.

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<sup>122</sup> Ibid.

<sup>123</sup> R. J. Nicholls, ‘An Expert Assessment of Storm Surge ‘Hotspots’, Final Report (Draft Version) to Center for Hazards and Risk Research, Lamont-Dohert Observatory, Columbia University, 2003.

<sup>124</sup> North America Chapter of the IPCC, Working Group II Technical Report, *Climate Change 2007: Impacts, Adaptation, Vulnerability*, (Cambridge, Cambridge University Press, 2007).

<sup>125</sup> Emergency Report, Sit Rep# 14, SIDR Cyclone Bangladesh 2007, The United Nations, Retrieved online, 12 April 2013.

<sup>126</sup> Post-Nargis Joint Assessment, The United Nations, Retrieved online 13 April 2013.

<sup>127</sup> S. Dasgupta et al., ‘The impact of sea level rise on developing countries: A comparative Analysis’, *Climate Change* 2009.

<sup>128</sup> K. A. Emanuel, ‘Increasing Destructiveness of Tropical Cyclones over the past 30 years’, *Nature*, vol. 309, 2005, p. 284.

The pattern is clearer for extra-tropical storms which are likely to become more intense, but perhaps less frequent, leading to increased extreme wave heights in the mid-latitudes'.<sup>129</sup>

#### **h) Loss of biodiversity**

Biodiversity refers to the variety of different species of plants, animals, or organisms, in one ecosystem within which they interact and live together. The term expresses the formation of ecosystems through the goods and services that are necessary for the sustainability of all kinds of life.<sup>130</sup> According to some studies, there are 13.6 million species known to man whereby millions are still under investigation and yet to be catalogued, especially in the tropical forests.<sup>131</sup> The world's biodiversity is immensely valuable for research and development, especially in the areas of science and technology.

With climate change, world's habitats are shrinking and many animal and plant species are at the risk of extinction. For instance, the world habitats have severely affected due to the destruction of rainforests.<sup>132</sup> With the loss of rainforests, between four to six thousand plant and animal species are disappearing per annum.<sup>133</sup> In 2005, the Millennium Ecosystem Report revealed some inevitable losses of biodiversity led by irresponsible human activities. In future, climate change will be the greatest direct driver for the extinction of animals and plants.<sup>134</sup> The report further states that climate change has direct impacts on the species as it 'changes the distribution, increases the extinction rates, affects the reproduction timings, and changes the length of growing seasons for plants.'<sup>135</sup>

In particular, many bird species cannot tolerate the increased warming as it interferes with their environment and endangers their existence, although they are able to migrate to newer locations. For example, climate change has particularly disturbed the nesting requirements of Kirtlands warbler and seagulls. Likewise, the snow geese of the far North follow the snowmelt line, however, changes in the precipitation pattern and snowmelt can stop the birds from

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<sup>129</sup> North America Chapter of the IPCC, Working Group II Technical Report, *Climate Change 2007: Impacts, Adaptation, Vulnerability*, (Cambridge, Cambridge University Press, 2007).

<sup>130</sup> *Biodiversity and Climate Change*, Convention on Biological Diversity, (Nairobi, UNEP, 2007), p. 1.

<sup>131</sup> D. Hawksworth and M. Kalin-Arroyo, 'Magnitude and Distribution of Biodiversity', In: V. H. Heywood and R. T. Warson, *Global Biodiversity Assessment*, (Cambridge: Cambridge University Press, 1995), P. 111.

<sup>132</sup> D. M. Gates, *Climate Change and its Biological Consequences*, op cit, pp. 164-165.

<sup>133</sup> E. O. Wilson, "Threats to Biodiversity," *Scientific American* 261, No. 3, September 1989, pp. 111-112.

<sup>134</sup> The 2005 Millennium Ecosystem Assessment Report, March 2005, Retrieved online, 15 August 2014

<sup>135</sup> *Biodiversity and Climate Change*, Convention on Biological Diversity, op cit.

migration. Ultimately, staying back can over-crowd their living environment and affect the fresh water vegetation including the salt marshes of the region.<sup>136</sup>

In many places, regional changing climate and outbreak of the fungal diseases may harm future survival of some species of the amphibians. For instance, since 1989, golden toad has become extinct in the Pacific region.<sup>137</sup> Specifically, the male sea turtle population is significantly endangered because the temperature is uniquely important for the hatching of male turtle compared to the female turtles. Changes in the rainfall patterns may also reduce the reproduction of frogs. Indian tigers are threatened by the loss of habitat and the sea level rise. In the African wilderness, due to longer dry spells, the elephant population is at a great risk.<sup>138</sup>

The IPCC and the Millennium Ecosystem Assessment reports indicate that the existing ecosystem is particularly vulnerable due to erratic climate change especially in the Polar region.<sup>139</sup> During the 20th century, Arctic air temperature rose by 5°C while there is a potential for further increase of 4.7°C in the 21st century, which greatly endangers the future of Arctic life.<sup>140</sup> Animals such as the walruses, polar bears, seals and some other marine mammals are especially dependent on the sea ice for resting, feeding, and breeding, which may not survive in warmer climates.<sup>141</sup> For instance, the shorter period of sea ice coverage does not allow polar bears to hunt for the length of time they need for their survival. Research indicates that in the 1980s, the polar bears in the western Hudson Bay area in Canada had an average weight of 650 pounds, which was reduced to 507 pounds by 2004.<sup>142</sup>

The biodiversity is particularly important to the indigenous communities. These communities use biodiversity to buffer against climatic variations and natural catastrophes. These people are very reliable source of information where climate models cannot reach out to predict future scenarios. For example, some of the indigenous communities have noticed climate

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<sup>136</sup> Ibid. pp. 168-169.

<sup>137</sup> UNEP-WCMC, Species sheet, February, 2002.

<sup>138</sup> *Biodiversity and Climate Change*, Convention on Biological Diversity, op cit.

<sup>139</sup> IPCC 2007, *Climate Change 2007: Synthesis Report*, Cambridge, Cambridge University Press, 2007.

<sup>140</sup> S. J. Hassol, 'Impacts of a warming Arctic', *Arctic Climate Impact Assessment (ACIA)*, Cambridge University Press, 2004.

<sup>141</sup> Ibid.

<sup>142</sup> 'Warming Climate may put chill on Arctic Polar Bear', NASA, Goddard Space Flight Center, 2006, Retrieved online, March 2013.

change in the Himalayas, British Columbia, Kalahari Desert, and the Arctic Zone, whereby they collaborate with the scientists and share valuable knowledge.<sup>143</sup>

The warmer climate has adversely affected the socio-economic structures of the indigenous communities. For thousands of years, people the indigenous communities in the Arctic Zone had adapted to the local living conditions. However, due to changing weather conditions, they are no longer able to practice their traditional hunting and fishing.<sup>144</sup> For instance, ringed seal is a major source of food for the Inuit of Canada. However, the reduced ice cover has significantly lowered the production of these seals.<sup>145</sup> Likewise, the *Dorobo* of Kenya are also facing a similar situation. For centuries, these communities have lived on the forest products, consisting on forest berries, honey, and wild animals. However, with other political factors, developmental issues and climate change, their traditional ways of lives have entirely changed.<sup>146</sup>

Loss of biodiversity is a global concern; therefore, the international community has taken few measures to preserve the endangered species and their habitats. In 1982, UN World Charter for Nature took serious steps to monitor the deterioration and over exploitation of natural habitats, and expressed the need for taking national and international measures to protect nature.<sup>147</sup> Furthermore, in June 1992, during the United Nations Conference on Environment and Development, 157 nations signed the Biodiversity Convention. The Convention emphasises on the need to protect animals and plant species together with their habitats such as wetlands and the forests. Key focus of the Convention was to address the issues of sustainable use of these resources. Additionally, it is more important for the governments to adopt national strategies that can balance the animal and plant species preservation with sustainable development.

### **3.7 Climate Change Regimes, Institutions, and Policies**

Since the 1960s and 70s, enhanced concentration of the CO<sub>2</sub> emissions and environmental deterioration led to fundamental debates at various levels. Therefore, to deal with growing

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<sup>143</sup> J. Salick and A. Byg (eds.), *Indigenous People and Climate Change*, Tyndall Centre for Climate Change Research, Oxford, May 2007, p. 12.

<sup>144</sup> J. D. Ford et al., 'Climate Change policy responses for Canada's Inuit population: The importance of and opportunities for adaptation', *Global Environmental Change* 20 (2010), pp. 177-191.

<sup>145</sup> Ibid.

<sup>146</sup> Interview with Mr. J. Kioli, Chairman Kenya climate Change Working Group and Executive Director Green Africa Foundation, Nairobi, 28 April 2014

<sup>147</sup> Draft of 48th plenary meeting of the UN General Assembly on World Charter for Nature, 28 October 1982, Retrieved online, 30 May 2014

impacts of environmental issues such as the global climate change, various initiatives have led to the establishment of climate change regimes, institutions, and policies at national, regional, and international levels.

**a) International Initiatives**

In 1972, first UN environmental conference was held in Stockholm, which was explicitly aimed to deal with issue of development in relation to the environment. The conference adopted an action plan to deal with the environmental problems and therefore, specifically marked the significance of the environmental issues in world politics.<sup>148</sup> The Stockholm conference concluded with international norms for the protection of the environment as a sovereign state's key responsibility. In addition, the Stockholm Declaration on human environment stressed for global cooperation and the establishment of international norms regarding trans-boundary pollution.<sup>149</sup>

Thereafter, the UNGA established the United Nations Environmental Program (UNEP). Key role of UNEP is to coordinate international response and disseminate information on environmental awareness. During 1987, *the Brundtland Report* gave substantial prominence to the issue of climate change, being a result of reckless anthropogenic activities. Following this, with the close association of United Nations Environmental Program (UNEP) and the World Meteorological Organization (WMO), the Intergovernmental Panel on Climate Change (IPCC) was established in 1988. The IPCC comprises multidisciplinary team of scientists and state representatives who are experts in the field of climate change. The panel reviews and assesses the outcomes of scientific, technical, and socio-economic information and provides up to date knowledge about the global climate change.

The IPCC team is sub-divided into three committees such that the Working Group I assesses the physical science of climate change; Working Group II takes charge of examining the climate change effects while also looking for adaptation measures and; Working Group III prepares mitigation strategies. In addition, it establishes task forces to deal with specific issues. For example, the task force on National Greenhouse Gas Inventories was formed to develop and refine methods for calculation and reporting of national GHG emissions and removals. Since 1990, the panel has successfully published five periodic reports with key themes of emerging

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<sup>148</sup> H. W. Jeong, *Peace and Conflict Studies*, Institute for Conflict Analysis and Resolution, George Mason University, USA, 2000, p. 268.

<sup>149</sup> United Nations, *The Stockholm Declaration on Human Environment*, Articles 21-22, 5-16 June 1972.

climate change impacts while assessing the future climate scenarios. In addition, these reports offer economic, technological, and institutional policy options especially to mitigate the negative impacts on human societies.

In 1992, United Nations Conference on Environment and Development (UNCED) (the Earth Summit) was held in Rio de Janeiro, Brazil in June 1992. The Summit investigated the outcomes of *the Brundtland Report* and provided a platform to discuss the issues of environmental protection and sustainable economic development. The Earth Summit concluded with the signing of fundamental treaties on climate protection, biodiversity, and proposals for forest management and sustainable development.

For instance, the United Nations Framework Convention on Climate Change (UNFCCC), Agenda 21, Conventions of Biological Diversity, and Convention to Combat Desertification are few instrumental initiatives to address major international environmental issues. The Earth Summit created the Commission on Sustainable Development, which stressed to impose environmental measures on the activities of the industrialised nations. Furthermore, the Commission established the Global Environmental Facility (GEF), with a major aim to provide financial incentives for poor states in dealing with climate change impacts.<sup>150</sup>

One hundred and ninety two states ratified the UNFCCC that became a party to the Convention. The UNFCCC is the main international treaty on climate change and provides an umbrella to the member states. UNFCCC's key objective is for the '*...stabilisation of the greenhouse gas concentration in the earth's atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system...*'.<sup>151</sup> Key focus of the UNFCCC was to encourage Annex 1 states (the developed states) to tackle the issue of global warming by significantly reducing the emissions of green house gases (GHGs), which are disrupting the climate system.<sup>152</sup> However, the Convention does not provide any all agreed legally binding targets for the members to restrict their GHGs emissions.<sup>153</sup>

Since the establishment of the UNFCCC, it has held series of conferences on annual basis. In December 1997, the UNFCCC held its third Climate Conference of the Parties (COP3)

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<sup>150</sup> H. W. Jeong, *Peace and Conflict Studies*, op cit, pp.268-269.

<sup>151</sup> *The United Nations Framework Convention on Climate Change (UNFCCC)*, Article 2, The United Nations , 1992, p.5.

<sup>152</sup> Ibid.

<sup>153</sup> *National Climate Change Response Strategy*, Government of Kenya, Ministry of Environment, and Mineral Resources, 2010, p, 23.

in Kyoto, Japan, whereby the members adopted the Kyoto Protocol. The Kyoto Protocol was a legally binding treaty, aimed to set up targets especially for the industrialised states to cut their total 5.2 per cent GHGs emissions compared to the levels of 1990. It further produced a timetable within that 37 industrialised states (Annex 1) were obliged to meet the targets of emission reduction during 2008-2012.<sup>154</sup>

Additionally, the Kyoto Protocol encouraged the member states to implement national climate change policies by setting a carbon tax. It recommended that until 2015, heavily industrialised countries or the major polluters will need to pay US\$ 23, per ton of carbon released into the atmosphere. An important outcome of the Kyoto Protocol is that it paved a low carbon path for the world. For instance, the ‘carbon market’ is an international market regime, meant for the carbon emissions trading to control the global climate change. These markets include the flexible mechanisms such as the Clean Development Mechanism (CDM) and the Joint Implementation (JI).

The CDM and JI are defined in the Articles 12 and 6 of the Kyoto Protocol, which imply that a country can implement an emission reduction project, especially aimed to reduce the anthropogenic emissions and mitigate climate change.<sup>155</sup> Such projects include renewable energy, low emission public transportation, energy efficiency, and reforestation. CDM projects are relevant to developing countries such as Kenya that are not obliged to tackle climate change by reducing carbon emissions but voluntarily agree to undertake the challenge of climate change.<sup>156</sup>

Among other major agreements, the Bali Road Map was adopted during the December 2007 Conference of Parties (COP13) in Bali. It concluded the Bali Action Plan, with a broad and long-term process and an effective implementation of the Convention beyond 2012. During 2009, at the negotiations of the UNFCCC’s 15<sup>th</sup> session of the Conference of Parties in Copenhagen, climate change was recognized as a threat to the environment. In this conference, a network of world known scientist and experts shared their common understanding of climate

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<sup>154</sup> *Kyoto Protocol to the United Nations Framework Convention on Climate Change*, Kyoto, Japan, 1998.

<sup>155</sup> *Ibid.*

<sup>156</sup> *National Climate Change Response Strategy*, Government of Kenya, op cit, p, 23.

change and stressed for limiting the GHG emissions below 450 parts per million (ppm) to control the average global temperature rise by more than 2°C.<sup>157</sup>

In the Copenhagen Conference, the delegates from majority of the developed and developing countries agreed to submit their emission reduction targets. However, despite the call for serious action against climate change, there was lack of any bold action from the policy makers. The conference concluded the Copenhagen Accord as a political framework aimed at reaching an agreement to take a sustainable path to circumvent dangerous climate change. However, once again it lacked the provisions for legally binding the member states.

After the Cancun Conference in 2011, the 2012 UN Climate Change Conference of Parties (COP 18) in Doha was of key significance as the participating nations agreed for the extension of the Kyoto Protocol until 2020. In addition, the conference laid down the principals in the areas of adaptation, mitigation, finance, and technology. The conference encouraged rich nations to provide funds for the poor and vulnerable countries, specifically to device plans for climate change mitigation and adaptation.<sup>158</sup> However, there are still uncertainties about the financing and dissemination of Green Climate Fund of US\$ 100 billion each year, which the rich states have agreed to provide.

The UNFCCC also requires that all Non-Annex 1 countries, especially the developing countries to complete their full National Communication and GHG Inventories every four years and send a biennial updated report to the convention. Key objective of this was to improve the reporting and information on mitigation actions, arising needs, and support received through an enhanced system to meet the goals. However, due to a number of constrains, there has been lack of transparency, and reliability in these reports and so far, the convention has not been able to acquire desired results from National Communications and GHG Inventories.<sup>159</sup>

#### **b) Regional Initiatives**

Despite the global efforts to control the emissions of GHGs, there has been difficulty in the enforcement of climate change mechanisms at regional level. This is because many of the developing and underdeveloped states lack financial, technical and human resources to develop

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<sup>157</sup> 'Summary for Policy Makers', In: S. Solomon et al (eds.), *Climate Change 2007: Mitigation*, IPCC, (Cambridge: Cambridge University Press, 2007).

<sup>158</sup> United Nations, *Decision on the Host of COP 18*, Climate Change Secretariat, Press release, Doha, November 2012.

<sup>159</sup> C. Breidenich, *To Improve the Reporting of National Communication and GHG Inventories by the Non-Annex 1 Parties Under the Climate Convention*, The Natural Resources Defense Council, New York, February 2011, p. 25.

these mechanisms. There is widespread understanding that due to excessive burning of the fossil fuels in the North, industrialised countries have the responsibility to take action and help the poor to deal with climate change. Initially, like the US and Canada, many of the developed countries opposed major international efforts and did not agree to enforce the emissions reduction norms.<sup>160</sup>

Nevertheless, since 2005, among other mitigation programs, the ‘cap and trade’ has gained popularity among few states such as the US, Canada, Australia, Japan, China, India, and South Africa. Based on the Clean Air Act of 1990, the ‘cap and trade’ scheme provided economic incentives by lowering the emissions of large-scale pollutants.<sup>161</sup> The ‘cap’ aims to restrict the GHG emissions of the companies or firms by the enforcement of emissions permits against each ton of CO<sub>2</sub> released into the atmosphere. On the other hand, ‘the trade’ allows more efficient companies who are emitting less than their permitted quota of emissions to sell their extra allowance of emissions to those who are unable to control.

For instance, the European Union (EU) has led the global efforts to reduce the GHGs with the European Union’s Emission Trading System (EU ETS), developed in January 2005. The program involved a trading program with the cooperation of 30 most industrialised states, including 27 of the EU members and 3 non-member states (Norway, Iceland, and Liechtenstein).<sup>162</sup> Likewise, following the cap and trade mechanism, nearly 500 Australian companies agreed to reduce nearly 60 per cent of the regions carbon pollution. Despite huge controversy against climate change mitigation in the US and Canada, the Western Climate Initiative (WCI) is an agreement between 10 Western US and Canadian provinces. Regional Greenhouse Gas Initiative is another mandatory program for the northeastern US states.

In the Asia- Pacific region, the ASEAN Climate Change Initiative provides a policy based action plan to address climate change. It is a broad plan to deal with major environmental hazards such as climate change, pollution, water resource and water quality management, energy efficiency and conservation, and environmental improvement.<sup>163</sup> Implementation of the CDM

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<sup>160</sup> H. W. Jeong, *Peace and Conflict Studies*, op cit, p.270.

<sup>161</sup> R. N. Stavins, ‘Experience with Market-Based Environmental Policy Instruments’, *Resources for the Future*, Discussion Paper 10-58, Washington D.C. November 2001.

<sup>162</sup> *EU Action Against Climate Change*, The EU Emission Trading Scheme, European Commission, 2005, p, 6.

<sup>163</sup> R. Letchmann, *Is There an ASEAN Policy on Climate Change?* Head of the Environment Division, ASEAN Secretariat, The Fourth ASEAN State of Environment Report, 2009.

and JI programs in Asia members has not gained much success as many countries in the region are less developed or in the process of development.

Japan and China have pursued proactive climate change policies. For instance, China aims to reduce its carbon emissions by 40 per cent compared to 2005 and launched the emission reduction schemes in seven of its major provinces and cities. Depending on the level of economic development, China gradually wants to establish world's largest carbon market.<sup>164</sup> Despite these efforts, GHG emissions are increasing every year, which is due to lack of commitment from the developed states and rapidly developing economies.

### **c) Climate change initiatives in Africa**

Climate change is a global issue, and affecting different regions at varied scales and intensities. With few exceptions, most of the African states are party to the UNFCCC and other important international environmental protection treaties including the Kyoto Protocol (1997), the Convention to Combat Desertification (1994), and the Stockholm Convention on Persistent Organic Pollutant (2001). However, regional climate change plans are in the early stages of development and implementation.

For most of the African states, climate change mitigation or adaptation is expensive and requires 5 to 10 per cent of the GDP.<sup>165</sup> Therefore, various African states have developed their climate change strategies according to local technology and within their financial resources. For instance, in 2007, the African Union outlined the Climate Change Response Strategy in its environmental and climate change regimes whereupon it stressed the engagement of international actors such as the Group 77, plus China, Alliance of Small Island States and the Africa Group.

The AU's climate change regime includes the Action Plan of the Environmental Initiative of NEPAD (2003), the Decision and Declaration of the African Union on Climate Change and Development in Africa (2007), the Tunis Declaration and Action Plan (2007), and the Algiers Declaration on Climate Change (2008). Furthermore, AU declared climate change as a security

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<sup>164</sup> R. Scotney et al, *Carbon Markets and Climate Policy in China*, China's Pursuit of a Clean Energy Future, Paper Presented for the Climate Institute by: Climate Bridge, October 2012.

<sup>165</sup> J. A. Van Wyk, *The African Unions Response to Climate Change*, Institute of Security Studies, Monograph 170, 2010, p. 16.

threat to the future existence and well-being of the continent; therefore, it suggests the need of institutionalisation and policy development to deal with climate insecurity.<sup>166</sup>

In the Horn of Africa, the Intergovernmental Authority on Drought and Development (IGADD) was originally formed in 1986. However, with increasing incidents of civil conflicts, the organization expanded its sphere of actions and was renamed as Intergovernmental Authority on Development (IGAD). In the Eastern Africa sub-region, IGAD Climate Prediction and Application Centre (ICPAC) has been established to foster capacity for climate information, climate prediction, early warning systems, and selected application to the emerging issues related to environmental scenarios. Its focus is eleven regional states where it runs discussions with the stakeholders on the issues of climate change and examines the grass root issues. The institution provides climate information on 10 days, monthly and seasonal time scale and includes actual observation and monitoring at national and regional levels.<sup>167</sup> Additionally, it involves the media to disseminate information and enhance the understanding of basic concepts and components of climate change.<sup>168</sup>

In 2011, the East African Community (EAC) succeeded in developing a Climate Change Master Plan. The Plan is a response to the negative impacts of climate change especially on the economies of the EAC's partner states.<sup>169</sup> Similarly, since 2007, multiple endeavors have been brought forward by other African regional organisations such as the Economic Community of West African States (ECOWAS) and the Southern African Development Community (SADC) where strategies to deal with climate change issues have been spelt out.<sup>170</sup> However, the implementation and responses to these strategies have been slow and there have not been any positive outcomes to combat climate change.

#### **d) National strategies**

Due to various interlinked factors such as poor infrastructure, inadequate institutions, weak governance, political instabilities, persistent poverty, lack of goodwill from the politicians and reluctance from the scientists, African states are the most vulnerable to the changing

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<sup>167</sup> Interview with Mr. A. Tadege, Climate Change Adaptation Specialist, IGAD Climate Prediction and Adaptation Centre Nairobi, 10 April 2014.

<sup>168</sup> Interview with Dr. A. Opere, Head of Department of Meteorology, University of Nairobi, 3 April 2014.

<sup>169</sup> *East African Community Climate Change Master Plan 2011-2031*, East African Community Secretariat, September 2011.

<sup>170</sup> B. Dewar, *Climate Change and Africa: Turning Up the Heat*, Chatham House, Africa Program Paper AFP PP 2012/15, November 2012, p. 8.

climate.<sup>171</sup> At national level, many African states have taken up the note of climate change impacts. For example, South Africa being an emerging economy, is leading in the global climate change negotiations. Domestically, South Africa acknowledged the climate change issue by presenting its National Climate Change Response Strategy, which emphasises the development of mitigation and adaptation procedures by setting reduced emission targets. It has set its carbon emission reduction by 34 per cent by year 2020 and by 42 per cent by 2025.<sup>172</sup>

In particular, Ethiopia's former Prime Minister Meles Zenawi played a phenomenal role to establish a climate change regime including climate finance. In 2011, Ethiopia established Climate Resilient Green Economy Strategy with a major objective to keep the GHGs emissions at current level.<sup>173</sup> Among others Rwanda, Congo, Egypt, and Nigeria are also taking lead to strategise their national climate change programmes.

#### **e) Kenya's national climate change initiatives**

Like other states in the Sub Saharan Africa, Kenya has been identified as a hotspot of climate change impacts.<sup>174</sup> Studies demonstrate that climate change is severely affecting Kenya's ecological, social, and physical infrastructure with various challenges.<sup>175</sup> For instance, majority of the Kenyan population is highly dependent on natural resources that are extremely sensitive to any change in the local climate. Due to dynamic affects of land use and land cover changes, Kenya is constantly suffering with severe droughts and rainfall variability.<sup>176</sup>

Climate change is exposing Kenya's entire population to spread of malaria, Rift Valley fever (RVF) and dengue fever especially in the highlands where such diseases were non-existent.<sup>177</sup> Other multiple impacts include crop failure, reduced water tables, drying up of rivers and lakes with dynamics in the energy production sector that threaten Kenya's economic development and human security. In the times of intense rainfall, there is lack of adequate

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<sup>171</sup> L. Edwards, *Global Problems, African Solutions: African Scientists Perspective on Climate Change*, Africa Initiative, CIGI, Discussion Paper Series NO.7, May 2013.

<sup>172</sup> *National Climate Change Response Strategy*, Government of South Africa, Department of Environmental Affairs and Tourism, Pretoria, September 2004.

<sup>173</sup> *Ethiopia's Climate-Resilient Green Economy Strategy*, Federal Democratic Republic of Ethiopia, Addis Ababa, 2011.

<sup>174</sup> *National Climate Change Response Strategy*, Government of Kenya, Ministry of Environment and Mineral Resources, Nairobi, 2010.

<sup>175</sup> Interview with Mr. J. Kioli, Chairman Kenya Climate Change Working Group (Executive Director Green Africa Foundation), Nairobi, 28 April.

<sup>176</sup> Ibid.

<sup>177</sup> Interview with Mr. A. Tadege, Climate Adaptation Specialist, IGAD Climate Prediction and Application Centre Nairobi, 10 April 2014.

mechanisms to conserve water. During heavy rainfall, flash floods ruin country's physical and social infrastructure, including losses of life, livestock, pastures, and property.

Due to dwindling resources in rural area, climate induced migration increases the flow of people from rural to urban areas, creating mayhem in the cities like Nairobi, which is currently one of the world's fastest growing cities. In addition, Kenya's horticultural exports are threatened due to the European environmental protection strategies such as cutting on carbon footprints or food miles. In future, such debates can also involve tourism industry, which is Kenya's key source of foreign exchange earner. Climate change may also threaten Kenya's wildlife as most of the national parks and game reserves are largely climate reliant with rain fed rivers.<sup>178</sup>

Thus, Kenya's social and economic development and much of the population's breadbasket is profoundly dependent on natural resources, therefore, strikingly susceptible to any interference with climate change. Since Kenya's early independence days, it has been on the forefront for environmental management and conservation concerns with its national development plans. For instance, since 1992, various policy initiatives have been put forward specifically in the areas of agriculture, water and forests conservation, livestock, food security, land, wildlife and disaster management. However, the implementation part has been very weak due to lack of political will and other interrelated problems.<sup>179</sup>

In 1999, for example, Kenya prepared two major documents on environmental protection. These included the Environment and Development Sessional Paper, and Environmental Management and Coordination Act No. 8 (EMCA). However, the later was never debated in the parliament for the purpose of adoption as a national policy framework on environment. This left Kenya with an environmental law but lacking an environmental policy, which is one of the biggest drawbacks when dealing with emerging environmental issues such as climate change. In addition, the document had least provisions or regulations for long-term climate change adaptation and mitigation, especially leaving the farming and pastoral communities vulnerable.<sup>180</sup>

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<sup>178</sup> S. Mutimba et al., *Climate Change Vulnerability and Adaptation Preparedness in Kenya*, (Nairobi: Heinrich Boll Stiftung, 2010).

<sup>179</sup> Ibid.

<sup>180</sup> Ibid, p. 34.

Kenya has a number of institutions mandated with environmental conservation, which also incorporate issues of climate change into their agendas. For instance, Kenya's Ministry of Environment, water and Mineral Resources plays a key role to monitor environmental issues including climate change. Other ministries also collaborate and play pivotal roles to combat climate change with adaptation and mitigation plans. Kenya being a party to most of the international climate change treaties, therefore, recognises that climate change impacts pose a major challenge to country's future development as well as various dimensions of human well being.

Since 1990, Kenya has taken keen interest in the climate change discussions at both regional and national levels. For instance, Kenya hosted Nairobi Declaration on Climate Change and that was the first key declaration on climate change in Africa. In 1994, Conference on Policy Options and Responses to Climate Change was held in Nairobi.<sup>181</sup> However, the Government of Kenya has been facing various challenges to protect the local climate from further deterioration. This is due to weak institutional system for policy implementation, especially to protect country's natural resources such as the forests and land. Since Kenya's independence, land allocation policies have been a constant source of ethnic animosity and growing conflicts. At the same time, Kenya has lost massive portions of its forest cover, although the Kenya Forest Act and the Draft Sessional Paper No. 1 provides guidelines on Forestry Policy.<sup>182</sup>

In 1963, more than 10 percent of its land was covered with natural forests; however, by 2006 Kenya was left with only 1.7 per cent. For example, since 1980s, one quarter of the Mau Forest complex has been excised for logging, charcoal producing, land clearing for subsistence agriculture and human settlements. Although the Forest Act 2005 covers wide range of objectives for environmental conservation, however, it does not directly treat the issue of climate change. Specifically, the forestry sector can hugely contribute towards climate change adaptation and mitigation with the implementation of Reducing Emissions from Deforestation and Forest Degradation (REDD) programmes, but the forest policy does not capture this programme.

In 2010, Kenya developed its National Climate Change Response Strategy, which assessed impacts of climate change in Kenya over the past fifty years. The strategy made note of increased day/night temperature trends in most areas of Kenya including the impacts of climate

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<sup>181</sup> J. S. Ogola et al, (eds.), *Potential Impacts of Climate Change in Kenya*, (Nairobi: Climate Network Africa, 1997), p. 176.

<sup>182</sup> *The Forest Act 2005*, Ministry of Environment and Natural Resources, Kenya, 2005.

change. The strategy relates climate change issues in various sectors such as the forestry, rangelands, local ecosystems, agricultural productivity, and food security. In addition, it proposes sector wise adaptation and mitigation plans with a monitoring and an evaluation system for the implementation of the climate change projects.<sup>183</sup> However, the strategy has been greatly criticized as it lacks strong provisions to set legal frameworks on adaptation and mitigation of climate change.

Additionally, the strategy does not look at climate change from the lens of human security. In 2013, to support the National Climate Change Strategy, Kenya developed its agenda guide as National Climate Change Action Plan.<sup>184</sup> This document provides a people centered action plan and provides a framework to help Kenya fight against negative impacts of climate change. Additionally, the plan provides guidelines for Kenya's financial needs for adaptation and stresses for low carbon path. It is estimated that Kenya needs approximately Ksh. 1 trillion for the implementation of such plans and heavily reliant on foreign donors. Such funding is unpredictable due to lack of transparency and corruption, which is another constraint to implement both climate change plan and the strategy at national level.

Relevant to climate change, Kenya's new constitution also provides a basis to adopt climate change legislation and policies, which Kenya essentially needs to establish. In this regard, in early 2014, Kenya's drafted its Climate Change Bill, which will guide to implement climate change Law and Policy in future.<sup>185</sup> Likewise, climate change response plans are also part of Kenya's Vision 2030. For example, among many other plans, the Integrated National Transport Policy (2010) focuses on transport solutions important for climate change mitigation. The Kenya Forestry Master Plan 1995-2020 provides solution to preserve the forests as national assets in relation to their roles in water, biodiversity, and climate change values. However, due to many challenges, implementation of the relevant mechanisms is very poor. Hence, presently Kenya cannot adequately deal with forest conservation and more specifically, lacks measures to tackle climate change related human insecurities and management for the climate disasters.

In addition to the above, Kenya has been developing it human and material capacity in climate change issues. In all ministerial programmes, the government of Kenya has encouraged

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<sup>183</sup> *National Climate Change Response Strategy*, Government of Kenya, Ministry of Environment and Mineral Resources, Nairobi, 2010.

<sup>184</sup> *National Climate Change Action Plan*, 2013-2017, Government of Kenya, Ministry of Environment and Mineral Resources, Nairobi, 2013.

<sup>185</sup> Interview with Mr. J. Kioli, op cit.

mainstreaming of climate change issues to allow the adoption in the national development plans. Several such plans are on course to generate data on national communications. These include the national REDD strategy, the Clinton Climate Initiative supported system for Land Based Emission Estimation and the USAID funded greenhouse gas inventory capacity. So far, the country has eight experts listed on the UNFCCC roster of experts on climate change and these would advise the country on mitigation measures in the various sectors.

### **3.8 Conclusion**

The study reveals a clear message that climate change is not new, however, since the industrial revolution, irresponsible human actions have led to an increased concentration of greenhouse gases. As a result, the average surface air temperature is constantly rising, causing global warming. More importantly, this has entirely changed the climate of many regions and sub-region of the planet Earth. The chapter concludes that the present day climate changes are erratic and dramatic compared to the historical changes. Physical and biological consequences of the recent climate change are affecting millions of people, making climate change one of the greatest challenges of the time, especially for poor and underdeveloped regions like Africa.

Many of the future effects are still unknown; however, the additional warming above the present mean temperatures will be catastrophic to the future existence of the human societies. Although, various concerted efforts are underway to tackle the growing climate change calamities, however, combating climate change will not be an easy task, especially for the underdeveloped and developing states. Therefore, national, regional, and international institutions need to work boldly, quickly and collectively, together with the global society to fight climate change and save the planet from future destruction.

## CHAPTER FOUR

### CLIMATE CHANGE AND HUMAN SECURITY IN AFRICA

#### 4.0 Introduction

Chapter three provided an over view of the historical and contemporary perspectives of climate change debate and explained the phenomenon from the perspectives of climate science. Climate science study depicts that climate change is not new; however, present day speed and scope of the rising global temperatures are a novelty and significantly altering the earth's climate. Additionally, the present day climate change is intensifying environmental degradation and the scarcity of important environmental resources with fundamental impacts on life.

Today, millions of people are facing profound security implications, which threaten their socio-economic well being and quality of life. This chapter examines major impacts of the changing climate on human security with a key focus on Africa, being the world's most vulnerable region to climate change. In addition, chapter discusses climate change led national, regional, and international security issues that can potentially jeopardise global peace and security. The major focus of this chapter is to explore the likely implications of climate change on various facets of human security, especially in the African continent.

#### 4.1 Framing the Concepts of Climate Change and Human Security

As discussed in chapter two, the formal concept of human security was pioneered by United Nations Development Programme (UNDP) in 1994.<sup>1</sup> Unlike traditional view of security, human security replaces the referent object from states to individuals. Thus, human security pushes an agenda for the security of individuals and provides the conditions to free them from everyday fears and wants, and ultimately offers an honorable life. In its broadest view, the concept of human security means to provide safety from common threats such as hunger, disease, unemployment, homelessness, resource scarcity, conflicts, forced migration, environmental degradation, and political oppression.

According to the UNDP Human Development Report 1994, there are seven interlinked dimensions of human security, including economic, food, environmental, health, political, personal, and community security.<sup>2</sup> Economic security is the assurance of adequate means of

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<sup>1</sup> 'New Dimensions of Human Security', *United Nations Development Report 1994*, (New York: UNDP, 1994).

<sup>2</sup> *Ibid*, p. 23.

incomes. Food security is the provision of an all time availability of sufficient, safe, and nutritious food. Health security entails minimum protection from diseases and injuries including all time health coverage. Environmental security aims to protect people from natural and manmade environmental threats. Personal security is the assurance against physical and psychological violence. Community security protects peoples' diverse cultural and traditional practices and values, as these are important elements of their identities. Lastly, political security raises the issue of the respect of peoples' basic human rights and assures their freedoms from all kinds of oppression.<sup>3</sup>

All dimensions of human security are interrelated in a complex way. For example, any threat to people's economic security can directly affect their food security, which consequently weakens health security. Likewise, any disturbance with political security can instantly harm personal security and indirectly lead to issues of food, economic, health or community security. The idea of human security is built on universalism and solidarity, where all individuals and communities have equal rights and opportunities and, share a common approach towards their responsibilities.<sup>4</sup>

In March 2005, former United Nations (UN) Secretary General Kofi Annan translated his ideas of human security in a report entitled *In larger Freedom* which was meant to deal with key themes to address human security issues.<sup>5</sup> Later, the human security issues were raised in the UN General Assembly discussions. The United Nations University Institute for Human Security formally developed the environmental aspect of human security where climate change also gained significant recognition.<sup>6</sup> In the 2007, UNDP furthered the discussion on the issue of climate change and its impacts on human development. The report expressed the fear and stated that climate change will reverse the efforts towards greater human development and undermining the joint efforts of the international community aimed at achieving the Millennium Development Goals.<sup>7</sup>

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<sup>3</sup> Ibid, pp. 22-27.

<sup>4</sup> M. Ul Haq, *Imperatives of Human Security*, Rajiv Gandhi Institute for Contemporary Studies, RGICS Paper No, 17, 1994.

<sup>5</sup> K. Annan, *In Larger Freedom: Towards Development, Security, and Human Rights for All*, (New York: United Nations, 2005).

<sup>6</sup> J. Bogardi and H. G. Brauch, "Global Environmental Change: A Challenge for Human Security – Defining and Conceptualizing the Environmental Dimension of Human Security", In: A. Rechkemmer, (ed.), *UNEO – Towards an International Environmental Organisation*, 2005, pp. 85-109.

<sup>7</sup> Human Development Report 2007/2008, *Fighting Climate Change: Human Solidarity in a Divided World*, (New York: UNDP, 2007).

In the last few years, climate change has been the core subject of political debates where the issue was discussed in the socio-economic development as well as security point of view. For instance, the Intergovernmental Panel on Climate Change (IPCC), the German advisory Council on Global Change (WBGU) and the Stern's review unanimously pinpoint that climate change poses catastrophic and agonising implications for the human societies. According to former UN Secretary General Kofi Annan, climate change poses an 'all- encompassing threat to health, to economy and to peace and security'.<sup>8</sup> In 2003, a British scientist David King observed that climate change is one of the greatest security challenges of the time and in future, it may pose a greater threat than terrorism.<sup>9</sup>

With similar views, Homer-Dixon, the most authoritative scholar of environment and conflicts predicted that future climate change would potentially exacerbate the frequency of 'insurgencies, genocide, guerrilla attacks, gang warfare, and terrorism.'<sup>10</sup> Giving political weight to the issue in 2006, British Foreign Secretary Margret Beckett announced that 'today being a credible foreign minister means being serious about climate security.' Later it was stressed that climate security needed to be part of British foreign policy issues.<sup>11</sup> Likewise in 2007, eleven United States' retired Admirals and Generals reported that in future, climate change may act as a threat multiplier for existing problems and can jeopardise the security of economically weak and volatile nations. The team emphasised that climate change must be part of US foreign policy.<sup>12</sup>

Again, in April 2007, Margaret Beckett brought the issue to the UN Security Council where the violent conflict in Darfur was linked to the changing climatic conditions of the region.<sup>13</sup> At the same time, there are anticipations that climate change led environmental scarcities would displace millions of people from their homelands and the influx of these climate refugees may create a 'world of many more Darfurs'.<sup>14</sup> In the 2009 Copenhagen Conference on Climate change, world leaders recognised the relevance of climate change to security. Here the

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<sup>8</sup> Human Impact Report, *Climate Change: The Anatomy of the Silent Crisis*, Global Humanitarian Forum, Geneva, 2008, p. ii.

<sup>9</sup> *BBC News*, Global Warming "Biggest Threat", 9 January 2004, In: O. Brown, A. Hammill and R. Macleman, Climate Change and the 'new' Security Threat: Implications for Africa, *International Affairs* 83:6 (2007), pp. 1141-1154.

<sup>10</sup> T. Homer-Dixon, 'Terror in the weather forecast', *New York Times*, 24 April 2007.

<sup>11</sup> 'Beckett's speech on Climate Change and Security', British Embassy in Berlin, 24 October 2006, Retrieved online, 10 May 2010.

<sup>12</sup> R. Nordas and N. P. Gleditsch., Climate change and Conflict, *Political Geography*, 26 (2007), pp. 628-629.

<sup>13</sup> F. Harvey, UN climate panel detailed potential for global conflict, *Financial Times*, 13 October 2007.

<sup>14</sup> *Human Tide: The Real Migration Crisis*, Christian Aid, London, 2007.

US President Barak Obama remarked, ‘Unchecked climate change will pose unacceptable risks to our security, our economies, and our planet.’<sup>15</sup> In the April 2007 Security Council’s debate, the majority of leaders expressed their concern about the climate change, which can potentially trigger enormous social and economic impacts as well as conflicts.

Climate change led security debates are also raising serious concerns for the African heads of states and may cause tensions between the North-South relations. In the 2007 African Union summit for instance, the Ugandan President Yoweri Museveni expressed his views by calling climate change as ‘an act of aggression’ of the developed world against the poor nations and stressed for compensation to handle the issue.<sup>16</sup> Likewise, Namibian UN representative, Kaire Mbuende declared that the greenhouse emissions of the developing countries’ act like a chemical attack.<sup>17</sup> Furthermore, tensions may increase the division between the north and the south if the international community and developed states do not act to help the poor and most vulnerable states.

Likewise, sea level rise and increased migration raise issues of sovereignty and security of national borders. As sea levels rise, many low-lying cities and islands will completely vanish, giving rise to territorial issues and large-scale human displacement. Relocation of the displaced may instigate regional conflicts that can have spillover effects on global relations, destabilizing international security.<sup>18</sup> The following sections provide an analysis of the complex interactions between climate change and various interlinked issues that can increase the potential for national, regional, and global security and pose a great threat to human safety and prosperity.

## **4.2 The Effects of Climate Change on National, Regional, and International Security**

In October 2003, the Pentagon paid special consideration to climate change and held high-level discussions, placing the issue at the centre of international peace and security. During the period,

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<sup>15</sup> B. Obama, ‘Obama’s Copenhagen Speech’, *Foreign Policy Magazine*, 16 December 2009, In: I. Salehyan and C. S. Hendrix, ‘Science and the International Politics of Climate Change’, *The Whitehead Journal of Diplomacy and International Relations*, Summer/Fall 2010, p. 7.

<sup>16</sup> A. Clark, ‘Climate Change threatens security, UK tells UN’ 8 April, 2008.

<sup>17</sup> O. Brown, A. Hammill and R. MaLeman, ‘Climate change as the ‘New’ Security Threat: Implications for Africa’, *International Affairs* 83 (6), 2008, p.1142.

<sup>18</sup> P. H. Gleick, ‘The implications of Global Climatic Changes for International Security’ United States Congress, Committee on Government Reforms, Sub-Committee of National Security, Emerging threats and International Relations, Hearing on Energy as a Weapon: Implications for US Security, 16 May 2006.

some of the media campaigns regarded climate change as the ‘mother of all security problems’.<sup>19</sup> Led by these views, some scholars linked climate change to physical security and argued that dramatic climate events such as severe droughts and floods may pose risks to national security. In this context, most debates were led by situations of weak states, poor governance, and existing political instability especially in many of the developing and underdeveloped states of the world where climate change can deteriorate living conditions and add to peoples’ misery.

Climate change does threaten security when due to financial constraints a state is unable to meet the primary demands of the public. Consequently, severe climatic changes may lead to a greater divide between the governments and the citizens.<sup>20</sup> Followed by the theory of grievances, in such situations various identity groups may join to create problems for the governments who fail to satisfy the basic needs of the citizens.<sup>21</sup> Historical evidence indicates that poorly governed and weak states are particularly vulnerable to political instability after the climate shocks. Such disasters often provide opportunities for political mobilisation, reinforce the existing tensions present in the governing apparatus, and ascertain their adaptive capacities.<sup>22</sup>

In addition, natural disasters play a key role in boosting the resource scarcities and due to growing frustration; the aggrieved may join the rebels or insurgents triggering political unrest using violence. This can potentially lead to issues of political as well as personal security of people, which entail respect of basic human rights including the protection from physical and psychological violence, torture, prosecution, and imprisonment.<sup>23</sup>

Economic impacts of climate change may also cost developing and developed countries and cause poor economic performance with declined Gross Domestic Product (GDP). For instance, the Kyoto Protocol demands the control of greenhouse gas (GHG) emissions. However, to some industrialised and oil producing governments, abiding by the Kyoto Protocol may temporarily lower the growth of their national economies. Therefore, a number of governments like the United States, Australia, China, and Canada are reluctant to fully imply the rules set by the Kyoto protocol (see chapter three section 3.7) which necessarily aims to control the

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<sup>19</sup> D. Stipp, ‘The Pentagon’s Weather Nightmare: The Climate Could Change Radically and Fast, that would be the Mother of all National Security Issues, *Fortune*, February 2004.

<sup>20</sup> M. Y. Omelicheva, ‘Natural Disasters: Triggering of Political Instability?’ *International Interactions: Empirical and Theoretical Research in International Relations*, University of Kansas, 34:4, November 2011, pp. 441-465.

<sup>21</sup> P. Collier, and A. Hoeffler, *Greed and Grievance in Civil War*, World Bank, 2002, p. 1.

<sup>22</sup> M. Y. Omelicheva, ‘Natural Disasters: Triggering of Political Instability?’ *International Interactions: Empirical and Theoretical Research in International Relations*, op cit.

<sup>23</sup> Ibid.

greenhouse emissions and the need to significantly reduce the industrial activities. Consequently, this would affect the production, with lower levels of economic growth and less comparative advantage among states.

There are fears that the implementation of the Kyoto Protocol will potentially affect the oil producing states. Consequently, this will affect the oil prices and may lower demand by the developed and rapidly developing countries who are the bigger consumers of oil. In future, this may create tensions in the relations of the net oil exporters and the high consuming importing states.<sup>24</sup> Other concerns are about the physical location of key energy resources, such as oil and gas. These resources are largely found in regions most vulnerable to climate change such as North Africa, the Middle Eastern states and many small Islands. In the face of severe climate shocks, access to these areas may become difficult or too easy, giving rise to geopolitical disputes, resource wars, and regional imbalance of power.<sup>25</sup>

Moreover, due to increased global warming, polar ice melts are opening new waterways in the Arctic and giving access to hidden resources in the region, which may result in territorial disputes.<sup>26</sup> According to statistics, climate change threatens the security of at least 46 countries that already suffer from previous or ongoing wars coupled with social and institutional weaknesses.<sup>27</sup> Most of these countries are from Asia, Africa and the Middle East, having intra-state conflicts due to resource distribution including, minerals, freshwater, timber and oil. Climate change has been associated with national security especially in many of the African states.

Over the past few decades, a number of African states such as Nigeria, Somalia, Sudan, Democratic Republic Congo, Libya, Sierra Leone, and Liberia have experienced continuous political unrest where resource sharing largely led to bloody coups, ethnic conflicts, and genocide.<sup>28</sup> Likewise, in the Middle East, division of dwindling resources such as water and land

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<sup>24</sup> J. Barnett, Security and Climate Change, *Global Environmental Change*, 13 (2003), pp. 7-17.

<sup>25</sup> P. H. Gleick, 'The Implications of Global Climatic Changes for International Security', United States Congress, Committee on Government Reforms, Sub-Committee of National Security, *Emerging threats and International Relations, Hearing on Energy as a Weapon: Implications for US Security*, 16 May 2006.

<sup>26</sup> 'Energy, Security, and Climate, United Kingdom Mission', UK Concept Paper at UN Security Council open debate, 2007.

<sup>27</sup> D. Smith and J. Vivekananda, 'A climate of Conflict: the Links between Climate Change, Peace and War', *International Alert*, London, 2007.

<sup>28</sup> Interview with Mr. J. Kioli, Chairman Kenya Climate Change Working Group (Executive Director Green Africa Foundation), Nairobi, 28 April 2014.

distribution is the root cause of the ongoing conflict between Israel and Palestine.<sup>29</sup> Future changes in the earth's climate and declined resource supplies may generate new conflicts. Such situations are particularly perilous where states are in the process of peace making and post-conflict peace building agendas. For example, after a long war, Southern Sudan recently got its independence and the country is still in the process of building up its institutions.

On the other hand, northern Sudan is also suffering from huge losses of oil, which have most deposits in the territory of the Southern Sudan. At the same time, climate change has turned thousands of acres of Sudanese land into parched desert. Researchers are predicting that if the temperature rise continues then the situation of desertification and unresolved issues between the two Sudan states may trigger new conflicts.<sup>30</sup> Studies depict that the potential for regeneration of conflict doubles within the first five years of the settlement process if resources were the key issues of conflict.<sup>31</sup> It was less than two years since South Sudan had gained independence, when fighting and violence again engulfed the country. As a result, thousands were killed and 1.5 million were driven out of their homes. Exact sources of this conflict are still unknown, however, ethnic hatred, division of resources and hunger for power are some of the potential root causes.<sup>32</sup>

The section below provides key links between the impacts of climate change on the scarcity of major environmental resources and arising human security implications especially in Africa.

### **4.3 Climate Change and Environmental Resource Scarcities**

Environmental resources include fresh waters, croplands, minerals, forests and fisheries that are significantly vital to sustain all kinds of life. According to Homer Dixon, environmental scarcity occurs due to depletion or degradation of a resource, from an imbalance between supply and demand or due to an unjust distribution of that resource. Simultaneously, depletion or degradation of a particular resource manifests due to physical vulnerability, uncontrolled population growth and over consumption of the resource.<sup>33</sup>

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<sup>29</sup> UNEP, 'From Conflict to Peace building' *United Nations Environmental Programme*, Nairobi, 2009.

<sup>30</sup> 'Sudan – Battling the Twin Forces of Civil War and Climate Change', Posted By J. Vidal, *The Guardian*, 21. November 2011, Retrieved online, 9 October 2013.

<sup>31</sup> 'From Conflict to Peace building', op cit.

<sup>32</sup> D. W. Joak, 'Major Causes of the Current Conflict in South Sudan', *South Sudan Tribune*, 20 February 2014, Retrieved online, 12 April 2014.

<sup>33</sup> Ibid, p. 14.

Although the global population growth rate has significantly slowed down since 1963, it is still projected to increase from 6.9 billion to 9.1 billion by 2050.<sup>34</sup> This growth will have higher rate in developing states like Nigeria, the Democratic Republic of Congo, and Kenya.<sup>35</sup> The growing demand of resources is not only a function of population growth, increased affluence in the developed and developing economies is another key factor for the surge in demand of receding resources. For instance, emerging economies such as China, India, and Brazil also need more natural resources to fulfill their growing energy requirements and therefore, for the past few decades their trade and investment relations have shifted towards African states that are rich in minerals and other natural resources. For instance, Nigeria, Libya, Algeria, and Angola are key producers of oil and gas resources and thus are members of the Organisation of Petroleum Exporting Countries (OPEC).

Since the onset of twenty first century, India and China are increasingly involved in the oil exploration and investment activities specifically in the East African states such as Uganda, Tanzania, and Kenya. These countries lack the technological knowhow in the extraction and refinery sectors; therefore, they rely on foreign companies due to their technological capabilities.<sup>36</sup> Historical analysis of Africa's oil rich counties suggests that minerals and oil particularly are cursed resources.<sup>37</sup> In the past, such resources have not only triggered conflicts within societies and groups, but also among neighboring countries.

For instance, in the case of Eastern Africa's Lake Albert, the conflict between DRC and Uganda was over the occupation of oil resources discovered in the Rukwanzi Island, which was a disputed territory between both the states. This violent conflict led to the loss of innocent lives including a British geologist.<sup>38</sup> Similar conflicts may take a serious toll when the actual oil production and sale will start in future. There are fears that oil and gas extraction projects may lead to issues related to regulatory systems with challenges of human security, including

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<sup>34</sup> United Nations Department of Economics and Social Affairs, *World Population Prospects: The 2008 Revision*, (New York: United Nations, 2008).

<sup>35</sup> Ibid.

<sup>36</sup> M. Sahu, 'Emerging Hydrocarbon Resources in East Africa and India', In: M. Mwagiru and A. Biswas, (eds.), *East Africa-India Security Relations*, (Nairobi, IDIS/PRIASA, 2012), pp. 171-182.

<sup>37</sup> P. Le Billion, *Fuelling War: Natural Resources and Armed Conflict*, Adelphi Paper 373, (London: The International Institute for Strategic Studies, 2005).

<sup>38</sup> M. Sahu, 'Emerging Hydrocarbon Resources in East Africa and India', In: M. Mwagiru and A. Biswas, (eds.), *East Africa-India Security Relations*, op cit.

effective governance, national development, and democratic practices, which are the key pillars of personal, political, and community security.

In addition, insecurity in the African states such as in Angola, Nigeria, and Democratic Republic of Congo often has linked with natural resource management system, including the issues arising from inter-group relations, widespread corruption, youth exclusion, and gender insensitivity.<sup>39</sup> Furthermore, growing demand and reduced supply of these resources will contribute to increased competition between and within various groups of a society or states. Class based division and weak institutional systems may weaken human security due to ethnic animosity and use of violence.

According to IPCC 2007 report, the carbon emissions in the atmosphere will further increase the global temperature by 0.6 degrees Celsius.<sup>40</sup> In one of the recent conferences on global warming, the UN Secretary General Ban Ki Moon expresses his fear and argues that ‘changes in our environment and the resulting upheavals – from drought to inundated coastal areas to loss of arable lands – are likely to become a major driver of war and conflicts’.<sup>41</sup> These rapid changes in the global temperature hold serious implications for the availability of key resources, triggering novel human security issues as discussed below.

#### **4.4 Climate Change and Water**

Water is vital for the survival of all living creatures. From food production to economic activities, all sectors are dependent on water resources. With the population growth, per capita water consumption is also growing and since 1940, the consumption of water has quadrupled globally. Rivers and aquifers are the largest fresh water suppliers for majority of the African states. For instance, issues like deforestation leads to scarcity of forests and causes water pollution with disrupted clean water supply.<sup>42</sup>

In most parts of the Sub Saharan Africa, due to increased environmental pollution only 22 to 34 per cent of the population has an access to safe water. Likewise, Southern Africa and Northern part of the Sub Saharan Africa are facing clean water stress. While water availability is

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<sup>39</sup> A. Alao, ‘Natural Resource Management and Human Security in Africa’, In: A. Abass (ed.), *Protecting Human Security in Africa*, (Oxford: Oxford University Press, 2010), pp. 102-121.

<sup>40</sup> M. Parry, ‘Humanitarian Implications of Climate Change’, Presentation to Inter-Agency Standing Committee Principals Meeting, Geneva, 20 April 2008.

<sup>41</sup> Ban Ki Moon, Address to the UN International School – *Conference on Global Warming: Confronting the Crisis*, 1 March 2007.

<sup>42</sup> T. Homer-Dixon, *Environment, Scarcity and Violence*, (Princeton: Princeton University Press, 1999), pp. 8-9.

plentiful in these countries, however, high level of water contamination makes the countries water stressed, forcing millions of people to live with water scarcity. As a result, 80 per cent of diseases and 30 per cent of deaths are borne of polluted and unsafe water. Research indicates that in Africa, unsafe water impedes recovery from malaria and heavily effects the agricultural production and causes food and economic insecurity.<sup>43</sup>

With the impacts of global warming, climate change significantly threatens the availability of fresh water<sup>44</sup> that are highly dependent on rainfall patterns. However, warmer temperatures coupled with changes in snow, rainfall, and stream flows alter the natural pattern of water supply.<sup>45</sup> Simultaneously, the rising temperatures intensify the evaporation process, which ultimately reduce the amount of water in lakes, rivers (blue water) and the soil (green water).<sup>46</sup> Research shows that the most devastating effect of higher temperatures will be longer and severe drought periods with uncertain rainfall patterns, causing water scarcity.<sup>47</sup> The IPCC warns that global warming will lead to ‘changes in all components of fresh water systems.....availability and quality of water will be the main pressure on, and issues for, societies and the environment under climate change’.<sup>48</sup>

According to a survey, more than 1.7 billion of the world’s population is already water stressed, and facing acute water shortages.<sup>49</sup> For instance, sea level rise can cause pollution of fresh water streams and underground water resources, thus, reducing the availability of fresh water for drinking, farming and other commercial purposes.<sup>50</sup> As the sea level rises, coastal communities especially in the low-lying areas may experience up to 50 per cent loss of fresh water supply. For example, slight sea-level rise can potentially cause intrusion of salt water into

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<sup>43</sup> C. W. Tatlock, *Water Stress in Sub Saharan Africa*, Council on Foreign Relations, August 2006.

<sup>44</sup> O. G. Mwangi, ‘Climate Change, Hydro-politics and Security in Lesotho’ In: D. A. Mwiturubani and Jo-Ansie van Wyk, *Climate Change and Natural Resources Conflicts in Africa*, Institute for Security Studies, Monograph no. 170, 2010, pp. 45-47.

<sup>45</sup> C. Miller, ‘Climate Change Impacts on Water’, National Center for Atmospheric Research, 2009.

<sup>46</sup> *Water for Food, Water for Life: A Comprehensive Assessment of Water Management in Agriculture*, International Water Management Institute (IWMI), (London: Earthscan, 2007).

<sup>47</sup> B. C. Bates et al., “Climate Change and Water, Technical Paper of the Intergovernmental Panel on Climate Change.” IPCC Secretariat, Geneva, June 2008.

<sup>48</sup> B. C. Bates et al., “Climate Change and Water, Technical Paper of the Intergovernmental Panel on Climate Change.” IPCC Secretariat, Geneva, June 2008.

<sup>49</sup> J. Rockstrom et al., “Future Water Availability for Global Food Production: The Potential of Green Water for Increasing Resilience to Global Change,” *Water Resources*, 45, 2009.

<sup>50</sup> C. Miller, “Climate Change Impacts on Water” op cit.

the underground fresh waters of the cities along the coastal lines, thereupon severely affecting the clean water supply.<sup>51</sup>

Studies project that climate change will particularly affect precipitation patterns in the subtropics and mid latitude regions where most of the poorest people inhabit.<sup>52</sup> For the last few decades, reduced precipitation is significantly contributing to greater water-level drops in the underground water tables of arid and semi-arid regions.<sup>53</sup> The IPCC indicates that prolonged droughts significantly attribute to acute water shortage in major cities of Australia, Asia, Africa, and the US. In a number of cases, severe water scarcity harms human health, food production, agricultural output, industries, and sustainability of the ecosystems.<sup>54</sup>

With growing issues of climate change, Africa is going to be the most vulnerable region as it has been estimated that by 2030, there will be 75 to 250 million people living in highly water stressed zones.<sup>55</sup> Among other East African states, Kenya faces problems in the clean water supply. In the city of Nairobi, fewer people can access clean drinking water, as majority of its population has been concentrated in slums where clean water supply is a major problem.<sup>56</sup> In Africa, water can potentially lead to political instability as conflicts often arise over issues of water scarcity as discussed following.

#### **Climate change and risks of water conflicts**

A country has adequate supply of water if there is at least 10,000 cubic meters of supply per person per year. However, problems arise where states cannot meet the demand and can only provide between 1670-10,000 cubic meters per person per year. While absolute or chronic water scarcity arises when states have the mere capacity to supply between 500-1000 cubic meters per person per year, which commonly cause poor health, inadequate hygiene and food insecurity,

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<sup>51</sup> R. J. Nicholls et al, 'Coastal Systems and Low-lying Areas', In: *Climate Change 2007: Impacts, Adaptation and Vulnerability, Contribution of Working Group II to the Fourth Assessment Report of the IPCC*, M. L. Parry et al, Cambridge, Cambridge University Press, 2007, pp. 315-356.

<sup>52</sup> G. A. Meehl et al., *Climate Change 2007: The Physical Science Basis, Fourth Assessment Report of the IPCC*( Cambridge: Cambridge University Press, 2007).

<sup>53</sup> D. Chondler, 'Water Supplies could be Strongly Affected by Climate Change: Changes in Rainfall can be Amplified, up or down, in Changes to Aquifers', *Massachusetts Institute of Technology News*, 18 December 2008.

<sup>54</sup> Z. W. Kundzewicz et al, 'Fresh Water Resources and their Management', *Climate Change 2007: Impacts, Adaptation and Vulnerability, Fourth Assessment Report of the IPCC*, M. L. Parry et al., Eds., (Cambridge: Cambridge University Press, 2007), pp. 173-210.

<sup>55</sup> *UN Water*, International Decade for Action 'Water for Life Decade' 2005-2015, Retrieved on 4th December 2013.

<sup>56</sup> M. Jacobsen et al (eds.), *The Future of Water in African Cities*, World Bank, 2013, pp. 85-88.

being key pillars of human security.<sup>57</sup> Various studies indicate that water stress may increase the economic and political instability at both inter, and intra-state levels,<sup>58</sup> which directly affect human security in a number of distinct ways. Firstly, reduced rainfall causes shortage of water storage and potential for conflict escalation among the consumers who rely on wells or riverbeds. Water conflicts are especially common in areas where many groups or states share water resources.

Africa, for instance is a region where water scarcity has the potential for conflicts. Historically, such conflicts occurred between the riparian states in the Kunene, Zambezi, Limpopo, Orange, and Nile Basins.<sup>59</sup> However, research shows that in many areas, water may not be the sole agent of conflict but it helps to exacerbate the socioeconomic tensions, already present in the structure.<sup>60</sup> For example, the conflict between Cameroon and Nigeria has taken roots from the settlement of Nigerian anglers in the territory of Cameroon. Studies indicate that during 1963-1998, due to climate change and other human activities, 95 per cent of the Lake Chad has drastically dried up.<sup>61</sup> Especially in the Nigerian section most of its water receded and the anglers had no choice but to stay in Cameroon. In 2000, the disputes between the anglers triggered a border conflict between the Nigerian government and the Cameroonians.<sup>62</sup>

Likewise, cases of violence have caused deadly conflicts between Senegal and Mauritania. These conflicts usually erupt due to the waters of Senegal River, which is shared among the semi arid lands of Mali, Senegal, and Mauritania. Since 1980s, persistent drought periods and shortage of rainfall has led to use of violence and issues of land use practices and thousands of people have died in both the countries.<sup>63</sup> Secondly, the risk of a conflict greatly increases in the absence of formal rules or treaties over the division of water resources.<sup>64</sup> Studies

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<sup>57</sup> M. Falkenmark, 'The Massive Scarcity Now Threatening Africa: Why Isn't it being Addressed?' *Ambio*, Volume 18, No. 2, 1989.

<sup>58</sup> N. P. Gleditsch et al., 'Conflicts Over Shared Rivers: Resource Scarcity of Fuzzy Boundaries?' *Political Geography*, 25 (2006), pp.361-383.

<sup>59</sup> O. Brown and A. Crawford, *Climate Change and Security in Africa: A Study for the Nordic-African Foreign Ministers Meeting*, Winnepeg: International Institute for Sustainable Development (IISD), 2009, p. 15.

<sup>60</sup> Ibid.

<sup>61</sup> M. T. Coe, and J. Foley, 'Human and Natural Impacts on the Water Resources of the Lake Chad Basin' *Journal of Geophysical Research*, 106 (D4) 2001, 3349-3356.

<sup>62</sup> S. A. Algamal, 'An Assessment of Climate Induced Conflict Risks over Shared Water Resources in Africa', In: W. L. Filho (ed.), *The Economic Social and Political Elements of Climate Change*, (New York: Springer, 2011), pp. 19-21.

<sup>63</sup> Ibid, p. 21-22.

<sup>64</sup> O. Mwangi, 'State Centrism, Legal Pluralism and Management of Water resources in Kenya', *Lesotho Law Journal* 16(1), 2006, pp. 93-94.

indicate that 158 out of 263 global international basins lack any cooperative management framework.<sup>65</sup> However, research shows that in the face of certain environmental change and resource scarcity, an unusual conflict situation may arise when the existing legal instrument becomes ‘outdated or irrelevant’.<sup>66</sup>

Another school of thought contends that mostly states apt to cooperate over the sharing of water resources.<sup>67</sup> Nevertheless, the water sharing agreements may become sources of conflict rather than cooperation due to any abrupt change in the water levels, especially if the legislation is set to divide waters according to volume rather than the available percentage. Therefore, in the face of growing warming, such agreements may lose authenticity if the water flow significantly changes, especially in the regions where the mass of water flow increases due to complete melting and disappearance of the glaciers and there after a drought follows.<sup>68</sup>

There are also concerns that apart from physical changes, political factors equally contribute to systemic changes in the water usage. Climate change may harbor international or civil conflicts if the water management policies will be amended to adapt to the new situations. For instance, this may happen when the old water management system degrades or it fails to adjust to a new situation, especially in the case of any natural disaster. In coming years, such conflicts are likely to increase in number, as climate changes will probably imbalance the seasonal distribution of water at the regional level.<sup>69</sup> In addition, unilateral decision-making based on political interests in the regional water redistribution can complicate the matter and may destabilise regional peace and stability.<sup>70</sup>

The River Nile, for instance, has been a constant source of tensions among the ten riparian states. During the 1950s, construction of the Aswan dam led to violence between Egypt and Sudan, however, the Nile water agreement helped to resolve the issues in 1959. In 1999, the Nile Basin Initiative led to further cooperation among all the riparian states. Nevertheless, due to

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<sup>65</sup> M. Giordano and A. Wolf, ‘The World’s International Water Agreements’, In: *Atlas of International Freshwater Agreements*, Geneva, UNEP, 2002.

<sup>66</sup> A. Evans, *Climate Change and the Risk for Violent Conflict*, Center on International Cooperation, New York University, 9 September 2010, Also A. Wolf et al., ‘International Waters: Identifying Basins at Risk’, *Water Policy* 5, No 1 (2003), pp. 29-60.

<sup>67</sup> O. G. Mwangi, ‘Climate Change, Hydropolitics and security in Lesotho’, In: D. A. Mwiturubani and Jo-Ansie van Wyk, *Climate Change and Natural Resource Conflicts in Africa*, op cit. p. 47.

<sup>68</sup> C. Paskal., *UK National Security and Environmental Changes*, op cit. p. 8.

<sup>69</sup> R. Schubert et al., *Climate Change as a Security Risk*, German Advisory Council on Global Change, (London and Sterling: Earthscan, 2008), p.79.

<sup>70</sup> *Ibid*, p. 8.

surging population and increased pressure on the water resources, all the riparian states are likely to experience water stress.<sup>71</sup> For instance, Simms states that ‘reduction of 20 per cent annual water flow of the Nile will interrupt normal irrigation, such a situation could cause conflict because the current allocation of water, negotiated during periods of higher flow, would become untenable’.<sup>72</sup>

With warmer temperatures and few water resources, Sudan relies on the Nile to irrigate the Sahel but Ethiopia has warned that any attempt to divert the Nile water will lead to military action. For Egypt, the River Nile supplies 98 per cent of country’s total water requirements. The Egyptians believe that the River Nile is a gift from God and is a vital part of Egypt’s ancient history and heritage. Simultaneously, the Nile water is vital for Egypt’s rapidly growing economy. Therefore, the authoritarian Egypt has threatened Sudan and Ethiopia that if they will attempt to interfere with the water flow, both will face serious consequences.<sup>73</sup>

At the same time, most of the Nile tributaries originate from Ethiopia, it also wants to benefit equally. To accommodate its growing industries, Ethiopia is planning to build a major dam, which is creating great panic for Egypt. Since recently, Ethiopian government also made several changes in the course of the River Nile and increased it for hundreds of meters. As a result, this has raised further concerns for the Egyptian government, considering its historical rights on the Nile waters as granted by several treaties dating back to 1929. However, Ethiopia is adamant that according to new amendments in the old treaty, it also has the right to do so.<sup>74</sup>

Simultaneously, being part of North and Eastern Africa, both Egypt and Ethiopia are equally vulnerable to climate variability. Therefore, the national governments need to take necessary measures for the future water supply and growing agricultural economies that are entirely reliant on the Nile waters. At the same time, fears arise that if water scarcity persists for a longer time, then with increased global warming, growing issues of water scarcity may involve social conflicts and military interventions.<sup>75</sup>

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<sup>71</sup> ‘State of World Population 2008’, UN Population Fund, New York, 2008.

<sup>72</sup> A. Simms, *Africa – Up in Smoke: The second report from the working group on climate change and development*, New Economics Foundation, London, 2005.

<sup>73</sup> K. M. Campbell, et al., *The age of Consequences: The Foreign Policy and National Security implications for Global Climate Change*, Center for Strategic and International Studies (CSIS) and Center for New American Security (CNAS), 2007.

<sup>74</sup> M. A. Rahman, ‘The Geopolitics of Water in The River Nile Basin’, *Global Research*, Center for Research on Globalization, 24 July 2011, Retrieved online, 5 December 2013.

<sup>75</sup> Ibid.

In addition, there is an indication that in the face of climate change driven water scarcity, probability of interstate conflict may become greater between the water abundant and water scarce nations. For example, Lesotho has been rich in freshwater resources as it holds a total of 5925 million cubic meters of static water and 341 million cubic meters of ground water. The country uses only 1.7 per cent (only a small fraction of the total) of the available waters, which means that the country had much more supply than the demand of its freshwater resources.<sup>76</sup> Therefore, based on Lesotho Highlands Water Project (LHWP), Lesotho sells around 2000 million cubic meters of water to neighbouring South Africa on yearly basis. To strengthen this cooperative arrangement, both the states also signed a bilateral treaty on 24 October 1986.<sup>77</sup>

Lesotho faces numerous challenges due to poor water conservation and weak management policies. In particular, there is no coordination between Lesotho's Water Resources Act of 1978 and international agreements and developments.<sup>78</sup> In the last few years, Lesotho has been facing the impacts of climate change as well as clean water scarcity. Secondly, due to substantially lowered regional precipitation, the country has been suffering from surface and subsurface water run-off.<sup>79</sup> During the drought of 2008, Lesotho was under severe clean water stress and severe food insecurity. In the rural areas, 30 per cent of water points, boreholes, streams, and wells dried up. Consequently, both lowlands and highlands experienced limited surface water availability.<sup>80</sup>

Lack of water led to health insecurity and poor sanitation. Following this condition, 60 per cent of the health centers did not have access to clean water, which contributed to diseases such as cholera, diarrhea, and dysentery.<sup>81</sup> There are predictions that due to low precipitation, there will be reduced run-off in the Orange River Basin and less water storage in the dams and

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<sup>76</sup> *National Report on Climate Change*, vii; AQUASTAT, Lesotho: Irrigation in Africa figures-AQUASTAT Survey Food and Agriculture Organisation, 2005.

<sup>77</sup> Trans-Caledon Tunnel Authority (TCTA) Lesotho Highlands Development Authority (LHDA), Sustainable Development and Lesotho Highlands Water Project, 2002, 3; LHDA, Development and Operations Divisions News: Water Deliveries and Royalty Revenue, Lesotho Highlands Water Project, 17 May 2005.

<sup>78</sup> *Poverty Reduction Strategy 2004/2005-2006/2007*, Maseru: Ministry of Finance and Development Planning, Kingdom of Lesotho, 2006, pp. 47-53, In: O. G. Mwangi, 'Climate Change, Hydropolitics and Security in Lesotho' In: D. A. Mwiturubani and Jo- Ansie van Wyk, *Climate change and Natural Resource Conflicts in Africa*, op cit. pp. 51-53.

<sup>79</sup> *National Report on Climate Change*, AQUASTAT, Lesotho; Irrigation in Africa figures-AQUASTAT Survey Food and Agriculture Organisation. 2005, p. ix.

<sup>80</sup> Ibid.

<sup>81</sup> 'Lesotho: Water running on Empty', *Wash News Africa*, Retrieved online, 7 December 2013

reduced water exports to South Africa, which will severely affect numerous water dependent activities in South Africa.<sup>82</sup>

Being a poor economy, Lesotho is greatly dependent on water revenues and any such disruption will lead to reduced income security<sup>83</sup> with diverse negative human security impacts for the people of Lesotho where 45 per cent of the population live below the poverty line. Initially, the LHWP seemed beneficial to both the states. Lesotho for instance, was receiving around 30 billion US\$ per year, making up to 14 per cent of its total export earning and directly adding to its economic development. Moreover, this water enabled South Africa to fulfill its water deficiency in the urban areas.<sup>84</sup>

Simultaneously, due to the LHWP, huge parcel of the fertile land needed to be utilised in the project. As a result, thousands of people who relied on farming activities are facing numerous economic challenges. According to a study, more than 150,000 farmers and river dwellers were entirely dependent on the river ecosystem, food supply, medicinal plants, and fuel. There are uncertainties that predicted lower water run-off might trigger conflicts between Lesotho, South Africa, and other riparian states threatening regional and international security.<sup>85</sup> Consequently, it may further affect social, economic, and ecological conditions of the rural communities' livelihoods, which are heavily dependent on ground water resources.

Lastly, poor governance, lack of cooperation and the absence of adequate national, regional, or international rules are other inter-acting factors that can potentially exacerbate water-sharing disputes, threatening various dimensions of human security.<sup>86</sup> Therefore, climate change and human security needs special attention of the regional institutions and national governments, specifically where countries are involved in trans-boundary water resources. Furthermore, there is dire need for human security norms, which must be aimed at 'an inter-subjective establishment

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<sup>82</sup> O. W. Mwangi, 'Climate Change, Hydropolitics and Security in Lesotho', In: D. A. Mwiturubani and Jo-Ansie van Wyk, *Climate Change and Natural Resource Conflicts in Africa*, op cit. p. 52.

<sup>83</sup> Ibid.

<sup>84</sup> Ibid, pp. 53-54.

<sup>85</sup> A. Turton, *A southern African Perspective on Transboundary Water Resource Management*, ECSP Report, Issue 9, (Washington: Woodrow Wilson Center, 2003), pp. 78-83.

<sup>86</sup> D. Garcia, 'The Climate Security Divide: Bridging National and Human Security in Africa', *The African Security Review*, 17, 3, 2008, Institute for Security Studies, pp.2-17.

of an existing threat within all sectors (military, social, political, economic, or environmental) with a saliency sufficient to have substantial political effect'.<sup>87</sup>

This discussion contends that in Africa, water scarcity is a potential source of conflicts between groups and states. However, future climate change poses a greater potential for reduced water supply and increased water stress in many regions of the globe, which may lead to increased cycles of environmental conflicts and political insecurity.

#### **4.5 Climate Change and Land**

Dry land covers more than 29 per cent (13 billion hectares) of the Earth's surface, while the remaining 71 per cent is water. Out of the total 29 per cent, only 11 per cent is arable and the remaining 89 per cent is mountainous or desert and unsuitable for crop productivity.<sup>88</sup> Africa being the second largest continent has a total land area of 20.4 per cent of the earth, comprising 30.2 million km<sup>2</sup>,<sup>89</sup> however, much of it remains unexploited for agricultural production. With a staggering growth rate, more than one billion people live in Africa, which is approximately 15 per cent of the total global population.<sup>90</sup>

On the other hand, majority of the African states largely rely on agricultural production and highly dependent on local climatic conditions, including the flora, fauna, and topography. With suitable land, some climates are relatively favorable for the up keep of livestock and farming practices. Therefore, the societies who are capable of making use of their land resources and natural climatic conditions for crop productivity and farming are more affluent than the others are.<sup>91</sup> Studies indicate that global climate change is putting increased pressure on land resources, especially, in the regions where arable land is already scarce. With growing climate change, land will significantly reduce in the tropics, especially in northern South America, Mexico, Central America, Oceania, and Africa.<sup>92</sup>

Global Climate Models (GCM) estimate that in the present century, reduced rainfall will remarkably affect the dry land areas. There are indications that the dry lands of Middle East and

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<sup>87</sup> A. Turton, 'An assessment of strategic issues in the policy field relating to water resource management in southern Africa', In: World Water Council (WWC) (ed.), *Understanding the role of politics in water management*, Proceeding of the Workshop on Water and Politics, Marseille, 26-27 February 2004, Marseille: WWC, 2004, p 51.

<sup>88</sup> D. Moyo, *Winner Takes All*, (London: Penguin Group, 2012), p. 28.

<sup>89</sup> C. J. Cleveland, 'Land Resources in Africa' *The Encyclopedia of Earth*, UNEP, June 2008.

<sup>90</sup> 'Africa Population 2013', *World Population Statistics*, Retrieved online, 2 April 2014.

<sup>91</sup> J. M. Diamond, *Guns, Germs, and Steel: The Fates of Human Societies*, (London: Jonathan Cape, 1997).

<sup>92</sup> N. Ramankutty et al., 'The Global Distribution of Cultivable Lands: Current Patterns and Sensitivity to Possible Climate Change', *Global Ecology and Biogeography*, 11(5), 2002, pp. 377-392.

the western areas of the Asian desert, western and southern parts of the United States, southern Africa, and Australia are constantly experiencing more than average warming.<sup>93</sup> Studies depict that climate change will potentially expand the dry land areas in the Sub Saharan Africa, and hence will significantly reduce the available arable land.<sup>94</sup> In Africa, soil erosion has severely affected crop yields. According to a study, globally the crop yields have reduced by 1-8 percent, while in Africa, yield reduction varies between 1-40 per cent.

Likewise, poor farming practices lead to nutrient depletion, causing land degradation especially in Africa. For instance, in Africa, approximately 950,000 square kilometers (km) land is constrained due to land degradation. In addition, due to increased temperatures, conditions in dry lands will become uninhabitable as greater evapo-transpiration, and lack of precipitation will turn many areas into parched deserts. United Nations Environment Programme identifies that approximately 17.7 per cent of the world population lives in the sub-humid, arid, and semi-arid climatic regions. Due to rapid desertification, every year nearly 60,000 square kilometers of land turns into deserts with direct implications on the lives of 100 million people.

The people affected by rapid desertification, risk mass migration, reoccurring famines, malnutrition, disease, economic depression, and failure of crop yields.<sup>95</sup> Studies suggest that desertification may contribute to violent conflicts and political disputes over mass displacement and accessibility to resources such as water and land.<sup>96</sup> There are predictions that global climate change will directly harm human land systems and land tenure, which will have numerous indirect impacts on livelihoods and socio-economic wellbeing.<sup>97</sup> Biophysical effects of climate change may lead to depletion of land and access to resources with possibility of land conflicts and political volatility.<sup>98</sup>

Due to climate change, land in many small islands and coastal areas has been vastly degraded. Additionally, climate change damages the marine ecosystem, which offers multiple

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<sup>93</sup> M. A. J. Williams et al., *Interactions of Desertification with Climate*, UNEP/WMO, (London: Arnold Publishers, 1996), p. 270.

<sup>94</sup> 'Land and Climate Change: The Role of Sustainable Land Management for Climate Change Adaptation and Mitigation in Sub Saharan Africa', Issue Paper, April 2009, p. 6.

<sup>95</sup> J. S. Ogola et al (eds.), *Potential Impacts of Climate Change in Kenya*, (Nairobi: Climate Network Africa, 1997), pp. 125-126.

<sup>96</sup> U. O. Spring, *Global Interactive Dialogue on Migration and Conflicts*, UNCCD, Third Session of the Committee for the Review of the Implementation of the Convention (CRIC3), Bonn, 10 May 2005, p. 12.

<sup>97</sup> J. Quan and N. Dyer, 'Climate Change, Bio-Energy and Land Tenure', In: *Climate Change, Energy and Food*, Technical Background Document, FAO, Rome, 3-5 June 2006, p. 10.

<sup>98</sup> *Ibid.* p. 16.

resources for the people living on the shorelines. Various studies identify that climate change led sea-level rise, coastal erosion, storms and frequent floods undermine the living conditions and development of the African coastal areas and islands. For instance, climate change will further amplify the problems including land scarcity and vulnerability of the islands to natural phenomena.<sup>99</sup>In addition, environmental catastrophes cause tremendous direct impacts on the land resources and threaten human security including loss of human life, livelihoods, outcome of water borne diseases and extensive environmental damage for the coastal communities.<sup>100</sup>

#### **4.6 Climate Change and Migration**

Migration refers to voluntarily or forced displacement of people within or across national borders.<sup>101</sup>People need to migrate when they are unable to secure their livelihoods or if their lives are endangered in the present conditions. For example, in Kenya, increased water scarcity and recurring droughts force the pastoral communities of arid and semi-arid areas. Severe dry conditions constantly affect these communities and force them to move either within the country or across the borders into Uganda, Somalia, Ethiopia, and Tanzania.<sup>102</sup> However, they return to their homelands when the rainy season begins and there is no more scarcity of water and pasture. Occasionally, due to natural disasters, temporary displacement often leads to permanent migration.

Climate or environmental migration is triggered by abrupt or gradual environmental change that adversely affects the lives of the people.<sup>103</sup>In this case, the affected communities abandon their homes because it is one of the possible survival strategies to cope with the ‘catastrophic shifts’ or ‘tipping points’. Tipping points occur when cumulative effects of rapid and abrupt climatic shifts or events cross a certain ‘critical threshold, triggering runaway changes

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<sup>99</sup> Ibid.

<sup>100</sup> E. C. F. Bird. *Submerging Coasts: The Effects of a Rising Sea Level on Coastal Environments*, (UK: John Wiley and Sons Ltd, 1993), pp. 147-152.

<sup>101</sup> E. Jahn, ‘Migration Movements’, In: R. Bernhardt (ed.), *Encyclopedia of Public International Law*, Volume III, Elsevier, Amsterdam, pp. 369-371.

<sup>102</sup> ‘Security in Mobility’, *Advocating for Safe Movement as a Climate Change Adaptation Strategy for Pastoralists in the Horn and East Africa*, A Joint Report by OCHA, IOM, UNEP and ISS, June, 2010.

<sup>103</sup> *Migration and the Environment*, Discussion Note, (MC/INF/288 – 1 November 2007, 94th Session), International Organization for Migration (IOM), Geneva, 14 February 2008.

that are then very difficult to control'<sup>104</sup> When tipping points exceed and human security is threatened, people begin to consider climate change as a substantial factor for their migration.<sup>105</sup>

The migrants consider the push and pull forces while they move from one place to the other. Push forces are the underlying motivational factors for movement, which generally include extreme poverty, high unemployment, underdevelopment, war, and persecution. Pull forces include high employment, better wages, economic development, political stability, social welfare, provision of aid, and security.<sup>106</sup> Meteorologically, climate change impacts are categorised into two distinguished drivers of migration; climate processes and climate events.<sup>107</sup> Climate processes are changes which progress slowly and gradually such as sea-level rise, salinity of agricultural land, desertification, severe droughts, and increased water scarcity.

Studies reveal that climate change has a strong relationship with environmental scarcity and plays a key role in migration.<sup>108</sup> For instance, in some arid lands of Sahel, people have to walk around 25 kilometers a day to fetch water. If due to the climatic processes, the distance to collect water increases, they will have no choice but to migrate.<sup>109</sup> Unlike climate processes, climate events take place suddenly and dramatically such as, due to storms, hurricanes, typhoons, floods, and glacial lake outbursts.<sup>110</sup> As these events strike the coastal lands, people have to evacuate as quickly as possible. For instance, during the August-September 2006 hurricanes Katrina and Rita, people of the Gulf coast of the United States faced catastrophic impacts. As a result, 1.5 million people were displaced temporarily and 300,000 left their homes permanently.<sup>111</sup> Likewise, during the Indian Ocean Tsunami in 2004, more than 2 million people were displaced and thousands lost their lives.<sup>112</sup>

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<sup>104</sup> R. Schubert et al, *Climate Change as a security Risk*, op cit. p. 241, Also K. Warner et al., *Human Security, Climate Change and Environmentally Induced Migration*, A Report by UNU-EHS, op cit.

<sup>105</sup> O. Brown, 'Climate Change and Displacement', *Forced Migration Review*, Issue 31, October 2008, Refugee Studies Centre, UNEP and University of Oxford, p. 6.

<sup>106</sup> R. Reuveny, 'Climate Change-Induced Migration and Violent Conflict', *Political Geography* 26 (2007), p. 658.

<sup>107</sup> R. McLeman and B. Smit, 'Assessing the Security Implications of Climate Change-Related Migration', Presentation to Workshop on *Human Security and Climate Change*, 21-23 June 2005, Oslo, pp. 8-9.

<sup>108</sup> K. Warner et al., *Human Security, Climate Change and Environmentally Induced Migration*, A Report by UNU-EHS, 30 June, 2008, p. 14.

<sup>109</sup> M. De Wit, and J. Stanjiewiez, 'Changes in the Surface Water Supply across Africa with Predicted Climate Change', *Science*, Vol. 311, 31 March 2006.

<sup>110</sup> O. Brown, *Migration, and Climate Change No 31*, IOM Migration Research Series, IOM, Geneva, 2008, pp. 12-13.

<sup>111</sup> P. Grier, 'The Great Katrina Migration', *The Christian Science Monitor*, 12 September 2005.

<sup>112</sup> Ibid.

The 1990 IPCC report predicted that in future, the most significant impact of climate change will be human migration where ‘coastal and shoreline erosions and agricultural disruption’<sup>113</sup> will be the main drivers to displace millions of people. By 2001, environmental hazards such as pollution, natural disasters, droughts, and land degradation displaced more than 25 million from their homelands.<sup>114</sup> The majority of these migrants belonged to the Sub Saharan Africa and 5 million of the total were affected by severe drought in the Sahel region while 4 million belonged to the Horn of Africa. Studies reveal that an additional 80 million Africans risked starvation due to several environmental factors<sup>115</sup> and 7 million of these had to move for food relief.<sup>116</sup> Furthermore, there were some 135 million threatened by desertification and 550 million faced acute water scarcity.<sup>117</sup>

Data suggests that during the 2007 rains and floods in Uganda, 60,000 people were displaced.<sup>118</sup> During the 2011 droughts in the Horn of Africa,<sup>119</sup> the failure of April-June rains affected millions of people in Djibouti, Ethiopia, Kenya, and Somalia. This prolonged drought particularly led to crop failure, acute food shortages, rising food prices and massive displacement from the southern Somalia. Led by severe famine, there was nearly 1.5 to 2.4 million IDPs in Somalia while more than 920,000 fled to neighboring Djibouti, Ethiopia, and Kenya.<sup>120</sup> The United Nations High Commissioner for Refugees’ (UNHCR) three base camps in Dadaab were hosting more than 440,000 Somali refugees while it had the capacity to host 90,000 only.<sup>121</sup>

As of 15 September 2011, nearly 1500 refugees arrived on a daily basis. In the migrant camps, due to malnutrition, child mortality grew by three folds. In the process of migration, women and girls experienced sexual assault. Similar situation was experienced in Ethiopia where three camps in Bokolomanyo, Melkadida and Kobe exceeded the normal capacity and the

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<sup>113</sup> *Climate Change 1990: Summary for Policy Makers*, Synthesis Report, IPCC, Geneva, 1990.

<sup>114</sup> ‘As Ranks of Environmental Refugees Swell Worldwide, Calls Grow for Better Definition, Recognition, Support’, UN Day for Disaster Reduction, United Nations University, 2 October 2006.

<sup>115</sup> N. Myers and J. Kent, ‘Food and Hunger in Sub-Saharan Africa’, *The Environmentalist* 21, 2001, pp. 41-69.

<sup>116</sup> M. Hulme et al., *Climate and Africa: An Assessment of African Policy Options and Responses*, Norwich, UK: Climatic Research Unit, University of East Anglia, 1994.

<sup>117</sup> N. Myers, Environmental Refugees: An Emergent Security Issue, 13<sup>th</sup> Environmental Forum, Prague, May 2005.

<sup>118</sup> Human Impact Report, *Climate Change: The Anatomy of A Silent Crisis*, Global Humanitarian Forum, Geneva, 2008, p. 48.

<sup>119</sup> ‘East Africa Drought’, *Humanitarian Report No. 3*, OCHA, 10 June 2011.

<sup>120</sup> ‘Overview of Drought Situation in the Horn of Africa’, *African Union Pledging Conference on Drought and Famine in the Horn of Africa*, Addis Ababa, Ethiopia, 25 August, 2011.

<sup>121</sup> ‘One-third of Somalis now Displaced’, *Voice of America*, 15 September 2011, Retrieved online 12 April 2012.

migrants were over-squeezed.<sup>122</sup> With the rising number of climate processes and sudden climate events, human migration is leading to countless human security implications. Especially, people migrate in large numbers with an entire collapse of livelihood chains.<sup>123</sup> Climate change also multiplies with other social, economic, and political factors, especially in the poor and underdeveloped societies who are at greater risk of displacement and due to their greater reliance on the environment for livelihoods. The following section provides an overview of climate change led likely human security implications in Africa.

#### **a) Future trends of climate induced migration**

Scholars have differing views in predicting future climate displacement. In 2001, Norman Myers claimed that ‘by mid-21<sup>st</sup> Century when global warming takes hold.....there could be as many as 200 million people overtaken by disruptions of monsoon systems and other rainfall regimes, by droughts of unprecedented severity and duration, and by sea-level rise and coastal flooding’.<sup>124</sup> Other scholars found the figures over exaggerated and miscalculated. As such, Myers also believed that the count needed to be ‘heroic extrapolations’ to meet the mark. However, these estimations were calculated from the limited available data and the IPCC reports. Later in 2005, it was estimated that by 2020, the number of migrants would be twofold globally.<sup>125</sup>

The migration pressure will particularly increase in Africa, especially in the Sahel region where environmental stress will increase and the population will grow by nearly 50 million. Studies suggest that the future temperature rise will worsen the water stress in southern Africa and the Mediterranean states.<sup>126</sup> As a result, crop yields will decline by 5 to 10 per cent in Africa and in some other tropical regions of the world and the sea-level rise will affect nearly 10 million people per year.<sup>127</sup> In this case, human migration may increase by 5 to 10 per cent. Particularly, people would like to shift from rural to urban areas; however, this migration will still be manageable.<sup>128</sup>

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<sup>122</sup> N. Myers, *Environmental Refugees: An Emergent Security Issue*, op cit.

<sup>123</sup> Ibid.

<sup>124</sup> N. Myers, *Environmental Refugees: A Growing Phenomenon of the 21<sup>st</sup> Century*, The Royal Society, 19 October 2001.

<sup>125</sup> N. Myers, ‘Environmental Refugees: An Emergent Security Issue’, *13<sup>th</sup> Environmental Forum*, Prague, May 2005.

<sup>126</sup> N. Stern (ed.), *The Economics of Climate Change, The Stern’s Review*, (Cambridge: Cambridge University Press, 2006), p. 57.

<sup>127</sup> Ibid.

<sup>128</sup> O. Brown, *Migration and Climate Change* No 31, IOM Migration Research Series, IOM, Geneva, 2008. P 27-28.

According to the IPCC's medium range scenario, the world will possess swift economic growth by the use of modern and most innovative technologies. In the process, the world energy would be sourced from fossil and non-fossil fuels,<sup>129</sup> which would affect negatively on the international communities' efforts to control the greenhouse gas emissions. In addition, limited supply of the Climate Change Adaptation Fund would hinder any further progress to fight climate change. Studies further indicates that by the end of 21<sup>st</sup> Century, average temperature rise would be 2.4 degrees centigrade and the atmospheric CO<sub>2</sub> concentration will be 850 parts per million (ppm).<sup>130</sup> This will lead to substantial sea-level rise between 21 to 48 cm and 20 per cent decline in precipitation, particularly in the sub-tropics.<sup>131</sup>

According to the Stern's review, with 3°C temperature rise, approximately between 1 to 4 billion people will be affected by water scarcity and 150 to 550 million people will suffer from famine. As a result, 11 to 170 million people per year will risk coastal flooding.<sup>132</sup> There are predictions that uncontrolled climate change led extreme weather events will significantly contribute to internal and international displacement of millions of people.<sup>133</sup> In the worst-case scenario, rapidly growing global economies would entirely depend on the fossil fuels, without any consideration for emission reductions or adaptation plans as set by the Kyoto protocol. In this situation, by the end of the 21<sup>st</sup> Century, the CO<sub>2</sub> emissions will reach 1550 ppm and the likelihood of temperature rise will be around 4°C.<sup>134</sup> This will result in reduced water availability by 30 to 50 per cent in most regions of southern Africa and the Mediterranean.<sup>135</sup>

Likewise, the agricultural production will decline from 15 to 30 per cent, particularly in most parts of Africa and Australia. The probable sea-level rise would range from 29 to 59 cm<sup>136</sup> making most parts of Africa, China, and South Asia uninhabitable. Frequent and more intense climate events and processes will force approximately 150 million people per year as by 2050 and 450 million by 2100s,<sup>137</sup> which is much more than Myer's predicted number of 200 million people. Although, IPCC 2007 report and the Stern Review projected above estimates of

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<sup>129</sup> IPCC, *Climate Change 2007: The Physical Science Basis, Summary for Policy Makers*, op cit. p. 14.

<sup>130</sup> Ibid, p. 14.

<sup>131</sup> Ibid, pp. 11-12.

<sup>132</sup> N. Stern, *The Stern Review: Economics of the Climate Change*, op cit, p. 57.

<sup>133</sup> O. Brown, *Migration and Climate Change* No 31, op cit, pp. 28-29.

<sup>134</sup> *Climate Change 2007: The Physical science basis – Summary for Policy Makers*, IPCC, op cit.

<sup>135</sup> Ibid.

<sup>136</sup> N. Stern, *The Stern Review: Economics of the Climate Change*, op cit. p. 57.

<sup>137</sup> R. J. Nicholls and J. Lowe, 'Benefits of Mitigation of Climate Change for Coastal Areas', *Global Environmental Change*, 14, 2004, p. 239.

the global environmental migration, however, the International Organization for Migration (IOM) argues that predicting the flows of climate change led migration is obscure due to a number of factors.

Firstly, IOM identifies that there is lack of database due to the changing scenarios in the future population growth in various regions of the globe. Secondly, the implementation of the policies for the control of greenhouse emissions and uncertainty in the adaptation and mitigation programs are other areas of concern. Thirdly, there is lack of consensus over the specific definition for climate or environmental migrants; therefore, the international community does not recognise the status of these migrants. As a result, major responsible agencies do not add them to their data collection.<sup>138</sup>

#### **b) Environmental conflicts and human security**

Scholars of environmental conflicts such as Gleditsch, Nordas and Homer-Dixon argue that climate change led migration interacting with cultural, social, economic and political fault lines and therefore, indirectly contributes to human insecurity.<sup>139</sup> Likewise, UN Security Council recognizes that large-scale population movements pose serious threats to international peace and security, especially for the societies greatly divided on ethnic or tribal lines.<sup>140</sup> Based on empirical extrapolations, studies clearly indicate that the probability of conflicts increases in the transit and also in the receiving areas, though, the intensity of conflict varies from non-violent skirmishes, insurgencies and inter or intra-state conflicts.<sup>141</sup>

Research indicates that the risks for insecurity and conflict increase if the population movement within national borders or in a region brings together groups of different identities who are competing for the same resources. In such cases, violence may erupt due to weak governance, poor institutions, proliferation of small arms and growing poverty.<sup>142</sup> For example, many states in the Northwest Africa are already experiencing political turmoil where climate

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<sup>138</sup> O. Brown, *Migration and Climate Change*, op cit, pp 22-31.

<sup>139</sup> J. Goldstone, 'Demography, Environment and Security', In P. Diehl and N. Gleditsch (eds.), *Environmental Conflict*, (Boulder: Westview Press, 2001), pp. 84-108.

<sup>140</sup> F. Sindico, 'Ex-post and ex-ante [Legal] approaches to Climate Change – threats to the international Community', *New Zealand Journal of Environmental Law*, Volume 9, 2005, pp. 209-238.

<sup>141</sup> 'Climate Change as a Security Risk', *German Advisory Council on Global Change*, op cit.

<sup>142</sup> O. Brown, *Migration and Climate Change*, IOM Migration Research Series, International Organization for Migration, Geneva, 2008.

change, migration and security issues multiply to create an ‘arc of tension’ within Nigeria, Niger, Algeria and Morocco.<sup>143</sup>

In Nigeria, especially in the city of Lagos, among other climate related problems, rising sea levels and frequent floods often cause outbreaks of diseases. Issue of land degradation has led to rapid desertification in the Northern parts of the country, severely affecting 200 villages in surrounding areas, and pushing people to lands with better living conditions. Likewise, climate change has forced environmentally displaced people towards the central parts of Nigeria where the influx of urban population is already high. Studies indicate that climate change led migration has fundamental implications for Nigeria’s national security and governance, including political coups, huge corruption, resource conflicts, and weak institutions.<sup>144</sup>

Additionally, following the inner migration routes, many Nigerians are seeking refuge in the neighbouring Niger and Morocco, from where they further move towards Maghreb and the European states. Migrants arriving in Niger, often face numerous challenges as majority of Nigeriens rely on rain fed agriculture, which over the time has significantly affected by the recurrent droughts. For example, in 2010, more than seven million Nigeriens experienced food shortages. Furthermore, future warming and climate change will potentially worsen living conditions due to more droughts, land erosion, and deforestation.<sup>145</sup>

Studies depict that climate change led conflicts among the pastoral communities and farmers are a common phenomenon. The African pastoral communities’ livelihoods are directly dependent on the natural resources.<sup>146</sup> In many parts of Africa, climate change increases the severity and intensity of droughts, reducing the water and forage availability for the livestock, leading to starvation and mass decimation of cattle. This has further implications for pastorals as they survive on their livestock. In particular, Somali pastoral communities Ishaq and Ogaden have constantly been fighting for the last 60 years.

Climate change factors such as desertification, persistent drought periods, and accompanied famines forced Ishaq to migrate from northern Somalia to Haud in eastern

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<sup>143</sup> M. Werz and L. Conley, *Climate Change, Migration and Conflicts in Northwest Africa: Rising Dangers and Policy Options Across the Arc of Tension*, Center for American Progress, Heinrich Boll Stiftung, April 2012, pp. 5-6.

<sup>144</sup> Ibid.

<sup>145</sup> Ibid.

<sup>146</sup> B. N. Njiru, ‘Climate Change, Resource Competition and Conflict amongst Pastoral Communities in Kenya’, In: J. Scheffran et al (eds.), *Climate Change, Human Security and Violent Conflict*, Hexagon Series on Human and Environmental Security and Peace, Volume 8, (2012), pp. 513-527.

Ethiopia. In the late 1940s, alarms were raised for land degradation due to overgrazing and over-congestion in Haud. In the later years, watering and grazing issues led to the killing of 80 persons. As the migration of Ishaq continued, these issues grew more complex and led to a bloody war between Somalia and Ethiopia during 1977-78. Over the past many decades, the two tribes have continued to fight and these conflicts are still unresolved.<sup>147</sup>

Similar situation exists in the Sahel region where during the past century, declined rainfall forced northern pastoralists towards the south where the landowners are sedentary farmers. Consequently, the farmers were pushed farther into the marginal lands, causing farmland destruction, cattle rustling, and intergroup conflicts. Over the period, growing activities of the pastoral communities increased the competition between the livestock and agricultural producers giving rise to violence and political instability in the areas.<sup>148</sup> Peoples' cultural and linguistic differences also interact when people of distinct groups migrate from one region to the other. In such cases, lives of the migrants are exposed to numerous personal and political security threats with complex and intertwined socio-economic factors.

Another area of concern is the timing and scale of migration. Migration in small number and at a slower pace can easily be absorbed and is less harmful, compared to sudden and heavy movement of people. However, in medium and worst case scenarios; abrupt climate change will push enormous flow of people who depend on natural resources. In these cases, the receiving areas may experience increased cycles of insecurity.<sup>149</sup> Simultaneously, climate induced migration can be beneficial as the migrants will increase the labor force and tax revenues in the receiving areas. Migrants can also transfer their skills to the residents and may promote cooperation to reduce the risks of conflict.<sup>150</sup>

#### **4.7 Climate Change and Food Security**

Food security entails availability, accessibility, consistency, and utilisation of food. The IPCC notes that increased concentration of GHG emissions severely threatens all components of food security. For instance, high levels of carbon dioxide with increased warming and changes in the

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<sup>147</sup> J. Markakis, 'The Ishaq-Ogaden Dispute', In: A. H. Ornas and M. A. Salih, (eds.), *Ecology and Politics: Environmental Stress and Security in Africa*, Scandinavian Institute of African Studies, 1989, p. 158.

<sup>148</sup> A. Nyong, *Climate Related Conflicts in West Africa*, Environmental Change and Security Program Report, Issue 12, 2006-2007, Woodrow Wilson Center for Scholars, Washington, pp. 36-43.

<sup>149</sup> R. Reuveny, 'Climate Change-Induced Migration and Violent Conflict', op cit.

<sup>150</sup> B. Wisner et al., *Climate Change and Human Security*, April 2007, p. 6, Retrieved online, 13 March 2012.

precipitation patterns directly affects food production and its availability.<sup>151</sup>The IPCC Report 2000 demonstrated that climate change impacts on food production would vary from region to region.<sup>152</sup> It further indicated that climate change would potentially ‘increase the disparities in cereal yields between the developed and developing countries in a more significant way’.<sup>153</sup>

Studies demonstrated that future climate change would considerably put pressure on food production and sources of livelihoods. Depending on the future emissions, slight to moderate changes in the climate will not significantly affect global food production, as high latitude regions like the North America, northern Europe, Russian Federation and East Asia will have increased grain yields.<sup>154</sup> However, countries located in the lower latitudes will be more vulnerable as an increased warming of 1.5°C to 4.0°C will negatively affect their agricultural production.<sup>155</sup>In particular, the developing countries that are located in the lower latitudes will face serious challenges due to changes in the precipitation patterns, growing intensity of droughts and increased water stress coupled with demographic changes and economic shortfalls. In addition, these climate change conditions will significantly increase the dry land areas causing food crisis and famine.<sup>156</sup>

Additionally, long-term changes in the land use and land cover have significantly declined the productivity of food. As a result, climate change has lowered the incomes of the subsistence farmers especially in the rural areas. Lack of resources affects the accessibility of food and, in the wake of climate shocks, first three components of food security are affected due to the breakdown of the physical infrastructure, which often hampers the supply from rural to urban areas and vice versa. Based on future predictions figure 4.1 shows projected climate change affects on crop yields in various regions of the globe. It is evident that Africa is going to be one of the most vulnerable regions.

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<sup>151</sup> *Africa Human Development Report 2012*, ‘Towards a Food Secure Future’, United Nations Development Programme, Geneva, 2012, p. 59.

<sup>152</sup> IPCC 2000, *Special Report on Emissions Scenarios*, IPCC, (Cambridge: Cambridge University Press), 2000.

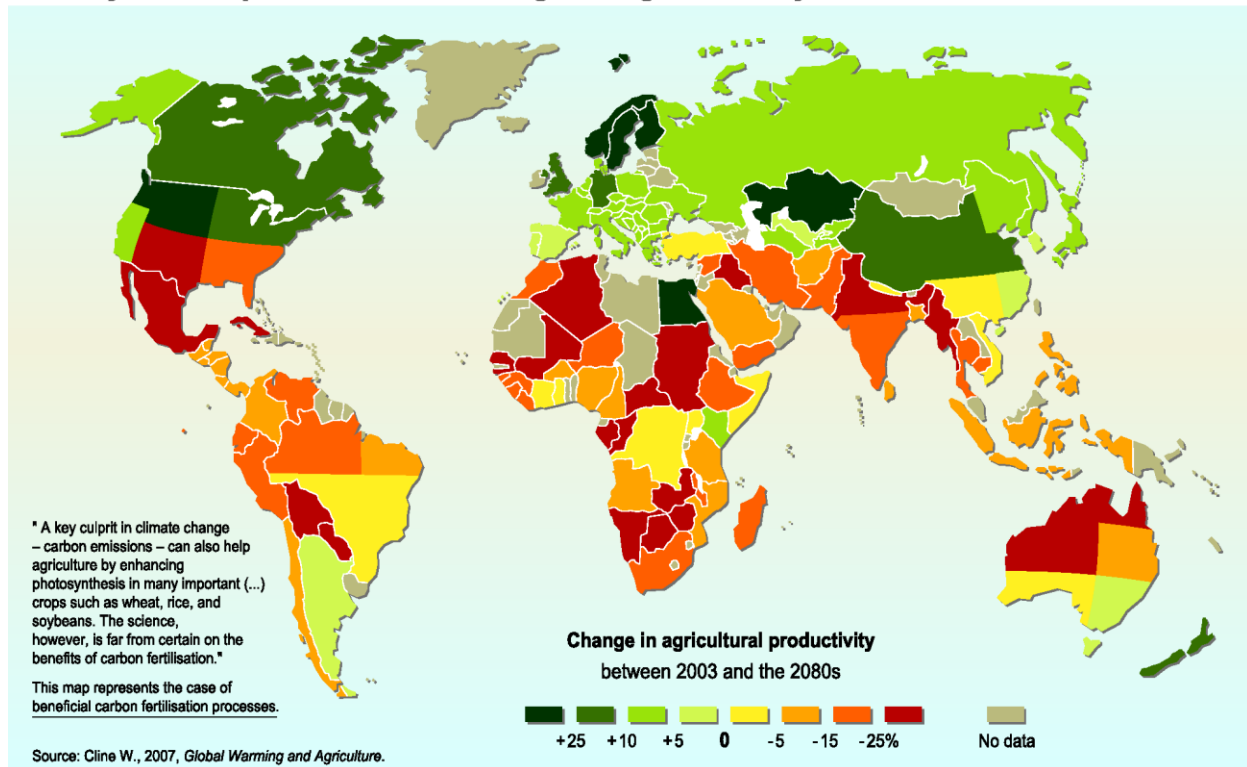
<sup>153</sup> M. L. Parry et al, ‘Effects of Climate Change on Global Food Production under SRES Emissions and Socio-economic Scenarios’, *Global Environmental Change* 14, 2004, pp. 53-67.

<sup>154</sup> R. Schubert et al, *Climate Change as a Security Risk*, German Advisory Council on Global Change, (London and Sterling: Earthscan, 2008), pp. 93-96.

<sup>155</sup> IPCC 2007, *Climate Change 2007: The Physical Science Basis*, Contribution of Working Group I to the Fourth Assessment Report of the IPCC, Geneva. 2007.

<sup>156</sup> *Ibid.*

## Projected impact of climate change on agricultural yields



**Figure 4.1** Key Impacts of climate change on agriculture production.

Source: W. Cine, *Global warming and Agriculture*, 2007

Figure 4.1 indicates that all parts of Africa will be facing moderate to high risks in agricultural production. For instance, productivity in the East African states will decline by 5 to 25 per cent during 2003 to 2080. At the same time, southern, and western parts of Africa will be the most affected, with 15 to 25 per cent yield reductions while northern Africa may not be affected very adversely. Studies project that by 2060, due to persistent droughts, dry land areas in Sub Saharan Africa could expand to 60 to 90 million hectares facing economic losses of US\$ 26 billion.<sup>157</sup>

In the course, Food and Agriculture Organisation predicts that due to climate change, 65 developing countries possessing more than half of the world population will face 280 million tones declined grain yields. Similar affects are being experienced in the rapidly developing economies. For instance, due to unpredictable rainfall patterns, India will potentially face 125

<sup>157</sup> *Fighting Climate Change: Human Solidarity in a divided World*, Human Development Report 2007/2008, UNDP, New York, 2007.

million tones of reduction in its cereal production. Whereas due to substantial increase in rainfall, China will be among the winners and will potentially have 15 percent increased grain yield.<sup>158</sup>

As discussed in the earlier sections, environmental degradation will amplify desertification, salinity, and depletion of the fresh water resources and will have grave repercussions for the agriculture sector. Depending on the economic conditions of a state, such situation can easily plunge a country's food security into food crisis and may lead to political instability. Especially, for economically weak states, that are relying on the agricultural exports, may face catastrophic impacts on the national GDP.<sup>159</sup>

Wealth distribution and income inequalities are important intervening factors when a shortfall of food supplies coupled with unemployment, loss of livelihoods, and high inflation rates may trigger bread riots and violent skirmishes, particularly, in the urban areas.<sup>160</sup> From the historical evidence, violent conflicts arise when small minority of the affluent is still satisfied and unaffected by the food crisis while greater number of population is hungry.<sup>161</sup> For example, in September 2010, increased wheat price in Mozambique led to bread riots in the city of Maputo. Due to increased hunger, poverty, and landlessness, people of Mozambique engaged in protests as the price of bread was increased by 30 per cent.<sup>162</sup>

In addition, lower cereal production often leads to price hike coupled with economic security issues as well as health insecurity. Lower earnings adversely affect the affordability and tend to increase the number of hungry and malnourished people. Using the micro level data, for instance, Ethiopian and Kenyan children born during the intense droughts are at a risk of 6 to 50 per cent to be undernourished. During the 2005 drought period, Ethiopia had approximately two million extra malnourished children. UNDP predicts that by 2080s, climate change led food insecurity will leave 600 million additional people affected by severe malnutrition.<sup>163</sup>

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<sup>158</sup> *Impacts of Climate Change, Pests and Diseases on Food Security and Poverty Reduction*, Background Document, 31<sup>st</sup> Session of the Committee on World Food Security, FAO, Rome, May 2005.

<sup>159</sup> R. Schubert et al, *Climate Change as a Security Risk*, German Advisory Council on Global Change, (London and Sterling: Earthscan, 2008).

<sup>160</sup> Bank for International Settlements (BIS), *BIS Quarterly Review – March 2006 – International Banking and Financial Market Development*, 2006.

<sup>161</sup> R. D. Kaplan, 'The Paris Bread Riot of 1725', *French Historical Studies*, 14(1), 1985, pp. 23-56.

<sup>162</sup> A. K. Satchu, 'Mozambique Bread Riots May be Warning Sign on African Food Security', *The Christian Science Monitor*, 6 September 2010, Retrieved online, 4 August 2014.

<sup>163</sup> *Fighting Climate Change: Human Solidarity in a Divided World*, Human Development Report 2007-2008, UNDP, New York, 2007.

Climate change has profound impacts on the livelihoods of subsistence farmers. The majority of population living in the developing countries relies on small-scale farming and due to increased frequency of droughts, crop yields will reduce as much as by fifty per cent in some parts of Africa.<sup>164</sup> For example, with other East African states, Uganda experienced intense cycles of droughts during the period of 1991-2000.<sup>165</sup> Eighty per cent of the Ugandans are dependent on rain fed farming, and agriculture contributes for 30-40 per cent of the national GDP.<sup>166</sup>

A study by the World Food Organization (WFO) observed that during 2008, Uganda faced at least 30 per cent reduction in its food production. This had devastating effects on health and physical growth of the Ugandan children.<sup>167</sup> Similar food security issues have been witnessed in other African states, especially where the governments have poor mechanisms to fight climate change and are unable to assist the citizens in the times of severe food crisis.

#### **4.8 Climate Change and Human Health**

Various IPCC reports support the idea that greater warming will be beneficial to health in very cold regions. For instance, warming of 1°C in the average temperature lowers the death rate, especially in relation to diabetes, digestive, and heart diseases. Therefore, climate change will help lower the death rate in some parts of the globe.<sup>168</sup> Simultaneously, researchers believe that greater warming increases the frequency of heat waves and changes the precipitation patterns with higher mortality rates. For instance, the World Health Organisation (WHO) study depicts that during the last four decades, changing climate has led to more than 150,000 deaths on yearly basis.<sup>169</sup> Climate change increases the risk of vector diseases and contributes to numerous health issues, especially in the underdeveloped parts of the globe.

In Africa, highlands of Ethiopia, Kenya, Rwanda, and Burundi were malaria free zones. However, the most recent research indicates the presence of malaria carrying mosquitoes with

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<sup>164</sup> M. Boko, et al., "Africa." *Climate Change 2007: Impacts, Adaptation and Vulnerability, Contribution to Working Group II to the Fourth Assessment Report of the IPCC*, M. L. Parry, et al. (eds.), Cambridge University Press, 2007, p. 435.

<sup>165</sup> 'Uganda: Rising Temperature Threatening Livelihoods', *Relief Web*, 3 March 2009.

<sup>166</sup> 'National water development Report: Uganda', *World Water Assessment Programme and Directorate of Water development*, Prepared for 2<sup>nd</sup> UN World Water Development Report, UNESCO, 2005, pp. 116-118.

<sup>167</sup> WFP, 'World Hunger', *World Food Programme*, op cit.

<sup>168</sup> S. M. Robeson, 'Relationship between Mean and Standard Deviation of Air Temperature: Implications for Global Warming,' *Climate Research* 22, 2002, pp. 205-213.

<sup>169</sup> J. A. Patz et al., 'Impacts of Regional Climate Change on Human Health', *Nature* 438, 17 November 2005, pp. 310-317.

growing incidents of the disease in the Highlands. Research suggests that rising temperatures specifically increase the risk of mosquito borne diseases, especially during the hotter years. For instance, in Ethiopia, where half of the population lives at an altitude between 1600 to 2400 meters, is exposed to malaria. World Health Organisation (WHO) identifies that in 2012, there were 207 million cases of malarial infections, which led to 627,000 deaths, whereby most of the people belonged to Africa.<sup>170</sup>

The United Nations (UN) warns that by 2050, uncontrolled atmospheric levels of ozone depleting chemicals will become 10 folds, exposing the sun's ultraviolet rays. Research suggests that this will potentially damage human immune system and an increase in the incidents of cardio-respiratory infections. Additionally, approximately 20 million people will risk skin cancer and 130 million cases of eye cataract may happen.<sup>171</sup> Moreover, climate change will halt the progressive capabilities of many states to fight against the spread of diseases like malaria, diarrhea, and other respiratory illnesses, hence impairing health security of people.<sup>172</sup>

Over the last two decades, due to sever rainfall variability, acute droughts, and heavy flooding, twenty five million Ethiopians suffered from hunger and malnutrition. Lack of clean water supply often spreads diseases like diarrhea, which kills approximately twenty thousand Ethiopian children every year.<sup>173</sup> This is only the case of one African country and many others are even worse off. Additionally, increased risks of food insecurity severely affect health security as discussed in the earlier sections. According to a survey, by 2010, due to climate change, 45 million people were at an increased risk of malnutrition, 182 million risked diarrhea and 11 million were exposed to malarial infection. There are assumptions, that by 2030, these numbers will considerably grow to 77 million, 216 million, and 19 million respectively.<sup>174</sup>

The 2013-14 IPCC report identifies that climate change poses new risk factors for health security, however, due to economic and technological challenges, there is little what Africa can afford to handle the growing intensity of these issues.

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<sup>170</sup> A. S. Sirag et al, 'Altitudinal Changes in Malaria Incidents in Highlands of Ethiopia and Colombia', *Science*, 7 March 2014, Volume 343, Number 6175, pp. 1154-1158.

<sup>171</sup> *The Millennium Development Report 2010*, The United Nations, New York, 2010, p. 55.

<sup>172</sup> P. R. Epstein, *Climate Change Futures: Health, Ecological and Economic Dimensions*, The Centre for Health and the Global Environment, Harvard Medical School, 2006.

<sup>173</sup> 'Case Study Africa', *Red Cross*, Red Cross/Red Crescent Climate Guide, 2009, p. 71. Also, 'Ethiopia Drought', Oxfam Great Britain, 2009, Retrieved online 15 April 2012.

<sup>174</sup> *The Anatomy of a Silent Crisis*, Human Impact Report, Climate Change, op cit, p. 90.

## **4.9 Climate Change and Human Security Initiatives in Africa**

The above analysis reveals that climate change poses numerous human security threats to Africa's human security. Although, Africa emits only 3.8 per cent of the total greenhouse gas emissions, however, due to financial constraints, weak institutions, chronic poverty, and underdevelopment, wide spread and catastrophic impacts of anthropogenic climate change are more pronounced in Africa than in other parts of the globe. Consequently, climate change led disasters are continuously affecting Africa's sustainable economic growth, human development, and security.

For the last two decades, climate led disasters have significantly challenged Africa's socio-economic well being. However, the continent's action against climate change has been slow and ineffective and due to these reasons, Africa's climate predicament has not received any prominent acknowledgement in the global climate change negotiations. So far, neither Africa has any specific institutions based on human security programme, nor has it adequately endorsed the concept into foreign or domestic policies.

In January 2007, Assembly of the African Union Heads of States called upon national governments to harmonise climate change into their corresponding national development plans. Similarly, during the November 2008 11<sup>th</sup> Ministerial Meeting on the Africa-EU dialogue, the issue of climate change was acknowledged as a shared responsibility. The meeting emphasised the need to combat the climate change vulnerabilities. For that, it was stressed that countries need legally binding emission reduction targets. Climate change being a common challenge for the African states, therefore, needs a collective action.

In 2009, the AU assembly approved the Algiers Declaration on Climate Change, which specifically aimed to participate in the fifteenth Conference of the Parties to the UNFCCC (COP 15). Furthermore, Assembly of the AU formed the Conference of Africa Head of States and Governments on Climate Change (CAHOSCC), mandated to provide a continental platform for Africa's leadership in the international climate change negotiations. Similarly, New Partnership for Africa's Development (NEPAD) recognises that climate change poses many challenges to the region's future development. NEPAD has integrated Climate Change and Natural Resource Management Programme, intended to share knowledge on few of the human security issues. Its major aim is to address the challenges of environmental sustainability, food security, and biological diversity.

In the recent years, Africa's sub-regional institutions such as IGAD, SADC, EAC, and ECOWAS have adopted various climate change policies. However, none of the organisation targets climate change as an emerging threat to human security. For instance, since its inception, food and environmental security has been the key priority areas for IGAD. It has also established Drought Monitoring Centers (DMNC) in Nairobi and Harare. In October 2003, DMNC was adopted in the 10th Summit in Kampala where the name of the institution was changed to IGAD Climate Prediction and Applications Centre (ICPAC). However, its main agenda is to provide information on future climate change. IGAD has initiated the policy and strategy responses to climate change that afflict the region. The organisation primarily requires assessments and studies that are not in place yet and it needs to adopt a human security approach to climate change issues.<sup>175</sup>

Simultaneously, climate change has been widely recognised as a major concern in the discussions of various regional forums. For instance, the 2010 Africa Development Forum (ADF VII) was aimed specifically at 'Acting on Climate Change for Sustainable Development in Africa'.<sup>176</sup> The forum was a collective effort of the UN Economic Commission for Africa and the AU Commission and the African Development Bank. The forum examined key climate change challenges and prospects within the global context and identified a way forward to take serious policy actions against the phenomenon. One of the key outcomes of the forum was to take 'sector specific actions' especially to develop resilience in agriculture, food security, and infrastructure sectors.<sup>177</sup>

Similarly, various African states have taken stride to develop their national climate change plans such as Kenya's National Climate Change Response Strategy as explained in chapter three, section 3.8. Generally, such plans are aimed at mitigation or adaptation plans, however, fail to tackle climate change through human security approach. Therefore, climate change and human security issues need far more attention and need to be resolved with the commitments of the national governments, various non-governmental organisations, and in collaboration with the civil society. Furthermore, African states need the establishment of

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<sup>175</sup> Interview with Mr. A. Tadege, Climate Change Adaptation Specialist, IGAD Climate Prediction and Adaptation Centre Nairobi, 10 April 2014.

<sup>176</sup> J. F. Jarso, 'Africa and the Climate Change Agenda: Hurdles and Prospects in Sustaining the Outcomes of the Seventh Africa Development Forum', *Sustainable Development Law and Policy* 11, No. 2 (2011), pp. 86-89.

<sup>177</sup> *Ibid.*

climate change and national human security policies and legislation, which African states lack presently.

#### **4.10 Conclusion**

This chapter concludes that climate change issues pose widespread challenges for Africa's human security, especially for the people living in arid or semi arid areas, coastal towns and small islands. In the regional context, climate change has led to increased depletion and degradation of the environmental resources. Majority of the African population is dependent on environmental resources such as agricultural land and fresh water supply; therefore, due to increased warming and recurring droughts, often face declined food production and loss of livelihoods. Consequently, climate change undermines all dimensions of human security including food, health, environmental, economic, political, and personal.

As global climate change proceeds, climate change impacts will further weaken peoples' resilience in the African continent. There are fears that if climate change issues are not tackled appropriately, scarcity of important environmental/natural resources may lead to inter and intra-state conflicts, and pervasive human security implications. Presently, Africa has poor implementation of climate change adaptation and mitigation mechanisms, therefore, needs serious action at regional as well as national levels if it wants to curb these issues. Additionally, an urgent financial support from the international community and western states is necessary to cope with future climate change.

## CHAPTER FIVE

# CLIMATE CHANGE AND HUMAN SECURITY IN THE MAU FOREST COMPLEX, 1963-2012

### 5.0 Introduction

A forest is an extensive area covered by trees that form a continuous canopy area densely filled with variety of trees, shrubs, and grasslands. Forests can be natural or manmade and refer to ‘land with a tree canopy cover of more than 10 per cent and area of more than 0.5 hectare (ha)’.<sup>1</sup> Forests have variety of roles that could be divided into, environmental, economic, aesthetic, and cultural. Other key roles of forests is to help filter and store water and control natural calamities such as floods, droughts, and landslides. In addition, forests contribute significantly in maintaining biodiversity of the world.<sup>2</sup>The relationship between forests and humans developed during the prehistoric times when both were friendly to each other. However, with industrial revolution and population growth, gradual demand of timber and forest resources led to over-exploitation of the world forests. Ultimately, the world is facing uncountable environmental dilemmas with myriad human security issues.

The preceding chapters of this study examined the links between anthropogenic climate change and human security repercussions, especially in Africa. This chapter is based on the case study of the Mau Forest Complex, which is Kenya’s biggest water tower. Key focus of this chapter is to analyse the implications of anthropogenic activities such as mass excisions, establishment of legal or illegal human settlements, conversion of forestland into subsistence farming, deforestation, forest fires, logging, and the resultant environmental crises causing climate change in the Mau Forest complex, especially during the period of 1963-2012. Additionally, the chapter examines the continued degradation of the Mau’s ecosystem and the overarching situation of resource scarcity and human insecurity in and around the Complex. The study focuses on the Eastern, Southwest and the Maasai Mau forest blocks, which are among the most degraded parts of the Mau complex.

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<sup>1</sup> *Global Forest Resources Assessment 2000*, FAO Forestry Paper 140, Food and Agriculture Organisation, Rome, 2001.

<sup>2</sup> The Forests Act, Kenya, 2005, p. 6.

## 5.1 The Mau Forest Complex: An Overview

The Mau Complex of forests is located in the West of the Great Rift Valley, and situated at approximately 250 kilometers from Nairobi. Originally, it covered massive land area of 405,000 ha. The Mau Forest Complex is the biggest of the five key water towers in Kenya and serves as an upper catchment for several streams and twelve rivers including Nzoia, Yala, Nyando, Sondu, Mara, Kerio, Molo, EwasoNgiro South, Njoro, Nderit, Mkalia and Naishi. At the same time, these rivers drain into five major lakes of the region; Victoria, Nakuru, Natron, Turkana and Baringo.<sup>3</sup>

The Mau Forest Complex comprises 22 units of forests contained within ten major forest blocks; Mau Narok, Maasai Mau, East Mau, Western Mau, Southern Mau, South West Mau, Londiani, Tinderet, Lembus and Trans Mara. These forest blocks are situated in the heart of some important counties like Narok, Nakuru, Baringo and Kericho (see Appendix 3 map).<sup>4</sup>Exposition from air photography demonstrates that one quarter of the South West Mau and 75 per cent of the Transmara is closed canopy. However, vegetation varies erratically from grasslands to thick bamboo forest formation in the Eastern slopes, where as the lower slopes of West and Southwest have a mixture of bamboo with various kinds of trees forming a closed canopy montane forest.<sup>5</sup> Based on this information, the Mau Complex is one of the biggest closed canopy montane ecosystems in the East African region.<sup>6</sup>

The Mau Forest Complex has five main forest reserves including the Eastern (65,000 ha), Western (22,700 ha), Southwestern (84,000 ha), Trans-mara (34,400 ha) OIPosimoru (17,000 ha) and the Maasai Mau (46,278 ha). All of these reserves are gazetted except the Maasai Mau, which is classified as trust land, managed by the County government of Narok. Gazetted forests are public property, directly under the government's authority and managed by the Kenya Forest Service, which is the state agency in charge of forests.<sup>7</sup> The national government manages

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<sup>3</sup> 'Assessment of Vegetation Cover and Biodiversity Hotspots in the Mau Forest Complex', Report Submitted to: Prime Ministers Task Force on the Conservation of the Mau Forest Complex, National Museums of Kenya Biodiversity Team, March 2009, p. 17.

<sup>4</sup> Ibid.

<sup>5</sup> G. Davies et al, West Mau, *South West Mau and Transmara Forest Reserves Mammal Survey*, KIFCON, Nairobi, Jan 1993, p. 5.

<sup>6</sup> P. Wass, *Kenya's Indigenous Forests: Status, Management, and Conservation*, IUCN, Gland, (Switzerland and Cambridge, 1995), p. 205.

<sup>7</sup> The Forests Act, Kenya, 2005

gazetted forests on behalf of the people whereby the revenues collected from the forest are utilised to strengthen national economy as well as for the common welfare of the citizens.

An un-gazetted forest is a private property held by individuals, corporate or communities.<sup>8</sup> A trust land is under the county government's management to fund local programmes. Its beneficiaries are the local communities, groups and individuals, who can use its resources followed by their customary norms.<sup>9</sup> However, once a part of it is registered under the name of any person, group, or organisation, it becomes a private property owned by that particular entity.<sup>10</sup> Topographical features of the Mau Forest Complex include the changing landscape, comprising a multitude of hills, rolling land, plains, and escarpments. Its slopes range from 2 per cent where the forest lies in the plains to 30 per cent along the foothills.<sup>11</sup>

The complex lies at an altitude between 2000 to 3000 meters above the sea level. The Mau Forest Complex lacks a definite dry or wet precipitation regime and receives rainfall throughout the year, especially in the eastern parts. Meteorological data indicates that during 1986-2005, the Mau Complex had a bimodal rainfall pattern, with continuous rains having two peaks; long rains, and short rains. Long rains extend from March to June while short rains are experienced during the period between October to December.<sup>12</sup>

However, since 2006, trimodal precipitation pattern has also been observed in certain areas having long rainy season from April to May while short rains occurring during November to December, with an extra small peak during August.<sup>13</sup> Average annual rainfall is about 2000 mm in the areas around Kericho and 800-1000 mm in areas adjacent to Narok, Nakuru, Molo, Lembus and Trans Mara. The normal temperature inside the Mau fluctuates between 12°C to 16°C.<sup>14</sup> During the months of summer, maximum temperature rises above 19°C.<sup>15</sup> The soil of the

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<sup>8</sup> Kenya Constitution 2010.

<sup>9</sup> Interview with Mr. J. M. Mbinga, Deputy Director Kenya Forestry Research Institute, Londiani, 13 February, 2014.

<sup>10</sup> *The Trust Land Act*, Chapter 288, Republic of Kenya, 1970, Revised Edition, Government Printer, Nairobi, Kenya.

<sup>11</sup> L. O. Olang and P. M. Kundu, 'Land Degradation of the Mau Forest Complex in Eastern Africa: A Review for Management and Restoration Planning', *Environmental Monitoring*, Published online by InTech, November 2011, p. 248

<sup>12</sup> 'Assessment of Vegetation Cover and Biodiversity Hotspots in the Mau Forest Complex', Report Submitted to: Prime Ministers Task Force on the Conservation of the Mau Forest Complex, National Museums of Kenya Biodiversity Team, March 2009, p. 13.

<sup>13</sup> T. J. Baldyga, et al, 'Assessing Land Cover Changes in Kenya's Mau Forest Region Using Remote Sensed Data', *African Journal of Ecology*, 46, 2007, pp. 46-54.

<sup>14</sup> Data sourced from Kenya Meteorological Department, October 2013.

Mau Forest region is volcanic and layered with fertile soil, thus, making it attractive for agriculturalists.<sup>16</sup>

The Mau Forest provides a habitat for variety of flora and fauna. Its flora changes as the altitude varies. Some parts of these forests consist of shrubs with numerous varieties of indigenous and exotic trees such as cedar, African olive, and Cypress, contrasting with grasslands in other parts. Its bamboo forest is of great economic and ecological significance and plays key role in the regional hydrological cycle. Bamboo conserves moisture, seeps rainwater and through this process, helps recharge the underground aquifers. In addition, it protects the soil, keeps it intact from erosion and water runoff.<sup>17</sup>

Other roles of bamboo is to help in carbon dioxide sequestration by storing excessive amount of carbon which otherwise would be released into the atmosphere and add to global warming and climate change. Bamboo is also a good source of handicrafts. Since 2013, the government of Kenya introduced the enterprise development programmes based on sustainable use of bamboo, especially aimed at the well fare of the internally displaced persons (IDPs) of the Mau Forest. Such programmes help to generate livelihoods by making handicrafts like baskets.<sup>18</sup> Other types of Forest trees provide wood for multiple usages from furniture to construction, mainly due to durability, strength, and flexibility.<sup>19</sup>

Although it is not a tourist attraction as such, the forest sustains more than 450 bird species and a huge variety of wild animals, including some rare and endangered species such as the bongo, yellow backed duiker and the African golden cat. Other commonly found animals found in the Mau forests include elephant, buffalo, gazelle, leopard, antelope, hyena, forest hog, colobus, blue and red-tailed monkeys, and many small species such as the African genet and hyrax.<sup>20</sup> Each species of the flora and fauna is an asset of the forest and plays a unique role to enhance its economic and ecological values. Therefore, each kind of flora and fauna has

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<sup>15</sup> ‘Assessment of Vegetation Cover and Biodiversity Hotspots in the Mau Forest Complex’, Report Submitted to: Prime Ministers Task Force on the Conservation of the Mau Forest Complex, op cit.

<sup>16</sup> Ibid, p. 12.

<sup>17</sup> Ibid. p. 7.

<sup>18</sup> Interview with Mr. J. M. Mbinga, Deputy Director Kenya Forestry Research Institute, Londiani, 13 February, 2014.

<sup>19</sup> Z. Ben-zhi et al., ‘Ecological Functions of Bamboo Forest: Research and Application’, *Journal of Forestry Research*, June 2005, Volume 16, Issue 2, pp. 143-47

<sup>20</sup> ‘Assessment of Vegetation Cover and Biodiversity Hotspots in the Mau Forest Complex’, Report Submitted to: Prime Ministers Task Force on the Conservation of the Mau Forest Complex, National Museums of Kenya Biodiversity Team, March 2009.

fundamental significance for the attainment of human security for the local, national, and regional population.

There are wide range of goods and services that are linked to the Mau's biodiversity. For instance, the Complex provides water, food, shelter, clothing, firewood, and grazing areas for the communities living in and around its proximity.<sup>21</sup> Forest animals and plants are source of food for the locals. Many of these contain medicinal properties and are used to cure day-to-day ailments.<sup>22</sup> The biodiversity also provides endless opportunities to researchers of various fields of study. The Mau Forests have been home to indigenous forest dwelling communities such as the Ogiek, meaning 'the caretaker of all plants and wild animals'.<sup>23</sup> They are also nicknamed as 'Dorobo' referring to the poor who cannot afford cattle and opt to live on hunting and gathering.<sup>24</sup>

Traditionally, the Ogieks have had an intrinsic relationship with their environment, which made them conscious about the ecosystem of the Mau Forest Complex. In the process, they sustainably used and protected the Mau forests with their indigenous practices and knowledge about the forests.<sup>25</sup> For decades, these communities have entirely relied upon the forest resources concerning various aspects of their human security. For instance, in the economic, food, and health security perspectives, the Ogieks relied upon bee keeping, game hunting, and other forest supplies such as roots of trees and wild berries. Honey is the most important item as they use it as food and trade it to make livelihoods. For the Ogiek women, the white pupa of the bees, found in the honeycombs, is a delicacy and a natural medicine to cure many diseases. Traditionally, skin or hide of the hyrax provided their clothing called *ender*.<sup>26</sup> As such, the forest has been a typical life sustainer for their routinely up keep.

The Ogieks settled in the East African forests before 1800 AD and held land through elders, selected on customary rules based on clans and families. These indigenous communities treated land as an asset, an element of spiritual identity, and most important part of their cultural

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<sup>21</sup> Z. Ben-zhi et al., 'Ecological Functions of Bamboo Forest: Research and Application', *Journal of Forestry Research*, op cit.

<sup>22</sup> The Mixed Community Focus Group Discussion, The Discussion was held in Oloikirirai village located on the boundary of the Maasai Mau, 13 June 2013.

<sup>23</sup> S. Joseph, *Case Study 3, Kenya*, 'The Ogiek in Mau Forest', April 2001, p. 114.

<sup>24</sup> The Ogiek Community Focus Group Discussion, (the Group consisted of five members; Peter Maikobi, Francis Nkoiko, Wilson Kursai, Ruth Musilo and Joylene Ngoisilo), The Discussion was held in Oloikirirai village located on the boundary of the Maasai Mau, 14 June 2013.

<sup>25</sup> Ibid.

<sup>26</sup> Ibid.

heritage. However, during the early 1900s, colonial rule partly demolished their land ownership rules to replace with exotic tree plantations.<sup>27</sup> The Native Land Trust, specifically, disowned the natives from their own land whereby other Kenyan tribes were registered and settled in reserve lands. Despite the huge demand for an Ogiek reserve, the British administration dismissed the issue and never recognised their right, being a minority community to own land.<sup>28</sup> During the 1930s, the colonial government harassed the Ogieks by confiscating their livestock, beehives, and the stocks of honey barrels.<sup>29</sup>

As they lacked access to education, this has led to high level of illiteracy among the community. Therefore, most of the time they have been sidelined from the political participation. Consequently, their voice has never been heard for their rights and socio-political development.<sup>30</sup> Instead, like other forests, the Mau complex was given under the government's custody. Therefore, since the colonial period, the community security of the Ogieks has been at stake as they have been forced to change their cultural and traditional patterns of life including food, livelihoods, and habitation.<sup>31</sup> Other key changes include population growth, increased entry of non-Ogiek squatters and repeated eviction plans from the forest.<sup>32</sup>

After independence, the Government of Kenya also refused to recognise the Ogieks' rights to own land, although the community leaders have been fighting for their land ownership rights for decades. For instance, through their Memorandum to the Constitution of Kenya Review Commission, they formally requested for the recognition and protection of basic human rights of the indigenous communities. Although, Kenya has been party to many international treaties such as the International Covenant on Economic, Social, and Cultural Rights and International Covenant on Civil and Political Rights.<sup>33</sup>

Similarly, the new constitution of Kenya also recognises the indigenous community rights and accepts them as the equal citizens of the country, however, the issue of their land

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<sup>27</sup> Ibid.

<sup>28</sup> T. J. Kimaiyo, *Ogiek Land Cases and Historical Injustices, 1902-2004*, Chapter 5, Volume 1, Retrieved on 30 January 2014.

<sup>29</sup> T. J. Kimaiyo, *Ogiek Land Cases and Historical Injustices, 1902-2004*, Chapter 12, Volume 1, Retrieved on 13 October 2013.

<sup>30</sup> The Ogiek Community Focus Group Discussion, op cit.

<sup>31</sup> Ibid.

<sup>32</sup> A. J. H. Jackson and P. S. McCarter, *A Profile of the Mau Forest Complex*, Kenya Indigenous Conservation Programme (KIFCOM), Nairobi, May 1994, p. 51.

<sup>33</sup> *Memorandum: to Constitution of Kenya Review Commission*, Presented on Monday 15 July 2002, Nairobi, retrieved online on 4 February 2014.

ownership is still a missing agenda, as the 2010 Kenya Constitution does not clearly spell out on this issue. Therefore, due to environmental and political factors, land conflicts have continued to erupt in the Rift Valley areas and around the Mau Forest Complex.

## **5.2 Economic and Ecological Benefits of the Mau Forest Complex**

Among a number of others major forests of Kenya, the Mau Forest Complex plays critical role to sustain natural and human environments. The complex provides fundamental environmental resources necessary for Kenya's sustainable development and achievement of the Vision 2030, which is a blueprint for Kenya's future socio-economic growth. Economic and ecological values of the Mau forests are the tangible and non-tangible benefits, crucial to attain human security. The rivers and lakes of the Mau Forest Complex are of tremendous economic and ecological values for the local, national, and regional human security needs. For instance, Mara River is a source of survival for the humans and animals both in Kenyan and Tanzania's game reserves such as the Maasai Mara and the Serengeti.

Lake Victoria is a great source of East Africa's fish industry; 75 per cent of its water comes from Mau's rivers (though Kenya has only 6 per cent of the lake's border). The lake produces more than 500, 000 tons of fish annually, which is exported to Europe, Asia and the Middle East, valued approximately US\$400 million annually. Other trans-boundary rivers and lakes are also key sources of water supply to the adjacent rural and urban areas. This water, thus, has been supporting numerous sectors such as housing, tourism, energy, agriculture, and industry.<sup>34</sup>

Compared to other water towers in the region, another special significance of the Mau is that its waters flow to trans-boundary lakes including the White Nile.<sup>35</sup> This implies that the Mau complex not only supplies water to the eastern Africa, but also it is an important water resource for the entire Nile Basin, covering the Horn and parts of Northern Africa.<sup>36</sup> The Mau forests, therefore, provide crucial social and ecological services at national, regional, and international levels. For instance, it helps in water regulation, underground water purification and waste treatment, water storage and ground water recharge.<sup>37</sup> Secondly, the vegetation cover of the

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<sup>34</sup> Interview with Mr. E. O. Omollo, Deputy Director, Forest Conservation and Management, Kenya Forest Services, Nairobi, 3 February 2014.

<sup>35</sup> Ibid.

<sup>36</sup> Ibid.

<sup>37</sup> Interview with Mr. B. Omondi, Senior Assistant Director, Watershed Management, Kenya Forest Services, Nairobi, 10 February 2014.

forest controls soil siltation and erosion, and protects against landslides and floods. Thirdly, the forest helps in the biodiversity conservation.

The forest also regulates disease control as changes in the land cover can enhance the growth and multiplication of bacteria and viruses causing diseases, like cholera and malaria. Lastly, the ecosystem of the Mau Forest helps to regulate the local and regional climate and mitigates natural disasters.<sup>38</sup> It is estimated that the Mau Complex generates goods and services equal to US\$ 1.3 billion annually, which is 2 per cent of Kenya's Gross Domestic Product (GDP).<sup>39</sup> Nearly 5 million Kenyans depend on the forest for their daily provisions. In the energy sector, the complex has the capacity to generate hydropower of 535 Mega Watts, which is 41 per cent of Kenya's total power generation.<sup>40</sup>

In addition, having catchments on the South West Mau, the power plants of the Sondu, Ewaso Ngiro Rivers, and the Kericho tea estates have potential to produce more than 440 MW of energy.<sup>41</sup> Thus, economic value of Mau's total energy generation amounts to US\$ 131.6 million.<sup>42</sup> Among other agricultural and horticultural commodities produced in the area, tea is Kenya's major cash crop that is ranked third highest foreign exchange earner for the country. Tea production needs particular microclimate with well-distributed rain to provide constant moisture, air and soil temperature and long sunny days. Most of Kenya's tea is cultivated around the southwest Mau as it provides an ideal environment for tea production. Kericho tea estates (formerly foreign owned), which belong to this region, produce one of the world's finest quality teas.

Being in the neighborhood of a natural forest, Kericho is world's leader in terms of tea yields per hectare. More than 100 small (less than 10 acres) scale tea farms contribute towards 65 per cent of Kenya's total tea production.<sup>43</sup> The tea sector provides nearly 35,000 jobs and around 50,000 small-scale farmers' livelihoods entirely rely on the ecological services of the Mau Forest Complex.<sup>44</sup> It is estimated that Kenya's tea earnings are nearly US\$ 163 million annually.<sup>45</sup> Many

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<sup>38</sup> *Integrated Forest Ecosystem Services*, Technical Report, UNEP, Nairobi, 2012.

<sup>39</sup> Interview with Mr. E. O. Omollo, op cit.

<sup>40</sup> Rehabilitation of the Mau Forest Ecosystem, A Project Concept Prepared by the Interim Coordinating Secretariat, Office of the Prime Minister, Government of Kenya, 200, p. 7.

<sup>41</sup> *Integrated Forest Ecosystem Services*, Technical report, (Nairobi: UNEP, 2012), p. 39.

<sup>42</sup> J. Elliot, *Water, and Climate Mitigation: Example form the Mau Forest Complex, Kenya*, Paper presented at the 2012 World Water Day in Stockholm, African Wildlife Foundation, August 26-31, 2012, p.5.

<sup>43</sup> Interview with Miss B. Cheserek, (Environmentalist) Tea Research Foundation, Kericho, 14 February 2014.

<sup>44</sup> F. Owino, *Report of the Prime Minister's Task Force on the Conservation of the Mau Forest Complex*, op cit, p. 16.

large multinationals such as Unilever Kenya, James Finlay, and Williamson also found in Kericho County. These companies employ thousands of workers from all parts of the country, thus help to maintain national economic security.

Studies reveal that compared to other tea producing areas of Kenya, there are 8 to 20 percent higher yields in the proximity of the Mau Forests. Therefore, more than two third of the tea produced in the western Kenya, benefits from the ecological functioning of the Mau forests.<sup>46</sup> Rice, wheat, and maize are other cash crops, which are produced in areas around the Mau's favorable climatic conditions.<sup>47</sup> During the past few years, production of grain has considerably increased in and around the MFC.

In the Narok County, for instance, total wheat production during 2011 and 2012 accounted for 2,983,130 and 4,908,400 bags of 90 kilograms respectively, which is significantly higher than the previous year's yields in the Narok County area. For the production of above-mentioned commodities, areas around the MFC are well established with smallholder (approximately 2.5 acres) agriculturalists found along the Bomet County, adjacent to West and Southwestern parts of the Mau Complex. The Olenguruone Enclave lies towards the Nakuru County, which is concentrated with groupings of settlements since 1940s. This area is known for the production of vegetables, pyrethrum, and tea.<sup>48</sup>

Molo Farms in Nakuru are still owned by the European settlers. These farms produce abundant quantity of oats, barley, and wheat. Other commercial farming activities include ranching, sheep rearing and dairying. However, these are gradually turning to smallholders with mixed agro-pastoral practices. The lower Northern part of the Mau Forest lies next to the Narok County, most of which is arid and semi-arid and has more pocketed population relying on mixed agro-pastoral economy.<sup>49</sup>

Socio-economic surveys reveal that thousands of the forest dwellers and local communities living next to the forests used the forest wood for making poles, spears, bows and arrows, fuel and furniture making.<sup>50</sup> Bamboo is used in building, construction and fencing. Grass

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<sup>45</sup> J. Elliot, *Water and Climate Mitigation: Example from the Mau Forest Complex, Kenya*, op cit, p.5.

<sup>46</sup> Ibid.

<sup>47</sup> Ibid.

<sup>48</sup> A. J. H. Jackson and P. S. Mccarter, *A Profile of the Mau Forest Complex*, Kenya Indigenous Forest Conservation Programme (KIFCOM), Nairobi, May 1994, p. 13.

<sup>49</sup> Ibid, p.15.

<sup>50</sup> A. J. H. Jackson and P. S. Mccarter, *A Profile of the Mau Forest Complex*, Kenya Indigenous Conservation Programme (KIFCOM), Nairobi, May 1994.

of the forest makes good material for thatching. Forest vines provide basket-making material. Various plants of the Mau are used as herbal medicines for both humans and animals. Historically, forest animals provided meat by hunting, though it has decreased due to various factors such as banning and shift in the agro-pastoral economy.<sup>51</sup>

Thus, the complex has been a key source for the national economic growth, for it directly provides means of attaining human security in relation to livelihood, water, food, medicines, and housing material for the local and regional population. However, since the colonial era, due to its affluence with innumerable environmental and ecological resources, the Mau Forests have been a battleground between the politicians, ruling elites, and the local communities of the country. The following section provides a detailed account of some of these issues, which over the years have led to the destruction of the MFC.

### **5.3 Pre-Independence Land Politics in Kenya**

Before the British rule in Kenya, various ethnic groups and local communities owned certain portions of land according to their customary laws. Abiding by these customary laws, people also did hunting, pastoral activities including livestock keeping and fishing.<sup>52</sup> The management and the use of natural resources were based on the indigenous knowledge of the clan or community members. Traditional rules and ethics helped to resolve major disputes regarding the land rights and transfer of ownership. During this period, most land was under communal ownership, which allowed the clan or community members to practice their occupations in a secure milieu based on the principle of reciprocity.<sup>53</sup> Thus, these communities lived in harmony, enjoyed their lives free from all kinds of fear and want, and led honorable lifestyle as the local laws provided necessary conditions for the human security.

In early June 1895, among other British colonies, Kenya was also targeted as their favorite destination and was declared as British Protectorate; however, the land ownership remained with the locals. In 1901, Europeans began to settle in Elburgon and moved towards Molo South and Keringet. From 1902, the colonial settlers began to amend the existing land ownership laws and introduced new land policies. For instance, under the Outlying District

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<sup>51</sup> Ibid, p. 5.

<sup>52</sup> T. J. Kimayio, *Ogiek Land Cases and Historical Injustices, 1902-2004*, Volume 1, Ogiek Welfare Council, Nakuru, Kenya, 2004.

<sup>53</sup> H. W. O. Okoth-Ogendo, 'African Land Tenure Reforms', In J. K. Hayer Judith et al (eds.), *Agricultural Development in Kenya and Economic Assessment*, (Nairobi: Oxford University Press, 1976), pp. 152-185.

Ordinance, the Maasai agreements of 1904 and 1911 were substantially changed. The Colonials also used the local administration to drive thousands of the Maasai and their herds to Laikipia.<sup>54</sup>

Following the new land allocation policies, the European settlers seized land in Central and Rift Valley Provinces of Kenya<sup>55</sup> where main use of land was ranching, farming, hunting, and plantation, depending on the type of labor available in the area.<sup>56</sup> During this time, the new land policies that helped to transfer huge portions of the Mau Forests were through the Crown Land Ordinance. In addition, with these distorted policies, the colonials displaced thousands of Kenyans of various ethnic identities such as the Kikuyus, the Luos, the Luhyas and the Kisiis. Most of them migrated to the White Highlands and settled as squatters, laborers, and peasants. However, some of them succeeded as farmers and gradually through the legal organisation of colonial settlements continued to occupy land in this area. As such, the Colonials empowered the Commissioners to grant 999 years leases (Section 34 of the Crown Land Ordinance), especially through the provisions of the Crown Land Ordinance of 1915, which specifically played a major role to disown the natives from their ancestral land.<sup>57</sup>

According to the Residents Native Laborers Ordinances, in 1918, these squatters were left with fewer tenancy rights. The situation further deteriorated during 1934-1939, when the Ordinance entirely disqualified the natives to own any piece of land, especially in the so-called White Highlands.<sup>58</sup> By 1940, there were thousands of squatters (majority being the Kikuyu) in the area who worked as laborers for the white settlers. With the population growth, the white settlers saw them as threat in the areas and tried their unprecedented evictions using force. This was due to their increased interest in the highly fertile land in the Highlands that the Europeans wanted to own exclusively.

Secondly, it was due to the new settler's growing need of labor force to work on these farms. Therefore, to deal with the shortage of labor, the colonial government used forced labor policies whereby the local administration such as the chiefs helped to recruit the squatters. Thus, most of the squatters were bound to work as low cost contractors or casual laborers with

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<sup>54</sup> H. W. O. Okoth-Ogendo, *Tenants of the Crown*, (Nairobi: African Centre for Technology Studies, 1991), p. 30.

<sup>55</sup> T. J. Kimayio, *Ogiek Land Cases and Historical Injustices, 1902-2004*, op cit.

<sup>56</sup> C. Boone, 'Land Conflict and Distributive Politics in Kenya', *African Studies Review*, Volume 55, No. 1, Published by African Studies Association, University of Texas, April 2012, p. 8.

<sup>57</sup> P. Mosley, *The Settler Economies: Studies in the Economic History of Kenya and Southern Rhodesia 1900-1963*, (Cambridge: Cambridge University Press, 2009), p. 5.

<sup>58</sup> H. W. O. Okoth-Ogendo, *Tenants of the Crown*, op cit, pp 58-61.

minimum wages or no wages at all.<sup>59</sup> As a result, the displaced pastoral and agricultural communities were severely affected with hunger as well as growing incidents of human and livestock diseases.

Furthermore, the white settlers used every barbaric tactic to keep away the Africans from farming and owning land in the Rift Valley. For example, they imposed various forms of taxes on the ordinary Africans, enshrined in the colonial laws. They imposed the Hut Tax of 1901, the natives of East Africa, for instance, had to pay to own a hut. Initially, it was the tax of one Rupee; however, it increased with time as the locals resisted paying.

By 1910, the Native Hut and Poll Tax provisions included severe punishments for non-payment and were imprisoned for three months or would be disowned from the property. Likewise, the Kipande laws restricted the movement of locals, even within their own homeland. In addition, these taxes and laws provided a weapon of capitalistic economy to force the locals in the labor market and to work for the settlers.<sup>60</sup> In 1941, to resettle the displaced squatters from previous year's eviction plans, the colonial government established their first schemes in Olenguruone part of the Mau, situated in the Narok Forest. By 1942, there were still more than 200,000 squatters in the area.

During 1945 and 1952, more than 100,000 squatters were maliciously forced to move to Central Kenya. During the late 1940s, these were among the fundamental factors that significantly fueled the formation of the Mau Mau movement.<sup>61</sup> The pattern of cyclic evictions continued when the colonials evicted most of these squatters in 1954, especially from the Kikuyu origin, from Olenguruone. However, it was one of the Colonial rule's strategies to contain the Mau Mau movement against their oppressive rule. Simultaneously, they wanted to allocate some of this land to the local Kenyans. Nevertheless, this was clearly for their self-interest as the colonial masters wanted to gain the loyalties of the local cronies who were pro-government and were against the Mau Mau revolt.<sup>62</sup>

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<sup>59</sup> R. M. A. Van Zwanenberg, *Colonial Capitalism and Labour in Kenya 1919-1939*, (Nairobi: East African Literature Bureau, 1975). Also N. S. Carey Jones, 'The Decolonization of the White Highlands of Kenya' *The Geographical Journal*, Volume 131, No. 2, June 1965, pp. 186-201.

<sup>60</sup> A. Waris, 'Taxation without Principles: A Historical Analysis of the Kenyan Taxation System', *Kenya Law Review*, Volume 1: 272, 2007.

<sup>61</sup> T. Kanongo, *Squatters and the Roots of Mau Mau, 1905-1963*, (Athens: Ohio University Press, 1987).

<sup>62</sup> N. S. Carey Jones, 'The Decolonization of the White Highlands of Kenya', *The Geographical Journal*, op cit.

## 5.4 Post-Independence Assault on Mau's Land

Kenya won its independence in December 1963. According to the Kenya Constitution of 1963, section 205, all land previously owned by the British Crown was automatically transferred to the government of Kenya, under the care of the President. This incorporated all kind of forestland, game parks, and reserves, including the white settler's land and the unoccupied land left for future development purposes. Under a number of schemes, half of this land was disposed on behalf of the small-scale farmers. In this process, Kenya's first President Kenyatta introduced the land transfer schemes, ranging from five thousand to ten thousand acres of land pieces. Thus, run by the state, 123 such settlement schemes were introduced.<sup>63</sup>

Many of these included the low density schemes especially intended for commercial farming where the division of land was from 8-16 hectares.<sup>64</sup> During the late 1960s and 1970s, many politicians and government dignitaries being heads of private land companies, for instance, introduced the Settlement Trustees Fund schemes to buy or lease estates and farms. However, the companies later sub-divided these chunks of land among their families, by holding shares. Through this politicised process, many Kenyans of Luo and Kikuyu origin gained control of land in the Rift Valley.<sup>65</sup> During this period, land parcels of 4-6 hectares were distributed among the subsistence farmers, based on the high-density schemes.<sup>66</sup> For instance, the willing-buyer-willing-seller policy was the focus of diverse ethnic classes, including the affluent middle class people, corporate societies, and the investor companies who were generally keen on agricultural production.<sup>67</sup> Thus, through this process 20 per cent of the White settlers' land was divided among the local farmers.

By 1970, these schemes gained a lot of momentum and helped to settle approximately half a million landless locals.<sup>68</sup> Simultaneously, President Kenyatta also enhanced his political powers and used the land allocation policies for his patronage purposes.<sup>69</sup> Under Kenya's first

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<sup>63</sup> H. W. Von Haugwitz, *Some Experiences with Small Holder Settlement in Kenya, 1963/4 to 1966/7* (Munich: WeltforumVerlag, 1972), p, 12.

<sup>64</sup> R. S. Odingo, *The Kenya Highlands: Land Use and Agricultural Development*, (Nairobi: East African Publishing, 1971), pp. 200-201.

<sup>65</sup> B. Berman and J. Lonsdale, *Unhappy Valley: Conflict in Kenya and Africa*, Book 2, *Violence and Ethnicity*, (London: James Currey, 1992), pp, 460-63.

<sup>66</sup> R. S. Odingo, *The Kenya Highlands: Land Use and Agricultural Development*, op cit.

<sup>67</sup> W. O. Oyugi, *Politicised Ethnic Conflict in Kenya: A Periodic Phenomenon*, Addis Ababa, 2000.

<sup>68</sup> C. Leys, *Under Development in Kenya: The Political Economy of Neo-Colonialism*, (Los Angeles: University of California Press, 1975), p. 75.

<sup>69</sup> Interview with Mr. E. Chebelyow, Former Director Brook Bond, Kericho, 14 February 2014.

constitution, all forestland is under the possession of the government as was the case with the Mau Forest. Nevertheless, forestlands can be used for multiple purposes through degazetment process. From 1970s to 1990s, through various informal schemes, Kenya's forests were continuously degazetted and divided among the influential political leaders and their party members. The beneficiaries mainly included the politicians, high status civil servants and the business community.<sup>70</sup>

The Kenyan government, for instance, established the Lake Nakuru and Mauche settlement schemes for the landless Kenyans and the squatters, especially from the Kikuyu tribe whereby many of these settlements were established near the forests. These settlement areas therefore, continuously expanded as the population grew with time, and consequently they grabbed more land from the surrounding areas.<sup>71</sup> The Kalenjins who believed that it was their ancestor's land and none other can own this land, however, opposed these schemes. In 1969, for instance, Jean Seroney who was the Deputy Speaker of President Kenyatta's Parliament and a minister for the Nandi North Constituency published a much controversial document *The Nandi Hills Declaration*.<sup>72</sup> In reaction, President Kenyatta's regime took a serious note of it and ordered to detain him.<sup>73</sup>

In 1978, President Moi came to power and progressively used the forestland allocation policies to advance his political motives. Specifically from 1986 onwards, among other forests and state properties, the Mau forests Complex became more of a fund, used to award and influence the party friends to strengthen the regime.<sup>74</sup> For instance, some leading members of the ruling tribe and party associates were among the 'land grabbers' especially in Nandi and Kericho Districts, being the most promising areas for agricultural development as well as social-multiplicity.<sup>75</sup> Simultaneously, the President was reaching out to help the aggrieved who had been disowned or could not possess land during the 1960s and 70s, under President Kenyatta's land allocation schemes. However, the new president's land allocation process was questionable and highly sensitive to the political environment of the country.

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<sup>70</sup> Ibid.

<sup>71</sup> Ibid.

<sup>72</sup> C. Leys, *Under Development in Kenya: The Political Economy of Neo-Colonialism*, op cit, pp. 229-230.

<sup>73</sup> 'Fighting for the Mau Forest, Land, Climate Change and the Politics of the Kibaki Succession', *Africa Policy Report 2010*, Africa Policy Institute, June 2010, p. 5.

<sup>74</sup> R. Southhall, 'Ndungu Report Summary', *Review of African Political Economy*, 103, March 2005, p. 149.

<sup>75</sup> C. Boone, 'Land Conflict and Distributive Politics in Kenya', *African Studies Review*, op cit p. 12.

During 1991-92, Kenya established the multi-party system, which stirred uncertainty for President Moi's future rule. However, once again the ruling party members triggered violence and ethnic clashes to clear the Rift Valley area. They used local militia groups who fiercely attacked the villages and burned houses, destroyed property, and brutally killed and raped hundreds of women. As a result, more than three hundred thousand were displaced whom since Presidents Kenyatta's times had lived in small settlements and owned land.<sup>76</sup> Following these incidents, the southwestern Mau Forest was opened up for new settlements of the people especially from Kericho and Bomet<sup>77</sup> and led to further occupation of the forestland.<sup>78</sup>

Over the years, Kenya's political elites have targeted the Rift Valley and the surrounding areas for electoral campaigns. Therefore, before and after every election period, there have been widespread and recurring episodic clashes in the area, in particular during 1991-92 followed by 1997, 2002, and 2007-2008 electoral periods. These bloody clashes and killings of thousands are the attribute of continued evictions and resettlements by the Kenyan politicians, who have been using the Mau forests for their political gains.<sup>79</sup> In 2001, the most critical issue that caught the attention of the international community was the destruction of the Kenyan forests and the controversy over the forestland ownership.

In 2003, due to the growing publicity of the forestland excisions and severe degradation of the Kenyan forests, a land commission was set up to investigate cases of land grabbing.<sup>80</sup> The commission reported that during the last two decades, huge chunks of protected parts of the Mau Forest were cleared to award the political elites, including some prominent companies. The Ndungu Report identifies serious incidents where political factions, public officers and provincial administrators used various illegal means for their personal benefits. The report also argues about various accounts of wide spread corruption, leading to human rights violations and land grabbing.<sup>81</sup>

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<sup>76</sup> Interview with Mr. E. Chebelyow, Former Director Brook Bond, Kericho, 14 February 2014.

<sup>77</sup> J. D. Bateson, *The Registration of the Forest Dwellers of the South Western Mau Forest Reserve*, Kenya Indigenous Forest Conservation Programme (KIFCOM), June 1994, p. 8

<sup>78</sup> 'Fighting for the Mau Forest, Land, Climate Change and the Politics of the Kibaki Succession', *Africa Policy Report 2010*, op cit

<sup>78</sup> P. Kantai, 'Saving Kenya's Mau Forest', *Africa Report 21*, September 2009

<sup>79</sup> Interview with Dr. H. A. M. Ole Kamwaro, Former Chairman of the Narok County, Nairobi, 25 June 2014.

<sup>80</sup> *The Ndungu Report*, 2003, p. 23, Retrieved online, 22 October 2013.

<sup>81</sup> Ibid.

Additionally, the reports identified that the Kenyan presidents who were the trustees of the public land, used their powers to lease hold and free hold public land to some individuals and corporations<sup>82</sup> while the deserving individuals and communities, including the Ogieks, did not receive any land. According to the legislations provided in the Kenya Forest Act, de-gazetted forest can be used for genuine public interest.<sup>83</sup> However, according to the Kenya land commission's report, in this case, most of the land was allocated for political gains and mobilisation of the elections. At this point, it can be argued that throughout the twentieth Century, neither the colonial rulers nor the Kenya's independent governments had any environmental security concerns. In addition, Kenya's political leaders did not attempt to use the natural resources sustainably, while keeping in mind the future implications in terms of environmental degradation, climate change, resource scarcity, and the human security repercussions.<sup>84</sup>

Since 2004, the Kenya government made significant efforts to restore the complex, however, there has been a clash of political interests, and consequently various parts of the complex have been encroached and degraded. Secondly, the political leaders have also used the forest evictees to strengthen their positions by promising incentives, such as greater control of land. In addition, the local chiefs who administer some parts of the complex, realign with various political parties during the campaign periods, and have their own political motives.<sup>85</sup> Consequently, during the previous election periods, political shifts have led to fundamental excisions and destruction of the Mau Forest Complex. Specifically, until 2001, Kenyan leaders distributed the huge chunks of the forestland among their cronies to acquire their support and win the seats.<sup>86</sup>

During the 2005 referendum campaign, for instance, President Kibaki ordered to evict thousands of forest dwellers to protect and restore the forest. These evictees were issued with 12,000 title deeds to win their favors for the next election period.<sup>87</sup> In response to the ongoing degradation and encroachment of the Mau Forest, the Kenya government sponsored many

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<sup>82</sup> Ibid.

<sup>83</sup> Ibid.

<sup>84</sup> Interview with Dr. H. A. M. Ole Kamwaro, Former Chairman of the Narok County, Nairobi, 25 June 2014.

<sup>85</sup> Interview with Mr. J. M. Mbinga, Deputy Director, Kenya Forestry Institute Londiani, 13 February 2014.

<sup>86</sup> Interview with Mr. E. O. Omollo, Deputy Director, (Forest Conservation and Management), Kenya Forest Services, Nairobi, 3 February 2014.

<sup>87</sup> *'Fighting for the Mau Forest: Land, Climate Change and the Politics of the Kibaki Succession'*, Africa Policy Report 2010, op cit, pp.12-13.

programmes with huge sum of finances.<sup>88</sup> In the process, many reforestation plans were initiated to rehabilitate the Mau Forests. For example, one such programme was setup with the help of the Council of Elders' in Narok. This was an initiative to grow seedlings and establish nurseries. However, the plan was abandoned midway and the allocated funds were diverted towards unknown projects.<sup>89</sup>

In June 2005, President Kibaki's government ordered to evict thirty thousand squatters.<sup>90</sup> However, the forest encroachment was never fully controlled and by 2007, the rapid destruction of the forest reached a crisis state. In the aftermath, the office of the former Prime Minister Raila Odinga established the Mau task force, mandated to conserve the Mau Forest Complex. In July 2008, the task force held a forum whereby more than 300 participants, comprising members of the government and civil society were present. The forum produced a status report with key findings, indicating that the forest is under severe threat. The report highlighted several themes including governance, capacity building, climate change, and environmental sustainability.<sup>91</sup>

However, major issues concerning climate change and key provisions of human security were missing from the report. The report, for instance, needed to assess the social, economic, political, and environmental security costs, which would threaten the lives of the evictees. The report recommended restoration measures with the eviction of 200,000 people residing in the forest.<sup>92</sup> As a result, the government ordered further eviction from the Mau forest. Until 2013, for more than three years, the evictees lived in the Internally Displaced People's (IDP) camps, waiting to be compensated and relocated.<sup>93</sup>

The evictions led to mass human rights violation, socio-economic and environmental impacts on the IDPs. More notably, the evictees faced various challenges in terms of economic, food, health, personal, community, political and environmental security, being important pillars of human security. During this period, the evictees were living on the roadside in temporary shelter, squeezed in camps with scarce provisions of water and food. The compounded impacts

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<sup>88</sup> Interview with Dr. H. A. M. Ole Kamwaro, Former Chairman of the Narok County, Nairobi, 25 June 2014.

<sup>89</sup> Interview with Hon. P. Ole Lemain, Former Senator Narok County, Nairobi, 25 June 2014.

<sup>90</sup> Report of the Prime Minister's Task Force on the Conservation of the Mau Forest Complex, op cit.

<sup>91</sup> Ibid.

<sup>92</sup> Ibid, p. 52.

<sup>93</sup> Focus Group Discussion No. 2, (Mixed Community members), The Discussion was held in Oloikirirai village located on the boundary of the Maasai Mau Forest, Narok County Council, 13 June 2013.

<sup>93</sup> Researchers personal Observations, Kericho, April 2012.

led to a number of social issues such as food insecurity and increased cases of HIV/AIDS. Lack of sanitation led to cases of pneumonia without any medical assistance.<sup>94</sup>

During the election period, various political groups and Non Governmental Organisations (NGOs) manipulated the IDPs to demand compensation money as well as alternate land to resettle. Major outcome of these issues have led to conflicts between the IDPs, the government and the local administration. Due to inter-linkages between diverse human security components, threats further deteriorated other aspects of human security of the communities living in the area.<sup>95</sup>The Mau Forest Complex surfaced as an issue of global political discourse in the 2009 Copenhagen World Summit on Climate Change where it caught the attention of the international community.

Following this, in collaboration with the United Nations Environmental Programme, the Kenya Wildlife Services, Kenya Forest Services and various environmental NGOs, numerous programmes have been placed to control the situation of illegal settlements. For instance, with the help of the government of the United States and the European Union, huge funds have been poured for the restoration of Kenya's vital water towers. However, the situation is still uncontrolled as most forests of the Mau Complex are being under constant human encroachment.

### **5.5 Climate Change and Human Security Dimensions in the Mau Complex**

Land use and land cover changes in the Mau Forest have gradually influenced many changes in and around the Mau forest Complex.<sup>96</sup> Data reveals that before the mid 1980s, nearly 75 per cent of Mau's land cover consisted of unchanged forest, with 12 per cent woodland while 13 per cent was under farming.<sup>97</sup> However, since the late 1980s, large-scale deforestation and conversion of the forestland into cultivation and subsistence agriculture has substantially decreased Mau's forest cover.<sup>98</sup>

Figure 5.1 (see below) indicates the encroached, adjudicated, and excised areas of the Mau Forest Complex as have been marked with red, black, and blue shaded parts of the Eastern, Southwest, and the Maasai Mau forest blocks. As discussed earlier, parts of the Mau forest have

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<sup>94</sup> Interview with J. M. Mbinga, Deputy Director, Kenya Forestry Institute Londiani, 13 February 2014.

<sup>95</sup> Ibid.

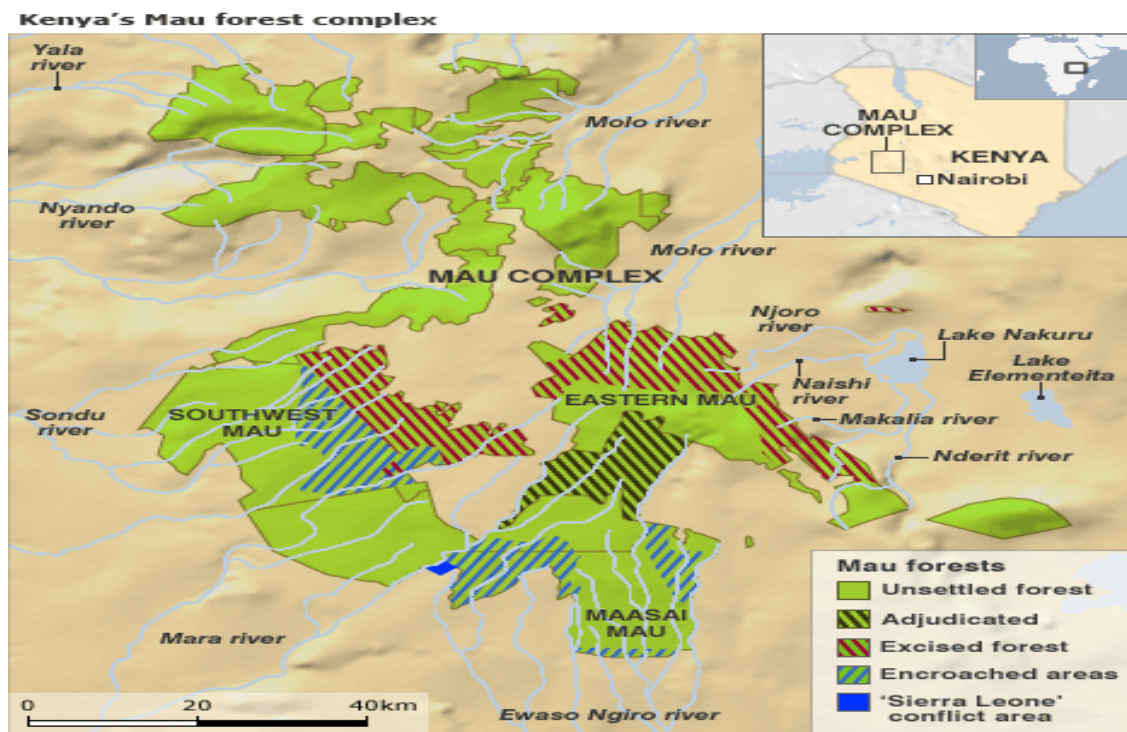
<sup>96</sup> Interview with Mr. E. Chebelyow, Former Director Brook Bond, Kericho, 14 February 2014.

<sup>97</sup> L. O. Olang and P. M. Kundu, 'Land Degradation of the Mau Forest Complex in Eastern Africa: A Review for Management and Restoration Planning', *Environmental Monitoring*, pp. 245-262, Edited by E. Ekundayo, Published online, November 2011, pp. 254.

<sup>98</sup> Interview with Mr. E. Chebelyow, op cit.

been occupied through legal and illegal encroachment, specifically which were previously under the forest management or conservation. In the case of Mau, the so-called legal way of forest encroachment is where the owners hold title deeds through the settlement schemes. However, if the claim of ownership is without any such documents, these parts of forests are under illegal ownership. In the adjudicated forest, land ownership right exists through an authorised registration process.

Excised forests are the parts of forest reserves cut out for a particular purpose such as for human settlements. Interview data reveals that over the time, many interacting factors have led to Mau's destruction. For instance, lack of management logistics and poor infrastructure to act efficiently against the encroachers has been a key factor. Most of the forest stations are ill equipped to monitor and control the illegal activities. Frequent clashes and ethnic violence in the area has left many stations of the forest unmanned, which further led to severe encroachment and allowed the raiders to steal wood.<sup>99</sup> In the policy area, there is weakness of policy implementation especially concerning the Mau Forest and human security issues.<sup>100</sup>



**Figure 5.1** Encroachments in the Mau Forest Complex.

Source: Kenya Forest Services

<sup>99</sup> Interview with Mr. E. O. Omollo, op cit.

<sup>100</sup> Ibid.

In sum, lack of good will from the politicians, absence of necessary management mechanisms and irrelevant policy enforcements are major factors that contributed to massive loss of the forest cover particularly in the Eastern, South West and the Maasai Mau forests. These activities are the potential causes of climatic changes such as warmer temperatures, irregular rain patterns, frosts, and droughts, influencing profound threats to human security in the area.<sup>101</sup>

## **5.6 Climate Change and Human Security in the Eastern Mau**

This Eastern Mau lies between the plains of Rongai-Njoro and upper slopes of Mau hills. Two important Rivers, Njoro and Lamriak are drained from the escarpments of the Eastern Mau and meet the waters of Lake Nakuru and other important rivers such as Kaumara, Nassuit and Rongai. The Eastern Mau is a critical source of water for the entire Lake Nakuru Basin (see figure 5.1), having great prospect for regional agricultural development and high produce of wheat, barley and dairy production.

Historically, the forest had rich vegetation cover, evergreen forests, and acacia trees, extending from the Mau hills to the Rongai-Njoro plains.<sup>102</sup> Most parts of the Eastern Mau were occupied with coniferous plantations including wooded grasslands and woodlands. Large-scale farms such as Tatton, Finerose and Growtch were once famous for agriculture and animal husbandry. Before the excisions, the Eastern Mau comprised total forest cover of 65,921 hectares (ha). However, after the excisions of 35,301ha (54.3%), it is one of the most affected parts of the Mau Forest Complex.<sup>103</sup> These excisions have led to considerable environmental, political, social, and economic implications especially for the local population.

Additionally, due to Kenya's changing land ownership regimes, uncontrolled population growth, rural-urban development and human settlements, the forestland came under high pressure, which also led to massive destruction of wetlands in the Eastern Mau forest. Consequently, it has contributed to the division of larger farms into smaller segments, considered more suitable for grazing and cultivation purposes. For instance, Sebiens and Wright were among the large-scale farms known for commercial purposes such as production of flowers, wheat, and dairy products. Likewise, in the Lake Nakuru area of Baruti, quarry activities such as

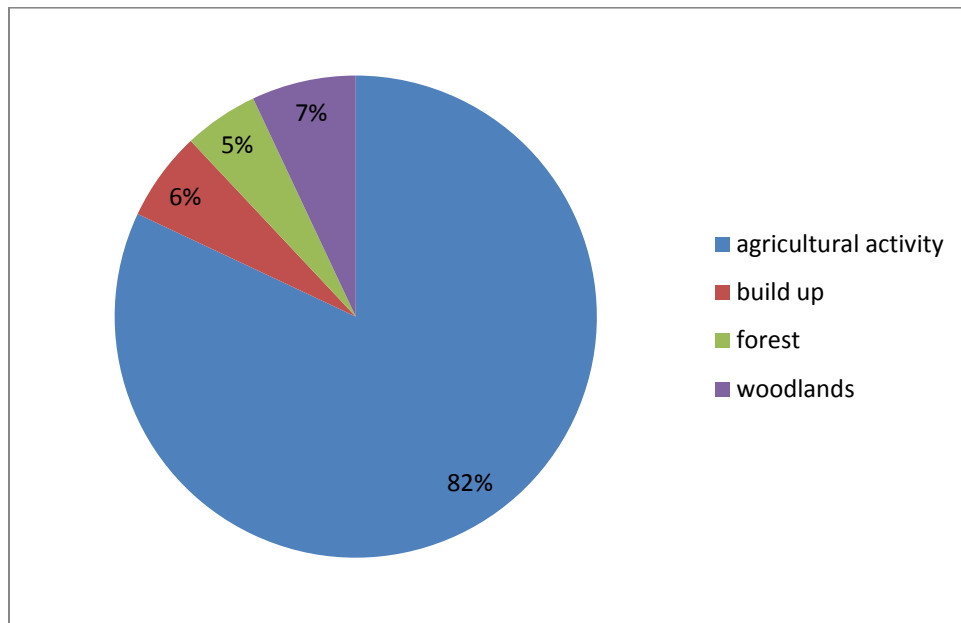
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<sup>101</sup> Interview with Miss S.Kosgei, DC Narok County, 13 June 2013.

<sup>102</sup> P. M. Kundu et al., 'Detecting and Quantifying Land Cover and Land Use Changes in Eastern Mau by Remote Sensing', Department of Agricultural Engineering, Egerton University, Njoro, 2003, p. 1, Retrieved online, 24 October 2013, p. 1.

<sup>103</sup> M. J. Kinyanjui, 'NDVI-based Vegetation Monitoring in Mau Forest Complex', *African Journal of Ecology*, 49, 2010, 165-174, Blackwell Publishing, p, 167.

sand mining and extraction have led to potential for landslides, especially in heavy rains and stormy weather.<sup>104</sup> From 1963 to early 1980s, fewer changes took place in the Eastern Mau as 92 per cent of the forestland was still covered with woodland and rich vegetation. However, by 1989, 66 per cent of the land had left with forest and woodland, while rest of the forest was utilised in farming and built-up. By 2003, total environment of the Eastern Mau changed as 82 per cent land was occupied by agricultural activities, 6 per cent went under built up, 5 per cent forest and only 7 per cent was left with woodlands (See figure 5.2).<sup>105</sup>



**Figure 5.2** Major land use/cover changes in the Eastern Mau Forest

Source: P. M. Kundu et al.

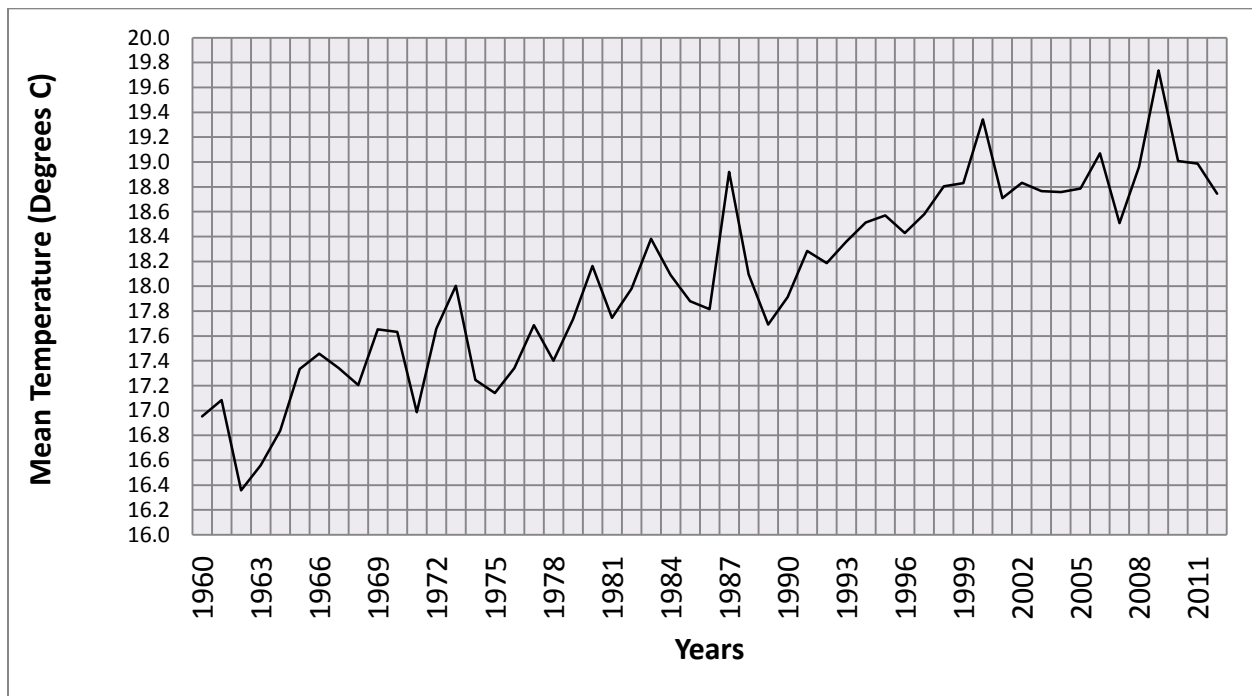
One half of the crop land in the Eastern Mau has been consumed in subsistence farming or development of kitchen gardens which largely produce potatoes, beans, maize and vegetables for local consumption purposes. By doing so, adequate measures to avoid soil erosion and water management have not been considered. Consequently, water quality in the Nakuru area has been affected due to the massive intrusion of harmful chemical ingredients such as Nitrates (NO<sub>3</sub>) and

<sup>104</sup> L. O. Olang and P. M. Kundu, 'Land Degradation of the Mau Forest Complex in Eastern Africa: A Review for Management and Restoration Planning', *Environmental Monitoring*, pp. 245-262, Edited by E. Ekundayo, Published online, November 2011, Retrieved online, 24 October 2013, pp. 253-254.

<sup>105</sup> P. M. Kundu et al., 'Detecting and Quantifying Land Cover and Land Use Changes in Eastern Mau by Remote Sensing', Department of Agricultural Engineering, Egerton University, Njoro, 2003, p. 1, Retrieved online, 24 October 2013, p. 3.

Phosphates (PO<sub>4</sub>).<sup>106</sup> Anthropogenic activities such as increased encroachment of the forest and irresponsible land use/cover practices of the Mau forest complex have changed the natural climatic conditions in the region.

Other interrelated impacts include an increased stress on water availability in the surrounding areas, changes in the precipitation patterns, recurring droughts, loss of biodiversity, and uneven agricultural production.<sup>107</sup> For instance, extensive deforestation has led to significant increase in both minimum and maximum temperature of the adjacent areas. Meteorological data indicates that during 1963-2010, mean temperatures in the Nakuru County increased from 16.6°C to 19.0°C, with a considerable rise of 2.4°C. Annual mean Temperatures peaked at 19.1°C and 19.7°C in 2006 and 2009 respectively. As can be noted in figure 5.3, during 1970, 1975, 1980, 1985, 1990, yearly mean temperatures were 17.6°C, 17.1°C, 18.2°C, 17.9°C, 17.9°C respectively which was within a normal average range.



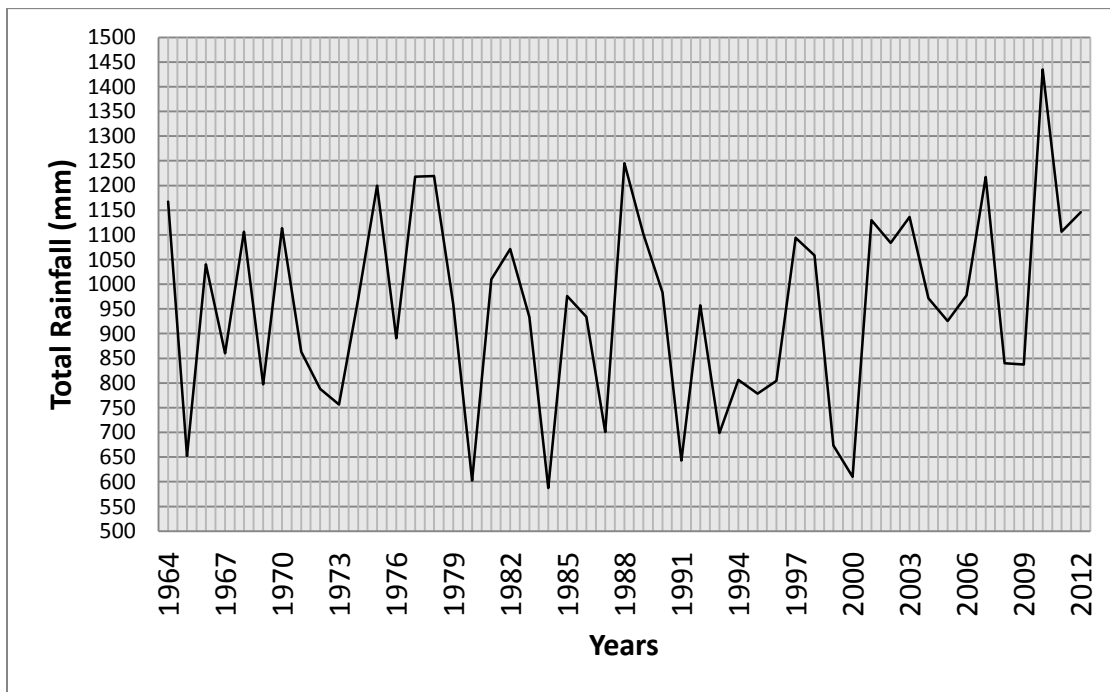
**Figure 5.3** Mean annual temperatures in Nakuru (1960-2011).

Source: Kenya Metrological Department

<sup>106</sup> A. Karanja et al, ‘The Influence of Land Use on the Njoro River Catchment Between 1975-1985’, In: *Soil and Water Conservation in Kenya*, University of Nairobi, 1986, In: L. O. Olang and P. M. Kundu, ‘Land Degradation of the Mau Forest Complex in Eastern Africa: A Review for Management and Restoration Planning’, *Environmental Monitoring*, *ibid*, p. 254.

<sup>107</sup> Interview with Mr. S. Minis, Chief Forester Narok County, 12 June 2013.

However, during 1995, 2000, 2005, and 2010, average yearly recorded temperatures were 18.6°C, 19.3°C, 18.8°C and 19.0°C respectively. Until 1990, the temperature increase was relatively gradual with fewer dips. However, there was a sharp rise from 1995 onwards. It is also noteworthy that during the period of 1970-2010, annual mean temperatures rose from 17.1°C to 19.3°C, with a significant difference of 2.2°C. This can be explained because of the human activities and progressive deforestation in the eastern Mau Forest that led to massive loss of natural vegetation, vital to trap excessive amount of carbon emission. With the rise in the average yearly temperatures, there has been a phenomenal change in the precipitation pattern of the region. For instance, throughout the 1960s and 70s, yearly mean rainfall in Nakuru was between 600mm to 1200mm (see Figure 5.4 below).



**Figure 5.4** Mean annual rainfall in Nakuru (1964-2012).

Source: Kenya Meteorological Department

Since 1980s, with an abrupt rise in temperatures, the precipitation became unpredictable and erratic with more frequent and severely drier years, especially towards mid to late 1980s. During 1993-1996, average rainfall was between 698mm to 806mm only. The data shows that since early 1980s, there have been recurrent drought periods with rainfall as little as yearly mean rains 587.3, 700.7, 643.26, 698.9, 673.7, and 610mm, during the years of 1984, 1987, 1991,

1993, 1999 and 2000 respectively.<sup>108</sup> At the same time, in 1988-89 and again in 1997-98 *El Nino* led rains triggered disastrous flash floods affecting the areas with heavy losses of life and wealth.

Since the beginning of the 21<sup>st</sup> Century, again precipitation pattern has been entirely unreliable with frequent drought periods coinciding with heavy rains. First five years of the new Millennium were moderately wet with fewer dryer seasons. However, second half of the decade witnessed a severe drought period in 2009 followed by significantly heavy and more than average precipitation during 2010, 2011, and 2012.<sup>109</sup> Major environmental impacts of these climatic changes are evident in the nearby areas. For instance, Njoro area is situated in the greater Nakuru County, which is on the eastern edge of the Mau Forest Complex and lies between the eastern Mau forest and Lake Nakuru National Park.

Generally, this area experiences two main rainy seasons; November-December and April-May. However, data suggests that since 1980, month of August has also been experiencing heavy rainfall which is an unusual change compared to historical records of the area. Additionally, since 1980s, annual mean rainfall has declined significantly, especially during the April-May rainy season. In addition, there has been increased variability in the rainfall during the January-February season, with some years having negligible rainfall, while others had more than average rainfall.<sup>110</sup> Research reveals that removal of forest cover especially cutting mature trees undoubtedly triggers greater stream flow.<sup>111</sup>

This is due to the natural process of evapo-transpiration, which allows trees to absorb water and then it evaporates through different parts but mainly from the surface of leaves. However, in cases of severe deforestation, as there are no trees to transpire, most of the rainwater stays on the surface of the ground and flows into the close-by streams and rivers causing flash floods.<sup>112</sup> Other hydrological studies on the seasonality of stream flow suggest that deforestation increases the frequency and volume of floods during rainy season, significantly reducing the flow during dry seasons.<sup>113</sup> Following this particular phenomenon, changes in the eastern Mau

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<sup>108</sup> Ibid

<sup>109</sup> County Stakeholders Consultative Workshop on the Development of the NCCRS's Action Plan, Report of the Workshop, Nakuru, 8-9 March 2012.

<sup>110</sup> D. Walubengo, *Community Led Action to use Forestry in Building resilience to Climate Change*, A Kenyan Case Study, Forest Action network, Njoro, Nakuru, p, 11, Retrieved online, October 2013.

<sup>111</sup> J. M. Bosh and J. D. Hewlett, 'A Review of Catchment Experiments to Determine the Effect of Vegetation Changes on Water Yields and Evapo-transpiration' *Journal of Hydrology*, 55, 1982, pp. 3-23.

<sup>112</sup> Ibid.

<sup>113</sup> L. A. Bruijnzeel, *Hydrology of Moist Tropical Forests and Effects of Conservation: A State of Knowledge Review*, UNESCO International Hydrological Programme and Free University, Amsterdam, 1990.

Forest have severely affected water flows in perennial rivers and streams draining from the Lake Nakuru Basin. Due to warmer temperatures and rainfall variability, phenomenal changes have been observed in the river and stream flows.

During the last three decades, especially until 2012, discharge of majority of the rivers originating from the eastern Mau significantly decreased. Due to dwindling rainfall, some rivers have dried up while others became seasonal. A Kenya Forest Working Group study indicates that due to replacement of forests by small-scale subsistence farming, headwaters of River Njoro dropped off by 9 per cent during 1964-2000.<sup>114</sup> Additionally, deforestation severely reduces or dries up the underground water tables causing water stress in the surrounding areas. The soil infiltration and soil protection capacity of the montane forests, therefore, results in soil erosion, siltation, and sedimentation. Consequently, river flows significantly reduce during dry seasons as there is less water held in the soil.<sup>115</sup>

Furthermore, during heavy rains, greater run offs from the bare land lead to reduced absorption of water and significantly lowers the water availability from wells and boreholes.<sup>116</sup> For instance, due to changes in the land use around the Egerton University, two of its boreholes dried up. In the nearby areas, some boreholes were affected by increased salinity.<sup>117</sup> Many rivers in the area and tributaries were flowing only during the rainy season. At the same time, the quantity and quality of water was considerably reduced, which threatens water and health security of the people in this area. For instance, surveys reveal that water quality of the Njoro River was largely affected<sup>118</sup> due to massive population growth (from 270,912 in 1979 to 413,698 in 1999), deforestation, small-scale farming, and livestock keeping.

Factors like urban development and built environment have led to sewage disposal that has greatly polluted the River Njoro water<sup>119</sup> with bacteria and diarrhea pathogens.<sup>120</sup> Consuming

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<sup>114</sup> *Excision and Settlement in the Mau Forest*, Report of KFWG, Nairobi, 2001, p. 15.

<sup>115</sup> Interview with Mr. J. Maina, Hydrology Department at Kenya Forestry Institute (KEFRI), Londiani, 11 April 2012.

<sup>116</sup> *The Role and Contribution of Montane Forests and Related Ecosystem Services to the Kenyan Economy*, United Nations Environmental Programme, Nairobi, 2012, pp. 25-26.

<sup>117</sup> D. Walubengo, *Community Led Action to use Forestry in Building resilience to Climate Change*, A Kenyan Case Study, Forest Action network, Njoro, Nakuru, p. 11.

<sup>118</sup> Interview with Mr. J. Maina, op cit.

<sup>119</sup> C. K. Kigen et al., 'Detecting Water Quality Changes in River Njoro, Kenya', Proceedings of the SUMAWA Mau Forest Complex Conference, 27-29 April 2009, Egerton University, Kenya. Also F. K. Lelo et al., 'Managing the River Njoro Watershed Kenya; Conflicting Laws, Policies and Community Priorities', *International Workshop on 'African Water Laws: Plural Legislative Frameworks for Rural water Management in Africa*, 26-28 Johannesburg, South Africa. January 2008.

this water endangers the food and health security of many communities living in the area. For instance, the forest evictees especially the Ogieks who are particularly dependent on this water may contract water borne diseases. During 1973-2000, the natural forests cover in the Njoro River Catchment decreased by 25 per cent. Major impacts of the land cover/land use changes significantly affected the river flow regime and consequently led to reduced water supply to the adjacent areas. Comparison between the periods 1977-84 and 1992-2000 suggests that the mean annual discharge during the second period was 36 per cent lower than the first period.<sup>121</sup>

With growing population, reduced water supply can severely impair the agricultural activities, lower economic growth, reduced livelihoods, and dwindling food security. Other changes in the climate especially in relation to rainfall variability have led to significant disturbance in the biodiversity of the Mau forests. Over the years, The Mau Complex has lost its massive vegetation cover and trees, which are critical for the ecological sustainability and natural habitat for animal life. Human settlements and population influx near the protected forest threatens the existence of wildlife. The upper segment of the Eastern Mau has been classified as a biodiversity hotspot, meaning that once the area was teeming with variety of wildlife and various plant species. However, presently it is under threat from increased human activity.<sup>122</sup>

Mau's rich vegetation provided an ideal environment for some rare East African animals such as giant forest hog, yellow back, and blue Duiker and many bird species. Parts of the Eastern Mau being open canopy had perfect living conditions for the Bongo that has been classified an endangered animal. After the vegetation cover changes, it is found in some other parts of the Mau complex as the Eastern Mau has lost its ideal habitat. Constant poaching and increased human-wildlife conflicts are also on the increase in the eastern Mau. Major costs of such conflicts include loss of life (human and animal), loss of property in terms of livestock and crops, and loss of natural ecosystems, which maintain socio-economic fabric between humans and biodiversity.

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<sup>120</sup> K. Silas et al., 'Bacterial quality and diarrhoeagenic Pathogens on River Njoro and Nakuru Municipal Water, Kenya', *International Journal for Biotechnology and Molecular Biology Research*, Vol. 2(9), pp. 150-162, September 2011.

<sup>121</sup> K. K. Mwetu et al., 'Effects of Deforestation and Climate Variability on River Discharge in the River Njoro Catchment, Kenya', Proceedings of the SUMAWA Mau Forest Complex Conference, 27-29 April 2009, Egerton University, Kenya.

<sup>122</sup> H. Oyioko, 'Assessment of Vegetation Cover and Biodiversity Hotspots in the Mau Forest Complex', Report by the Prime Ministers Task Force on the Conservation of the Mau Forest Complex, National Museums of Kenya Biodiversity team, Nairobi, March 2009.

According to Kenya Wildlife surveys, during the 2007-2009, there were 37 incidents of human-wildlife conflicts in Nakuru area. These conflicts involved destruction of crops, human and animal injuries, and livestock predation.<sup>123</sup> Likewise, the existence of many birds, reptiles, and amphibians is endangered due to increased human encroachment of the Mau forest.<sup>124</sup> In 1963, Lake Nakuru (which lies in the vicinity of the Eastern Mau forest) was given a status of National Park due to its diverse wildlife. The park has been a great tourist attraction primarily because it attracted a huge population of flamingos. Other key features of the Rift Valley lakes are the distinct levels of siltation and salinity that produce algae, a major food for the flamingos.

In the late 1990s and early 2000s, the lake receded significantly as its water volume decreased from the normal levels. According to a survey, with a growth rate of 13 per cent, Nakuru is ranked as one of the fastest growing towns in Africa. The demand for water in Nakuru town increased with population growth and developmental activities such as increased construction projects and industrial activities. Urbanisation in Nakuru also grew after the 2007-2008 post election violence as people found urban areas safer than the villages.<sup>125</sup> Increased water requirements of the surging population also led to diverted stream flows from the Lake Basin. By 1997, Lake Nakuru almost dried up and the number of flamingoes declined significantly. As a result, Lake's depth dropped to long-term mean of 2.5 meters.<sup>126</sup>

Since late 2012, the area has been receiving a good quantity of rainfall.<sup>127</sup> However, due to decline in forest cover, runoff has significantly increased and many rivers such as Njoro, Mkalia, Naishi, Nderit and Larmuduak that had become seasonal, have been over flowing especially during the rainy seasons. Consequently, Lake Nakuru and other Rift Valley lakes have expanded to their unprecedented levels. Studies indicate that similar phenomena were observed 50 years ago during 1963 and more than a century ago in 1901. In January 2010, Lake's volume was 31.80 square Kilometers (sq. Km), however it had expanded to 52.79 sq. Km by May 2013.

Research suggests that this over flow of water is potentially due to climate variability; increased run off in the Mau Forest, and declined ground water storage system.<sup>128</sup> To some researchers, it is a result of earth's tectonic activity as other Rift Valley lakes are also

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<sup>123</sup> Ibid, pp, 89-90.

<sup>124</sup> Researcher's Personal Observations.

<sup>125</sup> Ibid.

<sup>126</sup> J. A. Raini, 'Impact of Land Use Changes on Water Resources and Biodiversity of Lake Nakuru Catchment Basin' *African Journal of Ecology* 47 (Supplement 1), 2009, pp. 39-45.

<sup>127</sup> Researcher's personal observations made during field trips during 2010, 2011, 2012, 2013 and 2014.

<sup>128</sup> Interview with Mr. K.Korir, Manager Sarova Lion Hill Game Lodge, Lake Nakuru National Park, 17 May, 2014.

experiencing similar situation.<sup>129</sup> However, further research and monitoring is required to meet the new challenges. Key impacts of this flooding include complete destruction of the physical infrastructure inside the Lake Nakuru park, declined tourism, loss of revenues, risk of water borne diseases, contamination of water, change in biodiversity, decreased agricultural land and loss of employment for the people working inside the park.<sup>130</sup> These issues are causing serious concerns for the ecological sustainability, with severe negative effects on the local and national human security.

### **5.7 Climate Change and Human Security in the Southwest Mau**

Originally comprising an area of 84,140 ha, it was the largest block of the Mau Forest Complex. Southwest (SW) Mau consists of steep valleys beautifying it with crisscrossing rivers and streams. The SW part of the Mau Forest Complex lies in the Western Highland of Kenya. In 1960, it was established as a *Nature Reserve* due to the presence of large populations of rare species such as Bongo, leopard, elephants, and many bird varieties. The SW Mau has been under threat since 1932 when it was gazetted under the Legal notice No. 44. In 1934, 589 ha were excised for the boundary plan. Nearly 4000 ha were excised during 1951-1957, meant to establish settlements around Kuresoi area. Again, during 1968, an area comprising 9,386 ha was cut-off for more settlements in Embomos area.<sup>131</sup>

During the 1970s and 1980s, more than 6000 ha were additionally excised for Olenguruone settlements including the tea farms. All of these excisions were made under various legal notices.<sup>132</sup> A part of the SW Mau touches the Kericho County, which is Kenya's major tea producing area. In 1924, Kenya started its commercial tea production and the Kericho area provided the most favorable climate to cultivate the premier quality tea. Therefore, over various phases, huge chunks of the SW Mau were converted into tea plantations.<sup>133</sup> Although tea production brings huge wealth and foreign exchange for country's better economy, however, at the same time tea farms were developed at the cost of natural forests of the country.

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<sup>129</sup> S. M. Onywere et al., *Understanding the Environment, Promoting Health in Lake Baringo, and Bagoria Drainage Basin*, Kenyatta University, 2013.

<sup>130</sup> Interview with Mr. K. Korir, op cit.

<sup>131</sup> 'Assessment of Vegetation Cover and Biodiversity Hotspots in the Mau Forest Complex', Report submitted to: Prime Ministers Task Force on the Conservation of the Mau Forest Complex, op cit, p. 84.

<sup>132</sup> Ibid, p. 12.

<sup>133</sup> Ibid, pp. 84-85.

<sup>133</sup> Interview with Mr. E. Chebelyow, Former Director Brook Bond, Kericho, 14 February 2014.

For instance, in 1984, a government led Nyayo Tea Zone programme required to clear 100 meters wide bands along the gazetted forest boundaries, meant to buffer encroachments of the forests. Additionally, these tea plantations were established to generate national wealth and employment creation. Over the period, these plantations have occupied massive areas along the SW Mau and Transmara, nevertheless, at the cost of indigenous forest exceeding up to 150-200 meters, particularly in Kiptagich and the Nairotia areas. These schemes did not pursue the strict forest boundary, and lacked ecological impact assessment studies. In a number of places, open gaps left plenty of room for human encroachment into the forest, causing further deterioration to the forest.<sup>134</sup>

Similarly, the Tea Research Foundation was also established on the Mau's land as it still meets the boundary of the SW block of the Mau Forest Complex. Although, Tea Research Foundation promotes research for the production, better quality and quantity and cloning of tea, its costly effects on the natural environment have never been estimated.<sup>135</sup> During the 1970, World Bank financed a commercial tree plantation programme around Kericho, Saino and SW Mau that was intended to meet the growing needs for timber and industrial activities. Secondly, its major aim was to save the indigenous forests and control illegal logging. However, the programme was developed at the expense of indigenous forests, interfering with Mau's biological diversity and natural habitat.<sup>136</sup> By 2001, the government had excised further 22,797 ha from the SW Mau, representing additional 27.3 per cent loss of its total land area. The land was used for human settlements and small-scale cultivation.<sup>137</sup>

The 2005-2006 UNEP survey indicates that most of the excised areas in the SW Mau were cleared to settle the indigenous people.<sup>138</sup> Nonetheless, there were still around 2,300 illegal household covering 10 kilometers inside the gazetted forest. Traditionally, the Ogieks inhabited SW Mau, but over the time, the Kipsigis tribe also made it their home. Due to several eviction plans, many of these were forced to leave; however, a big population of forest dwellers and other

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<sup>134</sup> M. Jama, *Forest Utilisation by People Using Adjacent to South West and Transmara Forest Reserves*, KIFCON, Nairobi, November 1991, pp. 120-121.

<sup>135</sup> Interview with Mr. Charles, Manager Tea Hotel, Kericho, 10 April 2012.

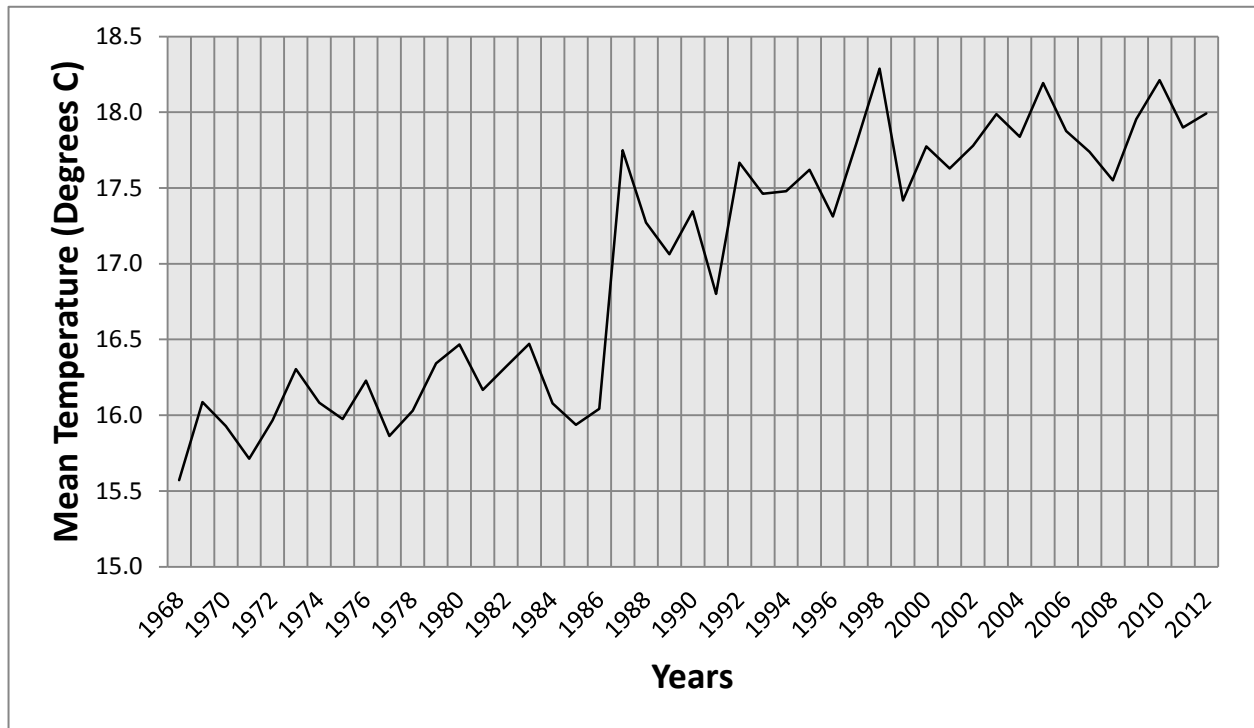
<sup>136</sup> Ibid, p. 118.

<sup>137</sup> M. J. Kinyanjui, *The Effects of Human Encroachment on Forest Cover, Composition and Structure in the Western Block of the Mau Forest Complex*, Unpublished Ph D thesis, Department of Natural Resources of Egerton University, 2009.

<sup>138</sup> *Eastern and South West Mau Forest Reserves*, Assessment and Way Forward, A report by the United Nations Environmental Programme, Nairobi, July 2006.

communities stayed back and used the area for cultivating tea.<sup>139</sup> Most of these community members mercilessly use the forest for logging though it has been legally banned.

In the SW Mau, increased human encroachment has led to extensive degradation and destruction of the forest using forest fires to clear land for firewood, charcoal making, and cultivation.<sup>140</sup> Over the time, these excisions have led to infinite impacts especially on the local climate as well as on various parameters of security of the people inhabited in this area. Figure 5.5 clearly depicts the changing trends of temperature increase in the Kericho area over the period of 1968-2012.



**Figure 5.5** Mean annual temperatures in Kericho (1968-2012).

Source: Kenya Meteorological Department

Various studies indicate that mean air temperature in Kericho area is increasing at the rate of 0.02°C per year from 1958 until the study period. The air temperature for every ten years is also showing positive correlation with time data.<sup>141</sup> As indicated in figure above, during 1970s

<sup>139</sup> Interview with Mr. Charles, Manager Kericho Tea Hotel, 10 April 2012, Also, *Eastern and South West Mau Forest Reserves, Assessment and Way Forward*, A report by the United Nations Environmental Programme, Nairobi, July 2006.

<sup>140</sup> *Eastern and South West Mau Forest Reserves, Assessment and Way Forward*, A report by the United Nations Environmental Programme, Nairobi, July 2006.

<sup>141</sup> Interview with Miss B. Cheserek, Environmentalist, Tea Research Foundation of Kenya, Kericho, 14 February 2014.

and mid 1980s, the average annual temperature in Kericho area remained within the range of 15.8°C to 16.5°C, though increasing gradually. After 1985, the temperature increased progressively, especially in 1987 average temperature jumped to a yearly mean of 17.8°C from the previous year's 16.0°C.

In 1998, once again there was an abrupt rise of temperature from 17.8°C in 1997 to 18.3°C. However, in later years mean annual temperatures remained relatively steady and within the range of 17.3°C-18.0°C. By 2005, Kericho's yearly mean temperature had reached the peak of 18.2°C. During the following years, average temperature remained more or less similar to the previous five years. Historically, Kericho area, received throughout the year rains, with annual rainfall ranging between 1800 to 2200mm. With an abrupt rise in temperature during the late 1980s, the rainfall pattern dramatically changed especially after 1985.

A comparison between figure 5.6 and 5.7 indicates that with continuously rising temperatures, the amount of rainfall significantly declined throughout the 1990s, with fewer periods of normal average pattern of rains. For instance, in 1998, the area received more than 2000mm rainfall, triggered by *El Nino* phenomenon, which caused flash floods in most parts of Kenya. However, in the following years, average quantity of rainfall remained around 1800mm per year, which is again significantly less than the previous pattern of average yearly rainfall.<sup>142</sup> Observations indicate that specifically since 2001, Kericho and the neighboring areas have been experiencing severely dry and extremely wet seasons with an inconsistent and unpredictable patterns of rainfall. For instance, during 2004, the average yearly rain was 2,487 mm.

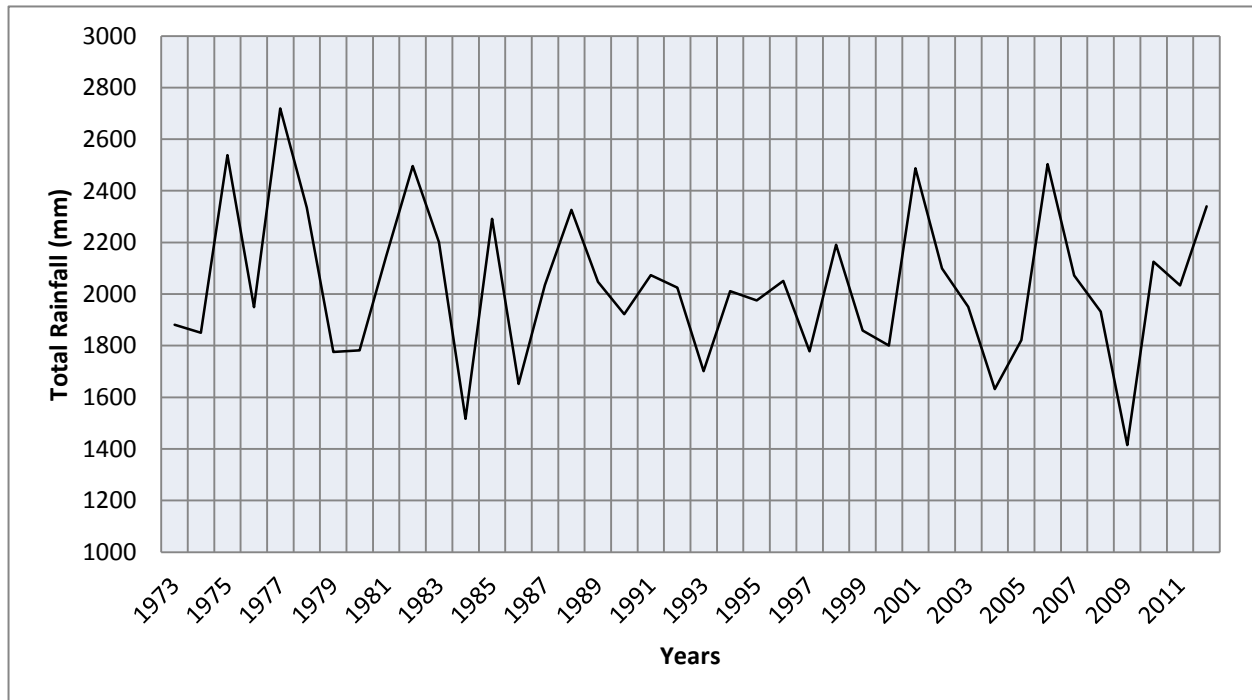
During 2006, average rainfall in the area was 2504mm, which is much more than the average annual rain in the Kericho area (See Figure 5.6). However, year 2009 received only 1,415mm, which is the least amount of rain Kericho received during the past fifty years. After this, the area has been reasonably wet with more than an average yearly 2,000mm rainfall causing severe spells of frost and hailstorms.<sup>143</sup> In the context of climate change implication, there are growing concerns as the area is already showing signs of fundamental changes in the local climate system. An analysis of the climate changes in the SW Mau forest indicates that

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<sup>142</sup> Ibid.

<sup>143</sup> Interview with B. Cheserek, Environmentalist, Tea Research Foundation of Kenya, Kericho, 14 February 2014.

deep routed causes are grounded in the severe destruction in the forestland cover and its misuses, especially if both continue for a long period.<sup>144</sup>



**Figure 5.6** Mean annual rainfall in Kericho (1973-2012).

Source: Kenya Meteorological Department

As discussed previously, forests are vital players in a hydrological system within and outside the forested areas. Secondly, water storage, movement, distribution, and quality is maintained by the forests. Therefore, good management mechanisms of the natural forests are necessary to keep them undisturbed and functioning. Most scholars of hydrological systems claim that droughts as well as floods are caused by land misuses/changes. Forests also play critical role to form a steady rainfall system as they release water vapors into the atmosphere, which fall back to the ground in the form of rain.<sup>145</sup>

In the forested areas, part of the rain stays on the leaves, which evaporates and has no role in the hydrological system of a forest. Thus, the amount of rain reaching the ground of the forest decreases compared to the non-forestlands. In the case of montane forests, approximately 75 to 86 per cent of the total rain reaches the ground. However, the remaining rainwater flows

<sup>144</sup> *The Importance of Rain forests*, The RIC Good Wood Guide, Retrieved online, 10 October 2013.

<sup>145</sup> *Ibid.*

into the nearby streams and rivers. Studies carried out near the SW tea estates depict that during stormy weather of 75 mm rainfall, the flow rate in the naked land was 75 cusecs while it was less than 2 cusecs inside the forest<sup>146</sup> (one cusec is one cubic foot of water flow per second).

Therefore, clearing up of the SW Mau's forests has led to drought periods lasting for continuous three months whereas previously the area received constant rains with around two weeks disruption. At times, heavy rains cause floods, and destruction of roads and other infrastructure of the area, which is already poorly managed.<sup>147</sup> Since the late 1990s, climate change in the SW Mau has led to significant changes in the local pattern of agricultural activities. Occasionally, the onset of rain is delayed which have particularly affected the planting season of maize from January/February to March/April. Additionally, unreliable/erratic rains have affected the usual farming cycle as the farmers prepare for sowing but there is insufficient rainfall in terms of average quantity necessary to provide required level of soil moisture.

Major consequences of these climatic changes include disrupted harvests and unpredictable crop yields. Other interrelated social effects include growing poverty, as many farm workers do not have work security, which destabilises economic security in the area.<sup>148</sup> With fewer incomes, local people have to compromise on other areas of life, such as health and children's education. However, in some area's government has sponsored programmes for alternative livelihoods. For example, in Olenguruoni area through alternative livelihood enterprise development, people are encouraged to utilise bamboo in the home craft industry and market the product to make living.<sup>149</sup>

Additionally, longer periods of drought are drying up the perennial rivers that flow during the rainy season only.<sup>150</sup> Other key impacts are ecological and hydrological changes including reduced water tables, increased siltation, and soil erosion in the surrounding area of the SW Mau Forest. Consequently, water tables and springs in the area have affected with reduced water levels. Some seasonal rivers, like River Kipchorian, which originates from River Nyando flows

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<sup>146</sup> H. C. Pereira, *Land Use and Water Resources*, (Cambridge: Cambridge University Press, 1973), pp. 72-84.

<sup>147</sup> Researcher's personal observations during the field trips, Kericho, 9-12 April 2012.

<sup>148</sup> Interview with Mr. J. M. Mbinga, Deputy Director Kenya Forestry Research Institute, Londiani, 13 February 2014.

<sup>149</sup> Ibid.

<sup>150</sup> Interview with Mr. M. Kiga, County Director of Agriculture, Kericho, 14 February 2014.

in rainy season, while its flow was on permanent basis especially during 1980s. However, due to the introduction of few reforestation programmes in 2012, water tables resurged in the area.<sup>151</sup>

With the severe changes in the local climate of the area, there are rising human security concerns. For instance, droughts primarily reduce water supply to households as well as to the industrial sector, which can have direct implications on people's lives. Secondly, reduced water supply also means dwindling conditions of sanitation with poor health security. Data reveals that in Kericho area, unlike previously, water supply is inconsistent as most people receive water either in the mornings or in the evenings.<sup>152</sup> Due to reduced fodder and pasture, the dairy production has been affected negatively<sup>153</sup> that has further suppressed economic and food security, locally as well as within the region.

Climate change is also linked to the occurrence of excessive spells of frost and hailstorms in the highlands, which is particularly damaging to the top leaves of tea plantations and other crops. Especially, during January-April 2012, Kericho and Bureti areas experienced an unusually prolonged period of frost, severely affecting agricultural activities including the tea industry.<sup>154</sup> Environmentalists state that frost is formed due to deviation in the day and night air temperatures, which is highly dependent on the surrounding environment. There is a complex relationship in forests and climate in the nearby areas. If extremely low temperature at night is followed by increased sun light and higher morning air temperature, this causes scorching of leaves, especially the top exposed layer.

In Kericho area, for the last few years nights have become significantly colder than the days, which is due to the changing climate of the Kericho area.<sup>155</sup> Because of continued frost during January-April 2012 period, tea industry of the area lost production of continuous three months. Consequently, small-scale tea farmers lost 12.5 per cent of their annual yields while the losses for large-scale farms accounted for 28 per cent of their yearly production. Furthermore, due to the wide occurrence of frost, tea bushes could not survive and had to be up-rooted and replanted which had enormous economic costs especially for the small-scale farmers whose

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<sup>151</sup> Interview with Mr. J. Njuguna, Researcher at KEFRI, Londiani, 20 February 2014.

<sup>152</sup> Ibid.

<sup>153</sup> County Stakeholders Consultative Workshop on the Development of the NCCRS's Action Plan, Report of the Workshop, 8-9 March 2012, Nakuru.

<sup>154</sup> Researcher's Personal Observations During the Field Trips to Kericho and the Southwest Mau, 10-12 April 2012.

<sup>155</sup> Interview with Miss B. Cheserek, Environmentalist, Tea Research Foundation of Kenya, Kericho, 14 February 2014.

livelihoods are entirely reliant on the tea productivity. Similarly, frequent hailstorms in the area cause havoc for tea farmers as these affect the tea production for up to four weeks, meaning disrupted plucking rounds with economic repercussions such as lost wages and lower crop yields.<sup>156</sup>

In relation to losses of biodiversity, due to extensive hunting and trapping activities of the white settlers and the forest dwelling communities, the number of large mammals is under stress while some animal species are on the edge of extinction. For instance, the most common antelope is rare in the forest and other animals like yellow back duikers have moved deep inside the forest.<sup>157</sup> Due to natural habitat destruction, population of bongo is non-existent in the SW Mau. Large population of elephants has moved to other parks as the natural conditions of the forest changed. However, since 1995, there has not been any systematic data collection on the biodiversity in the SW Mau. Neither, Kenya Wildlife Services (KWS) has had any special mechanism to do census of animals in the forest.<sup>158</sup>

Human wildlife conflicts also threaten biodiversity as well as personal security of human beings. Very often, these conflicts cause injuries and loss of life, property, and livestock including crops. During 2007-09, there were 30 cases of human-wildlife conflicts in the area.<sup>159</sup> In addition, quality of air and water in Kericho has greatly polluted with the chemicals used in various industries, which are hazardous for the environment, humans, animals, and crop health. Investigations suggest that no environmental assessment measures were undertaken while establishing the land excisions for settlements or network of tea estates and processing factories in and around the SW Mau.<sup>160</sup>

There are justifications that tea plantations are environment friendly and act like forests. However, a small tea bush cannot hold as much quantity of water as a fully-grown indigenous tree does. In addition, natural forests have upper and under stories and both play unique functions in the hydrological and evapo-transpiration cycles, which tea plantations cannot. Furthermore, there are fears that long-term negative impacts of plantations may threaten environmental security locally as well as regionally. This happens if natural forest is replaced

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<sup>156</sup> Ibid.

<sup>157</sup> G. Davies et al., *West Mau, South West Mau and Transmara Forest reserve Mammal Survey*, op cit, pp. 16-20.

<sup>158</sup> Interview with Miss. Salome, Warden Kenya Wildlife Services, Kericho, 14 February 2014.

<sup>159</sup> Ibid.

<sup>160</sup> Interview with Miss B. Cheserek, Environmentalist, Tea Research Foundation of Kenya, Kericho, 14 February 2014.

with short rotation biomass such as crop cultivation, including the growth of industries and built environment.<sup>161</sup>

Moreover, indigenous forests are known for biodiversity richness, which is not the case with tea farms. Nevertheless, as climate change is progressing in the area, environmentalists unanimously agree on the critical role of forests in the protection of global, regional and local climate and the direct relevance to sustain various pillars of human security such as food, health, economic, environmental, political, personal as well as community security.

### **5.8 Climate Change and Human Security in the Maasai Mau**

Unlike Mau's other blocks, the Maasai Mau forest is ungazetted, and remains as a Trust Land, under the trusteeship of the Narok County, one of the richest counties in the country. The Maasai Mau forest covers 46,278 ha of land and is situated at a distance of 17 Kilometers north of the Narok town. River Mara crosses through world famous game parks, the Maasai Mara National Reserve in Kenya and the Serengeti National Park in Tanzania. Main source of River Mara is at 3,000 meters in the Mau Forest and it finally drains into Lake Victoria.

Being an integral part of the larger Mau Forest, it is Kenya's major water catchment area and part of the upper catchment of the Ewaso Ngiro and the Mara Rivers (see figure 2). The upper catchment of the Mara River Basin comprises large-scale farming where much of area's agricultural production takes place. Therefore, its waters are vital for agricultural activities as well as to sustain the wildlife and tourism sectors in the nature reserves of Kenya and Tanzania. Waters flowing from the Ewaso Ngiro River feed Lake Natron in Tanzania. Lake Natron is a home to large variety of bird species such as flamingoes and aquatic life. Therefore, these rivers are major source of water for the households, irrigation, mining, and pastoral activities in the Narok and Kajiado counties in Kenya.<sup>162</sup>

During the dry period, these rivers are the most reliable water sources to meet the local demand. In the River Mara Basin, more than 8 million people rely on the River Mara waters. Climate of the Maasai Mau forest is moderate ranging between 8°C-28°C with uneven rainfall and throughout the year sunshine. The area around the Maasai Mau has numerous large and small wheat farms and other forest products such as honey, medicinal plants, and wild fruits for

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<sup>161</sup> Ibid.

<sup>162</sup> Total Economic Value of the Maasai Mau, Trans Mara and the Eastern Mau Forest Blocks of the Mau Forest Complex, Environmental Research and Policy Analysis, Lake Victoria Basin Commission Secretariat, Kisumu, 2011, pp. 32-33.

local consumption.<sup>163</sup>The Maasai Mau forest comprises indigenous *Juniperus procera* (African pencil cedar) forests carpeted with natural vegetation. The forest is affluent with wide variety of 450 bird's species.

The Maasai Mau forests that are adjacent to Maasai Mara game reserve have abundant variety of wild animals. A survey of the wildlife suggests that area has been rich with presence of big five and other common animals such as Giant Hog, Colobus Monkey, Baby Bush, and Greater Galago Bush. Due to its tourism potential, the Maasai Mau National Reserve Plan was proposed in 1980s. However, the plan is still under consideration, and no further action has been undertaken to adopt and fully implement it.<sup>164</sup>

Like other parts of the Mau, the Maasai Mau Forest has experienced extensive land use/cover changes since early 1970s. Especially, during 1973-1986, the forest outside and inside the boundary was extensively destroyed and lost 14,805 ha and 462 ha respectively. Until 2005, the Maasai Mau had lost 39,969 ha, representing 39 per cent of its land cover.<sup>165</sup> During 2003-2005, the forest lost was more progressive when 7,453 ha were destroyed within two years period. Due to the ongoing degradation of the Maasai Mau forest, in 2003, a Public Complaint Committee was setup to investigate the issues of forest destruction and land degradation,<sup>166</sup> however, the problem remained unsolved, and it went under further encroachment.

Parts of the Maasai Mau Forest have been destroyed due to subdivision of group ranches such as Sisiyan, Nkaroni, Enosokon, Enakishomi and Reyio. After the County Council granted the approvals, boundaries were extended farther than the registered areas. Following the rules of Kenya Forest Act, it was necessary for the County Council of Narok to pass a resolution to give away the forestland in relation to such cases. However, it was justified that the area affected was not invading the forestland under the Council.<sup>167</sup>

These subdivisions have led to issues of fragmentation, especially in terms of management systems. Under the big holders, for instance, it is easy to take good control of soil and water management that can also guarantee larger production. Whereas, under the small holders, management can be erratic as people with varied priorities would like to use land

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<sup>163</sup> *Maasai Mau Forest Status Report 2005*, A Joint Action by Ewaso Ngiro South Development Authority, UNEP, KFWG and KWS, Narok, 2005.

<sup>164</sup> Interview with Dr. H. A. M. Ole Kamwaro, Former Chairman of the Narok County, Nairobi, 25 June 2014.

<sup>165</sup> Interview with Mr. S. Minis, Chief Forester Narok County, Also Interview with Mr. Tampushi Leonard, County Environment Officer NEMA, 12 June 2013.

<sup>166</sup> *Maasai Mau Forest Status Report 2005*, op cit, p. 18.

<sup>167</sup> *Ibid*, pp. 18-19.

accordingly. Potential impacts have led to environmental degradation, especially in cases of population influx and destruction of the local ecological system.<sup>168</sup>

Additionally, with various owners, it is difficult to predict the precise quantity of cereal productivity in the context of future food security. Because of such divisions, total land area under production has declined due to development of infrastructure projects. These issues threaten local, national, and regional human security in terms of food, health, political and environmental security aspects.<sup>169</sup> Data collected from various government offices in the Narok County indicates that before the colonial period much of the Maasai Mau forest was undisturbed. As land was sold to new settlers, they did not have respect for the forest.

Over the time, human influx that has been taking place in the forest, is severely affecting its ecological goods and services.<sup>170</sup> Other common activities include small-scale agricultural production, charcoal production, illegal logging, livestock rearing, and forest fires to clear land.<sup>171</sup> In relation to these activities, thousands of animals are found grazing in the south and northeast of the Maasai Mau Forest. At various points, black smoke could be clearly seen near the vicinity of the forest. Investigations reveal that the smoke is due to charcoal making activities and comes out of the kilns, which are a clear evidence of the forest wood destruction by the forest dwelling communities. Furthermore, due to lack of goodwill, weak forest protection mechanisms, and low level of law enforcement, there are serious challenges to control these illegal activities.<sup>172</sup>

These activities are not only lethal to the natural environment of the forest; there can be numerous long-term impacts on the environment and forest's biodiversity that are some of the major aspects to attain local human security. The study depicts that irresponsible human actions such as forestland excisions, deforestations, human settlements and conversion to agriculture in the Maasai Mau are having profound changes in the climate system of the area.<sup>173</sup> Meteorological data indicates that since the mid 1970s, the average daily temperature has been severely affected. Since 1970s, the rise in the average temperature is gradual with few dips.

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<sup>168</sup> Interview with Miss S. Kosgei, DC Narok County, 13 June 2013.

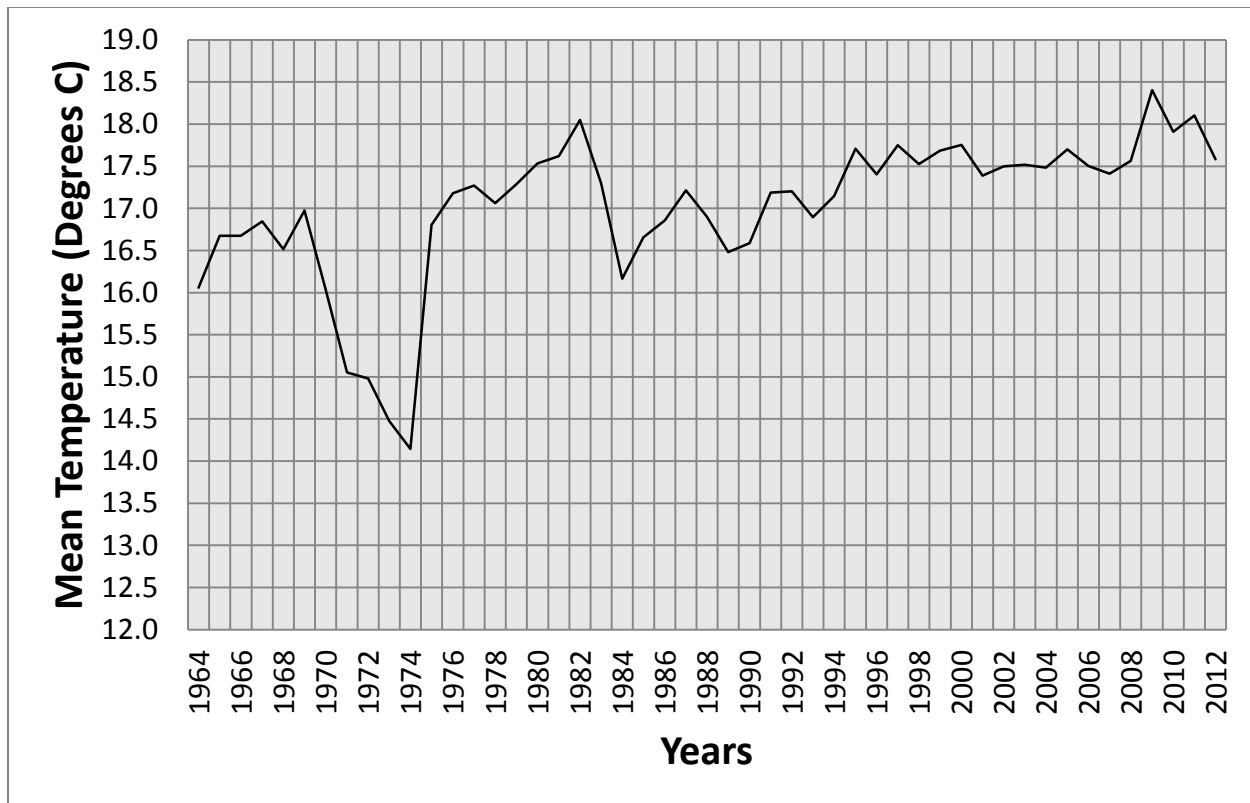
<sup>169</sup> Interview with Mr. J. M. Mbinga, Deputy Director Kenya Forestry Research Institute, Londiani, 13 February 2014.

<sup>170</sup> Interview with Mr. S. Minis, Chief Forester Narok County, Also Interview with Mr. Tampushi Leonard, County Environment Officer NEMA, 12 June 2013.

<sup>171</sup> Researcher's Personal Observations, 11-13 June 2013.

<sup>172</sup> Interview with Miss S. Kosgei, DC Narok County, 13 June 2013.

<sup>173</sup> Researcher's Personal Observations During the Field Trips, 11-13 June 2013.



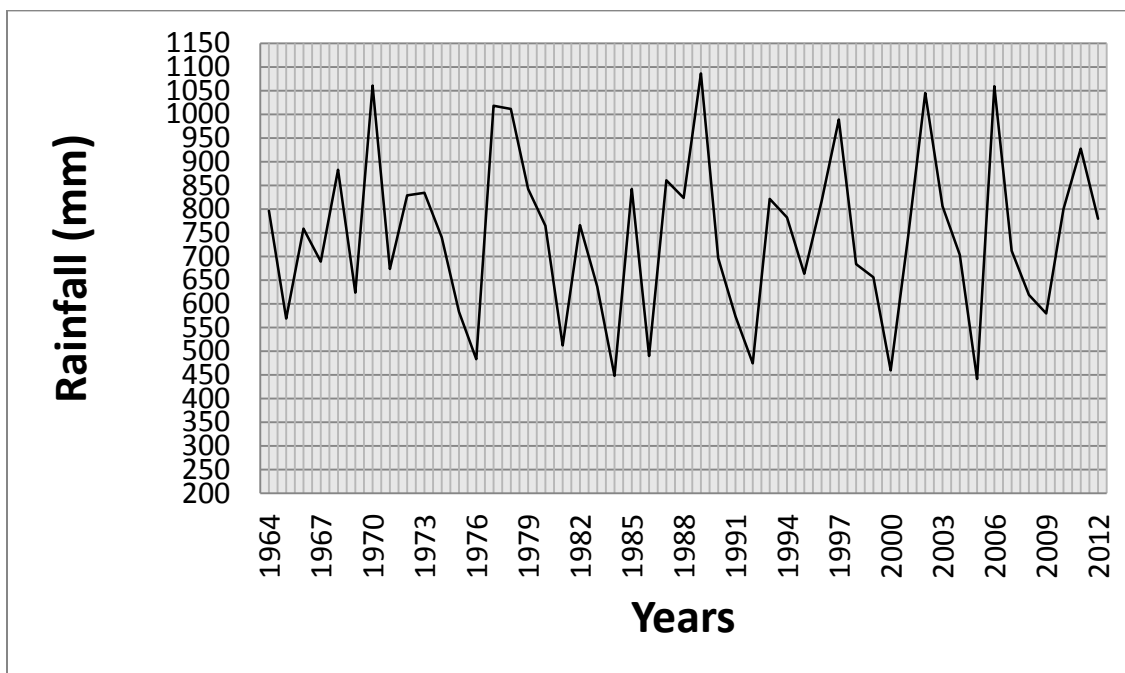
**Figure 5.7:** Mean annual temperatures in Narok (1960-2012).

Source: Kenya Meteorological Department

For instance, during 1973-74, average yearly temperature was below 15°C (see figure 5.7). However, During the 1980s, yearly mean temperatures remained within the range of 17.9°C to 18.2°C. From early 1990s, the yearly means drastically increased and peaked in 2009 as some months like March and April were as hot as 20°C and 19.2°C respectively. Due to constant high temperatures throughout the year 2009, it represented being the hottest year in the history of the Narok County.

Figure 5.8 indicates the average yearly rainfall pattern in the Narok County during 1964-2012. Calculations from rainfall data suggest that due to continuous encroachment of the forest and growing temperatures, the long-term annual mean rainfall has reduced significantly. Study indicates that during the 1960s, long-term rainfall averaged between 800-900 mm. However, since the 1970s, as the temperature progressed, the rainfall declined with an average long term or

decadal rainfall of 802mm during 1965-75. Following years, experienced decline in the average yearly rainfall, fluctuating between 650-750 mm, as can be noted in figure 5.8.<sup>174</sup>



**Figure 5.8** Mean annual rainfall in Narok (1964-2012).

Source: Kenya Meteorological Department

As discussed earlier, droughts and floods are two important components of climate change, especially in Africa. Data collected from the Kenya Meteorological Department suggests that since the early 1990s, area around the Narok County has undergone dynamic climatic changes and environmental stress. With significantly rising temperatures and changes in precipitation levels, the area has been experiencing recurring and intense drought periods along with heavy rainfall and flash floods at times.<sup>175</sup>

For instance, especially during the periods of 2003-2009, the areas around Narok County experienced recurring drought cycles. Since the onset of the 21<sup>st</sup> Century and specifically for the past few years, due to lower amount of annual rainfall, majority of the watering points dried and pastures were unavailable for the livestock. Consequently, more than 130,000 people faced food scarcity leading to hunger and starvation, while more than 25,000 animals died. In addition, there

<sup>174</sup> Ibid.

<sup>175</sup> Mixed Community Focus group Discussion, op cit.

was increased stress on livelihoods and food security for the pastoral communities who entirely relied on livestock keeping.<sup>176</sup>

The study suggests that the major climate change impact in Narok area is the delayed rainy season or sometimes there is an unusual and heavy spell of rainfall. Instead of late March, rains begin towards late April or May, which in turn leads to shifts in planting and harvesting patterns. Consequently, the farming community is always in a state of flux as they need to prepare their fields early enough for harvesting. Occasionally, heavy downpour and floods destroy the physical infrastructure causing huge losses of life and wealth in the area.<sup>177</sup> For instance, June is not a rainy season in Narok. However, in June 2011 and again in June 2013, the area experienced disastrous rainfall and floods. For instance, during the 2013 floods, Narok North, Narok South, and Kilgoris Constituencies had severe economic affects.<sup>178</sup>

In Narok North, which is adjacent to the Mau, landslides hit Mosiro and Sintakara villages and many people lost their lives. In addition, more than 60 families had to move to temporary camps due to the fear of further landslides. Negative impacts on crops included, less confidence for productivity of wheat, maize and Irish potatoes, which are key commodities for the local population to generate incomes.<sup>179</sup> Due to increased warming, new pests and crop diseases are common in the area. For example, recent studies indicate that in Narok area, Rust is a significant threat to wheat while Blight is common in tomatoes and potatoes. Likewise, Black rot commonly attacks cabbage produce. Most of the farmers are small holders; they do not have any insurance coverage. Neither the government has the capacity to protect them, which further leads to their vulnerability. Thus, changed climate of the area is heavily influencing the food, economic, health, personal and environmental security of the local communities.

Among other issues, large-scale changes in the Maasai Mau's land cover have led to environmental and ecological changes with substantial loss of biodiversity. The forest dwelling communities, whose food preferences included forest fruits and berries, are no more able to rely on these commodities. Traditionally, honey was used for the cure of many illnesses but due to unavailability, it is only a luxury item nowadays. Largely because of deforestation and loss of flowering trees, honeycombs are rarely found. With climate change, many plant species are

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<sup>176</sup> Ibid.

<sup>177</sup> Interview with Miss S. Kosgei, Former DC Narok County, 13 June 2013.

<sup>178</sup> Ibid.

<sup>179</sup> Ibid.

disappearing and being replaced with new parasitic plants. These plants are affecting the breeding of bees and production of honey. Likewise, some other plants and herbs, which were used for healing everyday ailments, are scarce now.<sup>180</sup>

Due to the loss of livelihoods, these communities have nothing to live on but to cut trees and make charcoal to survive, which is also against their cultural norms.<sup>181</sup> There have been many complex and inter-related issues causing community insecurity in the Maasai Mau forest. Due to forest evictions, for instance, the forest communities have been driven out of the forests, which is against their traditional way of life. During the process, these communities had to face human rights abuses with psychological torture and political oppression. Other environmental impacts include significant changes in the hydrological cycle, underground water storage system and water bodies.

Research suggests that one average mature tree can swallow up to 100,000 to 216,000 liters of water and can absorb 10 to 12 inches of floods.<sup>182</sup> As stated earlier, cutting of the indigenous forest significantly reduces the capacity of land to hold water and it leads to increased water flows in the rivers and streams.<sup>183</sup> Hydrographs produced in such studies indicate that clearing of trees and natural vegetation, and increased agricultural activities in the Maasai Mau have severely affected the hydrological system in the Mara River. Comparative studies conducted during 1973 and 2000 reveal that a small magnitude of rainfall in 2000 produced more significant stream flow than during 1973. Additionally, in 2000, the stream flow onset was much quicker, gained its peak faster, and receded at the same speed than during 1973.

In addition, reduced natural vegetation and growing agricultural practices have given rise to increased soil erosion in the Mara River Basin, deposition of sediments at the river mouth causing elevation of river channels, over flows, river banking back flows, especially during heavy rains. Due to these factors, the Mara Basin's wetlands significantly grew by 387 per cent during 1973-2000. Another area of concern is increased flood peaks during 2000 compared to 1973.<sup>184</sup> Recent studies depict that conversion of forests has led to lower flow in the dry seasons

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<sup>180</sup> Ogiek Community Focus Group Discussion, op cit.

<sup>181</sup> Ibid.

<sup>182</sup> 'The Role of Trees and Forests in Healthy Watershed, Managing Storm Water, Reducing Flooding and Improving Water Quality', *Forest Stewardship Bulletin* #10, Penn State University, 2008.

<sup>183</sup> Ibid.

<sup>184</sup> S. M. Mutie et al, Evaluating Land Use Change Effects on River Flow Using United States Geological Survey Geo Spatial Stream Flow Model in Mara River Basin, Preceding of the Second Workshop of the EARSel SIG on Land Use and Land Cover, Center for Remote Sensing of Land Surfaces, Bonn, 28-30 September 2006.

and excessive over flows and floods in the rainy seasons.<sup>185</sup> If not adequately dealt with, such changes will negatively influence Kenya's economy, impaired water supply, and energy generation, loss of tourist activities, soil erosion, and serious implications for the agricultural and pastoral activities. Ultimately, these factors can directly weaken human security not only in Kenya but also regionally.

## **5.9 Conclusion**

The Eastern, Southwest, and the Maasai forests of the Mau Complex are adjacent to areas of high population density, and provide human security to millions of Kenyans. Due to increased human interference, the Mau forests are going through critical climatic changes with significant human security threats including the loss of livelihoods, food crises, diseases, loss of flora and fauna. For instance, the River Mara Basin and the Lake Nakuru National Park is experiencing dramatic changes in water supply and agricultural production.

In Conclusion, this chapter reveals that since Kenya's independence, throughout the 1960s and 1970s, with fewer changes in the forest cover, there was no significant change in the natural climate of the area. However, during 1980s, and 1990s, more than one quarter of the forestland was destroyed and degraded using legal and illegal means such as excisions, logging, clearing for subsistence farming, and human settlements. Since these times, changes in the local climate have led to rapid rise in the average temperatures of the areas in and around the Mau Forest Complex. Secondly, it has led to inconsistent rainfall pattern causing frequent and more intense droughts and flash floods. As a result, people are facing numerous human security issues.

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<sup>185</sup> L. M. Mango et al, 'Land Use and Climate Change Impacts on the Hydrology of the Upper Mara River Basin, Kenya: Results of the Modeling Study to Support Better Resource Management', *Hydrology and Earth System Sciences* 15, 2011, pp. 2245-2258.

# CHAPTER SIX

## CLIMATE CHANGE AND HUMAN SECURITY IN AFRICA: A CRITICAL ANALYSIS

### 6.0 Introduction

In the light of the information provided in the preceding chapters, this chapter deals with the critical analysis of this study. As such, it examines key themes of the study, and seeks to assess the hypotheses in relation to specific objectives. Furthermore, this chapter explores the conceptual and theoretical linkages between climate change and human security in Africa as well as in the Mau Forest Complex. Homer Dixon's resource scarcity theory provides the theoretical framework for this study. The environmental resource scarcity theory is based on the notion that a scarcity of fresh waters, croplands, and forests coupled with issues of weak governance, lack of adequate institutions and regimes, and poor implementation of policies often lead to broad insecurities.

In the 1980s-90s, a number of scholarly discussions expressed the fear that in coming years, global climate change will potentially promote severe scarcities of environmental resources causing various levels of insecurity.<sup>1</sup> Guided by this theory, the study examined and analysed the interrelations between climate change and human security. This study, therefore, argues that climate change has significant impacts on Africa's environmental resources and thereupon, severely threatens human security. Particularly, due to inadequacy of climate change and human security regimes and institutions in Africa, the continent has not been able to formulate clear mechanisms to handle these issues. In the case of Kenya's Mau Forest Complex (MFC), massive changes in the land cover and land use have affected the entire climate of the MFC and the surrounding areas. As a result, the rapidly changing climate of the region has significantly affected the sustainability of the critical resources, leading to severe resource scarcities and direct repercussions for human security.

This chapter therefore analyses and assesses the major issues and the strategies developed over time to deal with the issues of climate change and human security, especially within the context of Africa and in reference to Kenya's Mau Complex (MFC). The first theme examines

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<sup>1</sup> T. F. Homer-Dixon, *Environment, Scarcity, and Violence* (New Jersey: Princeton University Press, 1999).

human security from the perspectives of Africa and determines major human security challenges in the continent. The second theme examines the debate on the historical as well as contemporary issues of climate change. The third theme examines the situation of climate change and the effects on human security in Africa. The fourth theme analyses the causes, key impacts, and intersections between climate change and human security, using the case study of the Mau Forest Complex in Kenya. The final theme analyses the existing norms and institutions in relation to climate change and human security in Africa at large, in Kenya and in the MFC, more specifically.

## **6.1 Emerging Issues**

### **i) The Notion of ‘Human Security’ Vs. the African Reality**

Currently, global security is at the heart of international political discourse and development agendas where security aims to confront all tangible and intangible threats to human survival. Thus, security in this sense focuses on safety and well-being of human life rather than the territories alone. This perception of security has led to the idea of human security, which provides a platform for universalism to eradicate poverty, freedom from hunger, diseases, environmental degradation, conflicts, political oppression, and the kind.<sup>2</sup>

To achieve this end, the most comprehensive definition of human security means freedom from fear and want, and a dignified life. Thus, human security is not a mere survival of people from traditional threats; it stresses to add quality to the lives of individuals by looking at three important premises relating threats. Firstly, human security presupposes getting rid of conventional threats, underdevelopment, and violation of human rights, being at the core of security mechanisms.<sup>3</sup> Secondly, that human security threats are inter-related, and manifest to form a chain reaction. For instance, environmental insecurity leads to environmental degradation and resource scarcity and that can potentially trigger food shortages, recurring famines, loss of livelihoods, human displacement, economic turmoil, political unrest, and conflicts between communities or groups.

In addition, human security threats may travel across the national boundaries and, ultimately can spread around the world. For instance, most common human security threats such as human displacement, drug trafficking, arms trade, environmental pollution, and terrorism have

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<sup>2</sup> *Human Development Report 1994*, ‘The New Dimensions of Human Security’, UNDP, (New York: Oxford, 1994).

<sup>3</sup> *Human Security Now*, Commission on Human Security, New York, 2003, pp. 1-10.

no territorial respect and virtually internationalise. This argument also suggests that human security threats may compound each other's effect.<sup>4</sup> Lastly, when dealing with human security threats, there cannot be any aspect of human security that is more important than the rest.<sup>5</sup> Therefore, to achieve ultimate security, societies need to get rid of all kind of aggression in everyday lives. Simultaneously, societies need to liberate themselves from routinely wants, which entails the issues of hunger, shelter, clothing, poor health, and inadequate education systems.<sup>6</sup> Thus, human security is a comprehensive concept for the well being, survival, and dignity of individuals.

Given the cases of oppressive leadership, and gross human rights violations with least respect for people's political freedoms, state cannot be trusted to guarantee national security. However, legitimate and effective democratic state that can undertake the responsibility to guarantee the respect for human rights is still viewed as a vital aspect of human security. Additionally, an ideal situation of human security requires the role of state and other non- state actors such as nongovernmental organisations, civil society, and individuals.<sup>7</sup> In essence, human security framework provides a shifted understanding of national security whereby the field of security incorporates the issues of underdevelopment (freedom from want) and human rights violations (freedom from fear) which has not been the case with the conventional understanding of security. Furthermore, the deeper synthesis of existing insecurities allows understanding the structural factors and deep-rooted weaknesses in the system, which helps to look for effective and long lasting solutions.<sup>8</sup>

Since the UN's recognition of human security in the UNDP 1994 Human Development Report, the concept has gained significant acceptance among few states and organisations that have taken a lead to adopt the concept, being part of their foreign policy measures. However, in much of the developing states, the governments have not been able to combine states security with human security, although the situation of human security is greatly challenged for them, as has been noticed in the case of Africa.

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<sup>4</sup> J. Nef, *Human Security, and Mutual Vulnerability: The Global Political Economy of Development and Underdevelopment*, 2<sup>nd</sup> Edition, (Canada: International Research Development Centre, 1995).

<sup>5</sup> *Human Development Report 1994*, Chapter 2, UNDP, op cit, p. 33.

<sup>6</sup> *Human Security Now*, op cit.

<sup>7</sup> S. Tadjbakhsh and A. M. Chenoy, *Human Security: Concepts and Implications*, op cit, p. 238.

<sup>8</sup> S. Tadjbakhsh, "Human Security": Looking Back before Looking Forward, Paper Presented for the ICHSWA Conference Birjand, Iran, 26 November 2009.

## Human security in Africa

Like other parts of the developing world, majority of the Africans are vulnerable to numerous military and non-military threats. Even after independence, Africa has consistently been facing economic, political, social, and environmental crises. Human security threats in Africa are rooted in its poor leadership and governance, violent conflicts, absence of health care, extreme poverty, human displacement, food deprivation, and unequal access to quality education.

Issues of national governance occupy a phenomenal role in the human security discourses as it is directly concerned with leadership and management of the state affairs, respect of all forms of human rights, compliance of the rule of law and creation of democratic institutions.<sup>9</sup> Effective governance is subjected to transparency, empowering individuals, and communities in order to let them participate and be heard in the decision-making processes of the state.<sup>10</sup> Governance sets a stage where the state and dynamic civil society together make decisions and create opportunities for common good of the state and its citizens. Decisions taken as such lead to regulate the norms that can guide the routine affairs of the state, with its citizens.<sup>11</sup>

Furthermore, governance plays a key role to direct constitutional reforms, organising fair and free elections, freedom of the media and administration of the development affairs. Thus, good governance leads to peace, stability, respect of human rights, sustainable development, and hence human security. However, this is not the case with majority of the African states. Poor leadership, dictatorship, fiefdoms, distortion of the public revenues, lawlessness, wide spread corruption and human rights abuses are common features of African governance. Consequently, people have lost trust in their respective institutions and leadership, which has plundered human safety in the region.

Most of the African conflicts are triggered by lack of good governance. For example, in 1999, Africa saw 16 out of 37 violent conflicts in the world.<sup>12</sup> Bewildered and disappointed with their governments, people have no option but to revolt. Thus, incidents of insurgencies, guerilla wars, political turmoil, and eventual civil wars exclusively belong to Africa. The recent civil

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<sup>9</sup> O. Sana, 'Good Governance as a Building Block towards Improved Human Security in the Horn of Africa', In: M. Mwangi, *Human Security: Setting the Agenda for the Horn of Africa*, (Nairobi: Africa Peace Forum, 2008), pp. 34-35.

<sup>10</sup> P. A. Nyong'o, 'Governance, Poverty and Sustainable Development in Africa' In: P. A. Nyong'o, *Sustainable Development, Governance: African Perspectives*, (Nairobi: Heinrich Boll Foundation, 2002), pp. 38-54.

<sup>11</sup> Ibid.

<sup>12</sup> P. Walensteen and M. Sollenberg, 'Armed Conflict 1989-1998' *Journal of Peace Research*, Vol. 37, No. 5, 2002.

wars in Sudan, Democratic Republic of Congo, Somalia, Liberia, Sierra Leone, and in the Central African Republic have caused much mayhem in the lives of the ordinary Africans. Although, exact figures of fatality are not available, however, in the case of 2013-14 South Sudanese conflict, more than 10,000 people lost their lives within a few days of civil war.<sup>13</sup>

Conflicts cause statelessness and drive millions out of their homes who are forced to live as refugees or internally displaced persons (IDPs).<sup>14</sup> In 2005, there were nearly 5 million refugees and IDPs from Africa. Conflicts in South Sudan, for instance, led to large-scale human displacement and drove more than 86,000 Southern Sudanese out of their houses with all kinds of insecurities.<sup>15</sup> Lack of food, water, and sanitation causes poor health and diseases in the shelter camps. Sexual harassment, physical and psychological abuses, presence of militia groups further threatens the human security of these refugees. Thus, violent conflicts in Africa are one of the fundamental factors causing human insecurity.<sup>16</sup>

Secondly, Poverty takes various routes to weaken human security of a common person in Africa. Chronic poverty is rampant in Africa as 288 million people of the sub-Saharan Africa are living on 1US\$ a day. The World Bank 2000 report indicates ten major outcomes of poverty. The poor have no permanent and reliable means of living; therefore, they have to rely on donor assistance. The poor live in disgraced shelters with fewer or no provisions. Due to hunger, diseases, and exhaustion, their bodily health remains poor. Discriminatory behaviour erodes their gender, family, and communal ties, leaving them physically and emotionally insecure.<sup>17</sup> Although, African states are signatories and party to the UN treaties for the women and children rights, however, in Africa, gender issues are widespread. In most parts of Africa, women are marginalised and their rights are still restricted.

Cultural and traditional practices often deprive women to have equal opportunities to access education, jobs, and economic resources. Conflicts exacerbate women's suffering as it increases their responsibility to take care of the family. In many cases, they have to migrate to peaceful zones and look for livelihoods. Likewise, children are also deprived from their basic human rights due to social and economic factors such as poverty, and conflicts and they are often

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<sup>13</sup> 'South Sudan: The UN Mission Cites Clear Indications Death Count Much Higher than Early Estimates', *UN News Centre*, Retrieved online, 14 March 2014.

<sup>14</sup> S. Ogata, 'Human Security: Some Refugee and Statelessness Perspectives', UNHCR, An Address at the Ministerial Meeting on Human Security Issues on "Lysoen Process" Group of Governments, Norway, 19 May 1999.

<sup>15</sup> 'South Sudan Conflict: 3.7 Million in Need of Food', *BBC News Africa*, Retrieved online, 14 March 2014.

<sup>16</sup> *Ibid.*

<sup>17</sup> 2013 World Hunger and Poverty Facts and Statistics, Retrieved online, 14 March 2014.

orphaned due to diseases like HIV/AIDS. Occasionally, they also become victims of gangs who use them for street crimes, begging, and as child soldiers.<sup>18</sup>

Lack of quality education is another human security issue in Africa, though it is a fundamental right of all humans. Generally, 38 per cent (153 million) of the African adults are illiterate, however, in many states more than 50 per cent of the population cannot read and write.<sup>19</sup> Due to illiteracy, limited skills, and lack of awareness, poor people get fewer opportunities to express their grievances; therefore, they have low self-esteem. Their physical and psychological security is therefore, stigmatised with no peace of mind. These factors contribute to fear, rejection, isolation, loneliness, social exclusion frustration, and anger. Thus, in majority of the African states, people have little capacity to recognise and fight for their basic human rights, which greatly threatens their political security.<sup>20</sup>

Since 2000, with the establishment of the UN's Millennium Development Goals, most states have embarked on educational programmes to fight illiteracy and especially to attain minimum level of education. However, Africa still lacks access to quality education that can help to attain the minimum level of human security. Since the inception of the organisation 1945, the United Nations' Security Council has been empowered to resolve matters concerning international security and peace building. However, the organisation has been facing multiple challenges and has failed to restore peace and security in many of the African states. Similarly, the African Union's Peace and Security Council was established for regional conflict prevention, resolution, and management in the continent. However, due to financial and logistical constraints, the role of AU is disputable and its success level has been relatively low.

Likewise, due to factors like political issues and partiality, other regional and sub-regional actors such as ECOWAS, SADC, and IGAD have been facing their share of problems.<sup>21</sup> As Mwagiru points out, security in Africa has a restricted and 'parochialist approach' towards international security.<sup>22</sup> Moreover, Africa's participation in the international security agenda setting lacks dynamism and an independent approach that are necessary requirements to support the diplomatic discourses and procedures, regarding regional human security.

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<sup>18</sup> L. Pring, *Children in Armed conflict: Human Security*, Retrieved online, 15, April 2014.

<sup>19</sup> UNESCO, 'Literacy and Non- Formal Education', Retrieved online, 14 March 2014.

<sup>20</sup> D. Naryan et al., *Voices of the Poor: Crying Out for Change*, (New York: Oxford University Press, 2000).

<sup>21</sup> I. Farah, 'African Regional Security Arrangements: ECOWAS and Lessons for IGAD', In: M. Mwagiru (ed.), *Human Security: Setting the Agenda for the Horn of Africa*, (Nairobi: Africa Peace Forum, 2009), pp. 237-250.

<sup>22</sup> M. Mwagiru, 'African in International Security Agenda Setting' In: M. Mwagiru, (ed.), *Human Security: Setting the Agenda for the Horn of Africa*, (Nairobi: Africa Peace Forum, 2009), p. 2.

Conventionally, the African security agenda setting has relied on narrower and military means, lacking humanised and people centered approach. In addition, most African states rely on their ad hoc policies, which minimise their participation in the international security agenda setting.<sup>23</sup>

Although, the African Union and Africa's regional and sub-regional organizations recognise human security as a rational response to Africa's wider mandate, however, so far, African governments have taken little interest to incorporate human security into their domestic or foreign policies. Furthermore, African leaders have misconception of human security and consider it as a western tool to invade Africa. What Africa needs is to unite and be more vocal about their sovereignty and must articulate its regional human security framework. Moreover, there is a dire need for a regional institutional platform where common issues need to be prioritised within the human security norms and especially to ensure the respect for territorial integrity and safety of states together with the people of Africa.

## **ii) Climate Change: Debates and Discourses**

The 18<sup>th</sup> and 19<sup>th</sup> Century climatologists believed that climatic conditions were strongly related to peoples' culture and traditions. However, during this period much of these discussions focused on resolving the mystery of ice cover in the northern part of Europe when much of the earth's climate variability was entirely dependent on the natural phenomena.<sup>24</sup> These changes spanned from ice ages to glacial, interglacial and then little ice ages. During that period, few researchers focused on the greenhouse gases emissions and the role of such gases to stabilise the earth's temperature. In the late 19<sup>th</sup> Century, further investigations revealed some forecasts about increased amount of carbon dioxide (CO<sub>2</sub>) and its relationship to global warming. Anyhow, such revelations did not gain much appreciation due to lack of relevant data and fascination in explaining the ice ages.

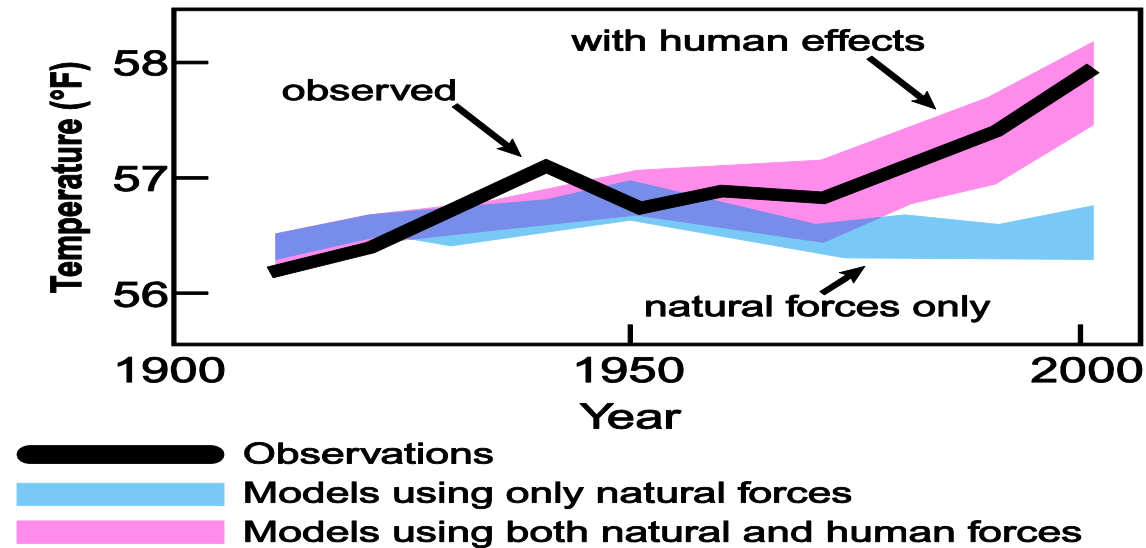
Gradually, due to growing cultivation and increased deforestation, the climate of the developed world underwent progressive change. As the study of climate science flourished among the European thinkers, in 1938, Guy Scallender argued that increased burning of fossil fuels was slowly increasing the levels of CO<sub>2</sub> in the atmosphere. Meanwhile, the scientific revolution discovered complex climate models to predict future climate change. In 1950s,

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<sup>23</sup> Ibid, pp. 2-3.

<sup>24</sup> R. Flemming, *Historical Perspective on Climate Change*, (Oxford and New York: Oxford University Press, 1998).

Keeling devised a technique to measure CO<sub>2</sub> of the atmosphere and his revolutionary discoveries transformed the scientific understanding of global warming. Especially, his famous graph, the ‘Keeling Curve’ initiated international political debates over the global warming trends.



**Figure 6.1** Effects of natural forces and human activities on rising temperatures.

Source: Hegerl et al.

By this time, the scientists had already discovered that CO<sub>2</sub> played a significant role to absorb heat and maintain the climate of the earth. In addition, it acts as a blanket by letting the visible light pass through, while blocks the required level of heat to escape (the green house effect). Other studies conclude that excessive amount of CO<sub>2</sub> above a certain level, contributes to warming of the air, oceans, and land. Over the years, scientists have used Keeling’s work as a basis for their research on climate change. Since 1960s and 70s, much of the climate change debates seek to study the future scenarios in the cases of increased levels of CO<sub>2</sub>.

Climate science reveals that some natural climate changes take place gradually, over thousands to millions of years; therefore do not have much role in the present day climate change. However, human activities such as the land use and land cover changes, including subsistence agriculture, over grazing, deforestation and growing industrialisation (use of fossil fuels) are the most likely suspects for changing the global climate. Figure 6.1 clearly marks the changes in the global average temperatures over the previous century and indicates the impacts of natural as well as human effects.<sup>25</sup> Research indicates that since the burning of fossil fuel has

<sup>25</sup> G. C. Hegerl et al, *Understanding and Attributing Climate Change, Climate Change 2007: The Physical Science Basis*, IPCC Contribution of the Working Group I (Cambridge: Cambridge University Press, 2007).

significantly increased, levels of atmospheric CO<sub>2</sub> have increased by 40 per cent compared to the pre-industrial levels.<sup>26</sup> For instance, the climate models reveal that if the levels of CO<sub>2</sub> will double, the average yearly temperature of the earth would rise by 5 to 6°C. The temperature rise is uneven but most severe at the poles with detrimental implications for the African continent.

Since 1990s, much of the climate change debates have focused on the negotiation process held by the United Nations Framework Convention on Climate Change (UNFCCC) and the periodic reports of the Intergovernmental Panel on Climate Change (IPCC). Key objectives of the UNFCCC were to stabilise the concentration of the greenhouse gas (GHG) emissions in the atmosphere and lower it to the level where ecosystems can sustain and adapt to the changing climate, without interfering with adequate food production and economic development. Furthermore, the convention stressed for the need to protect the climate system for the future generations whereby the developed countries (Annex 1) were given a prominent role to control their industrial activities to fight climate change. However, the developing states were assigned voluntary roles without any obligations.<sup>27</sup>

In 1997, the UNFCCC discussions framed the Kyoto Protocol that entered into force in 2005. The principal concept of the Protocol lied in the establishment of the commitment in reducing the GHG emissions by 5.2 per cent, compared to the levels in 1990. The Protocol demands specifically enormous changes in living conditions and existing patterns of energy consumption and therefore, challenges economic aspirations of many states.<sup>28</sup> Due to this reason, the most developed states like the US and Australia did not ratify the protocol although these are one of the highest global GHG emitters.<sup>29</sup>

Similar is the role of the fastest growing economies that do not agree to reduce their industrial activities. Thus, majority of the governments prefer the growth of technology policy other than the emissions trade, which has become major factor in non-compliance of the Kyoto Protocol.<sup>30</sup> Due to these factors, the Kyoto Protocol has remained controversial and ineffective to control the GHG emissions. Secondly, there were debates on flaws in non-compliance and enforcement mechanisms as different national targets were set for different states.

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<sup>26</sup> G. Walker and D. King, *The Hot Topic: How to Tackle Global Warming and Still Keep the Lights on*, (London: Bloombury, 2008), pp. 14-23.

<sup>27</sup> Article 2 of the United Nations Framework Convention on Climate Change (UNFCCC).

<sup>28</sup> J. Vogler, 'Environmental Issues', In: J. Baylis and S. Smith (eds.), *Globalisation of World Politics*, (Oxford: Oxford University Press, 2011), p. 356.

<sup>29</sup> *Ibid.* pp. 358.

<sup>30</sup> F. Jotzo, 'Climate Policy: Where to and How?' *Agenda*, Volume 14, No. 1, 2007, pp. 17-34.

Furthermore, the Kyoto Protocol has overlooked the damaging side of the potential leakage and the GHG emissions' spillover effects, especially by the fastest growing economies like China and India who belong to the Annex II countries. This debate has caused a structural divide between the North and the South.<sup>31</sup> To some, in the end the protocol will prove of little environmental benefits compared to the costs due to uncertainties tied with it. For this reason, many developing countries are hesitant to make commitments and finding the protocol policies costly and incompatible to their goals of national autonomy with long-term economic security.<sup>32</sup>

Other arguments are based on the desired level of efficacy of the Clean Development Mechanism (CDM) and Joint Implementation (JI). Both the mechanisms contain provisions by technology transfer and credits earnings while considerably reducing the total emissions. Anyhow, due to high transaction rates, corruption, lack of technology transfer, and uneven regional distribution, CDM and JI have proven ineffective especially for the African states.<sup>33</sup> In addition, the 2009 Copenhagen Accord introduced the Green Climate Fund, which is a form of financial assistance for climate change adaptation and mitigation projects in the developing states.

In the 2010 Cancun Climate Change Conference, as the climate change negotiations furthered, the developed states pledged to establish the fund of US\$100 million per year by 2020. The Africa Development fund estimated that by 2015 Africa would need US\$22 to 30 billion per year to mitigate climate change. However, by 2030, the cost will rise to US\$ 52 to 68 billion per year. Due to various challenges there seems no way forward for the sourcing and release of this fund for Africa.<sup>34</sup> For instance, the donors have stringent terms and conditions to acquire the fund. Secondly, there is no fixed amount of funds specifically for Africa, being the most vulnerable and poor region. Thirdly, countries need to establish and implement national climate change policies, which can further the procedure to acquire climate funds. Lastly, many African states still lack the expertise, capacity, and transparent mechanisms to develop such policies that can also absorb the fund.

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<sup>31</sup> C. Philibert, 'Lessons From the Kyoto Protocol: Implications for the Future', *International Review of Environmental Strategies*, Vol. 5, No. 1, pp. xx-xxx, 2004.

<sup>32</sup> Ibid.

<sup>33</sup> I. Shislov and V. Bellassen, *10 Lessons from 10 Years of the CDM*, Climate Report, Research on the Economics of Climate Change, No. 37, October 2012.

<sup>34</sup> L. Schalatek and S. Nakhooda, *The Green Climate Fund*, Climate Fund Update, Heinrich Boll Stiftung, November 2013, Also R. K. Lattanzio, *International Climate Change Financing: The Green Climate Fund*, Congressional Research Service Report for Congress, 16 April 2013, Retrieved online 5 April 2014.

### **iii) Climate Change and Human Security: New Challenges for Africa**

Africa experiences various types of climates including, marine, savannah, tropical rainforest, steppe, highlands, desert, humid subtropical and the Mediterranean. Northern parts of the continent are arid, semi-arid, and mostly desert, being one of the hottest parts on the world. However, Central and Southern Africa comprises scenic landscapes including savannahs and rainforests.

According to various studies, Africa is the most susceptible region to climate change, although Africa's contribution to the total GHG emissions is less than 2.5 per cent.<sup>35</sup> In addition, myriad human security issues lower the capacity of ordinary Africans to deal with the growing intensity of climate change.<sup>36</sup> Secondly, Africa is one of the most underdeveloped parts of the globe with 30 per cent of its population living below the poverty level. Thirdly, much of the population is dependent on natural resources and rain fed subsistence farming, highly susceptible to increased warming and rainfall variation. At the same time, due to technological, institutional, and financial constraints African states are unable to deal with climatic changes.<sup>37</sup>

In Africa, most fundamental changes include rapid rise in the average temperatures and rainfall variation. In terms of amount of precipitation, there is significant variation depending on the local conditions. Southern, eastern and the northern Africa has been experiencing more intense and frequent droughts whilst the Sahel has become parched with fewer than average rainfall, extending the horizon of deserts. Similarly, Kalahari is an arid region of the northern South Africa, Angola, and Zambia, where low amount of rain and higher winds have led to declined vegetation and shifts of landmasses into deserts. In the last three decades, the eastern parts of Africa have become 2 to 3°C warmer with significant variation in rainfall and frequent droughts.

Climate change led disasters have directly disrupted socio-economic development with increased water crisis, desertification, land degradation, poor agricultural productivity, and population movement.<sup>38</sup> In the coming decades, increased warming will further stress the living conditions in Africa. Some parts of the region will experience reduced rainfall, specifically, fewer rainy days in summer. However, the tropics and some eastern and southern parts will

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<sup>35</sup> K. Dow and T. Downing, *The Atlas of Climate Change*, (London: Earthscan, 2006).

<sup>36</sup> Interview with Dr. A. Opere, Head of the Department of Meteorology, University of Nairobi, 3 April 2014.

<sup>37</sup> Ibid.

<sup>38</sup> R. Clements et al., *The Economic Costs of Climate Change in Africa*, Pan African climate Justice Alliance, November 2009.

experience off-season rains, causing increased intensity of cyclones, tropical storms, and flash floods especially along the southern Indian Ocean. There are predictions that climate changes will increase the competition for important resources, which can destabilise various aspects of regional human security with political instability, increased poverty, resource wars, and issues of food and health security.<sup>39</sup>

Although, climate change cannot be a sole agent of violent conflict, however, climate change led natural disasters and resource scarcity has the potential to trigger political instability.<sup>40</sup> Research indicates that in the underdeveloped and politically marginalised societies, natural disasters can open ways for political agitation and riots, at both local and national levels.<sup>41</sup> Climate change also challenges regional peace and stability as conflicts commonly arise within economically weak societies<sup>42</sup> where the poor are often marginalised while the elites can have the bigger portion of pie and may trigger structural scarcity. Thus, with resource capture such issues can potentially give rise to environmental conflicts.<sup>43</sup>

There are views that with increased warming and environmental degradation, climate change will increase the scarcities of water, land, pastures, and crops.<sup>44</sup> For instance, in the northern, southern and the Horn of Africa, rainfall variability has considerably affected water availability.<sup>45</sup> Recurring and prolonged droughts and flash floods change hydrological systems with reduced or increased runoff, soil moisture, and underground water tables, considerably increasing the competition for access to water.<sup>46</sup> Thus, from historical evidence, both demand and supply induced scarcities coupled with structural scarcity may trigger political agitation.<sup>47</sup>

Water in many parts of Africa is already scarce (such as Kalahari and Sahara deserts in the North, and Near East and Southern parts of Africa) and with growing population and high rate of urbanisation, its supply often out strips the demand. According to future projections, with

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<sup>39</sup> Ibid.

<sup>40</sup> O. M. Theisen et al., 'Is Climate Change a Driver of Armed Conflict?' *Climate Change*, 117(3), 2013, pp. 613-625.

<sup>41</sup> M. Y. Omelicheva, 'Natural Disasters: Triggers of Political Instability?' *International Interactions: Empirical and Theoretical Research in International Relations*, 37:4, 2011, pp. 441-465.

<sup>42</sup> Ibid.

<sup>43</sup> T. Homer-Dixon, *Environment, Scarcity and Violence*, (Princeton: Princeton University Press, 1999).

<sup>44</sup> Interview with Mr. A. Tadege, Climate Adaptation Specialist, IGAD Climate Prediction and Application Centre, Hague Park, Nairobi, 10 April 2014.

<sup>45</sup> Ibid.

<sup>46</sup> Interview with Dr. A. Opere, (HoD), Department of Meteorology, University of Nairobi, 3 April 2014.

<sup>47</sup> T. Homer-Dixon, 'On the Threshold: Environmental Changes as causes of Acute Conflict', *International Security*, Vol. 16, No. 2, Fall 1991, pp. 116.

warmer temperatures, there is likelihood of greater evaporation that will raise the sea levels, submerging the islands and low-lying areas near the coastlines. For example, on the Indian Ocean, the island of Mombasa, which is the largest port in the East Africa and serves many land locked states, is threatened by cyclones, floods, salt-water intrusion into the inland waters and loss of marine ecosystems.<sup>48</sup>

What might be the impact of future changes in the region? Presently nothing can be predicted precisely; however, future temperature rise in Africa will increase the thermal expansion of seawaters with coastal flooding, and loss of marine life and agricultural activities near the coasts. Frequency of extreme events such as floods, droughts, and heat waves will grow with significant affects on land and water resources.

#### **a) Climate change and cropland scarcity**

Intensified land cover and land use changes such as deforestation, poor agricultural practices, livestock keeping and over grazing, are sensitive to natural climate. These activities are common factors of land degradation, soil erosion, and destruction of natural vegetation, therefore, increase pressure on arable land. In addition, such factors negatively influence land's natural ability for production, and result in permanent desertification. High rate of desertification is one of the most alarming environmental issues especially in Africa. It arises due to severe soil erosion, causing land degradation with loss of productive land and reduced soil functioning. Desertification challenges human security and manifests as declined socio-economic development.

Additionally, with escalating issues of temperature rise and droughts, croplands are becoming increasingly scarce in the northern parts of Africa, especially in the Sahelian belt. In the southern part of Africa, along the Kalahari Desert and in the Horn of Africa, much of the land is already arid and semi arid.<sup>49</sup> Although, desertification is a natural process, however, human activities are aggravating its progression, especially in the case of Africa. Studies demonstrate that 74 per cent of the African agricultural land is undergoing severe to moderate degradation, especially in the Sahel.

By 2030, if not adequately controlled, two thirds of Africa's cultivable land will become arid and deserted. According to estimates, land degradation has affected more than 485 million

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<sup>48</sup> C. B. Awuor, V. A. Orindi and A. O. Adwera, 'Climate Change and Coastal Cities: The Case of Mombasa', Kenya, Institute of Environment and Development, *Environment and Urbanisation*, Volume 20(1), pp. 230-242, 2008.

<sup>49</sup> S. Erikson, 'Linkages between Climate Change and Desertification in East Africa', Part 1: Physical and Social Linkages, *Arid Lands*, No. 49, May/June 2001.

people, which is 60 to 70 per cent of the African population.<sup>50</sup> Although, alarming rate of desertification led to the establishment of international treaties such as the UN Convention to Combat Desertification, however, many African states have not committed themselves to address desertification and cropland scarcity by mainstreaming the issue into their climate change policies. In addition, lack of regional as well as national human security policies also hinders fighting these issues. Furthermore, there is need to implement the national policies to restore the degraded land. Therefore, due to fewer funds and lack of concerted action, the African governments have failed to take serious measures to roll back rapid march of deserts causing severe land scarcity.

#### **b) Climatic changes and fresh water resources**

The Earth's total water volume comprises 1.5 billion cubic kilometer with 97.3 per cent being salt contaminated and the remaining 2.7 per cent as fresh water. Ice caps and glaciers make up for 77.2 per cent of total fresh water that is a frozen mass in the Antarctic, the Arctic Circle, and Greenland. Additional 22.8 per cent is buried in the depths of underground aquifers. That leaves only 0.36 per cent for the daily usage or human consumption, available in rivers and lakes.<sup>51</sup> With population growth and developmental demands, water consumption has substantially increased in all sectors of life. Therefore, in most parts of the world, individuals, groups, and states compete for limited availability of fresh waters. In 1990s, a number of studies predicted that fresh water scarcity would be one of the major resource issues of the 21st century.<sup>52</sup>

Water scarcity is led by factors such as rising demand due to population growth and increased urbanisation where by depletion and pollution constraint the supply end. In addition, climate change undermines water security with implications on water cycles and hydrological variability. However, it differs in all regions according to the changing developments in local geographical features, demographic factors, and water management systems.<sup>53</sup> Simultaneously,

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<sup>50</sup> B. Terminski, 'Current Dynamics of Desertification in Africa', Facts and Statistics, Africa Research Library, May 2012, Retrieved online 11 April 2014.

<sup>51</sup> P. H. Gleick, *Water in Crisis: A Guide to the World Fresh Water Resources*, (Oxford: Oxford University Press, 1993).

<sup>52</sup> P. LeRoy, *Sustainable Water: Population and the Future of Renewable Water supplies*, (Washington DC: Population Action International, 1993).

<sup>53</sup> *Water Security and the Global Water Agenda*, A UN-Water Analytical Brief, United Nations University, Ontario, 2013, p. 7.

prolonged dry periods substantially affect the hydrological systems with impaired quality and quantity of water.<sup>54</sup>

Growing rate of warming causes evapo-transpiration from rivers, lakes, and seas and eventually triggers cyclones, storms, and floods. Therefore, during heavier rainfall and flash floods, coastal areas may not suffer from water scarcity. Nevertheless, due to lack of or impaired water management mechanisms, many developing states lack the capacity to store water for longer terms. This often leaves people water stressed and in vulnerable state of human security. In most parts of Africa, fresh water inventory is very limited and unevenly distributed.

With interlinked issues of climate change, population growth, high rate of urbanisation in mega cities and infrastructure development, water is also becoming scarce. Thus, reduced quantity and quality of water supply directly affects hygiene and farming activities with declined food production. Africa relies on hydropower generation for much of its electricity. For instance, East Africa's 79 per cent of the power supply is dependent on hydropower generation. Africa is already energy deficient, which is another major constraint in achieving human security. For Africa, climate change will stress energy production and especially the hydropower supply.<sup>55</sup>

There are indications that due to prolonged drought period, many of the African states undergo acute energy stress and power crises, with massive economic losses. Within the East African Community, for instance, Kenya historically has experienced severe water scarcity and power rationing, especially in 2001. However, more recently Kenya has been diversifying its power generation and investing more in the development of wind and solar energy programmes. Uganda is still pouring heavy resources into hydropower projects due to more reliable source of such power.

Increased incidents of droughts and shortage of rainfall often paralyses the operations of these power plants, which leads to acute drop in the supply sector. On the other hand, floods cause siltation, and damage the hydro power plants and dams, affecting the amount of water available for power generation. As a result, power shortage hinders many sectors of human security, with extensive drop in the Gross Domestic Product (GDP), economic insecurity, and losses of livelihoods.<sup>56</sup>

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<sup>54</sup> B. C. Bates et al., 'Climate Change and Water', Technical Paper of the Intergovernmental Panel on Climate Change, IPCC Secretariat, Geneva, June 2008.

<sup>55</sup> Interview with Mr. A. Tadege, op cit.

<sup>56</sup> Ibid.

Rising temperatures and increased occurrences of natural disasters will potentially affect the fresh water resources and future supply. Studies reveal that water scarcity can increase the risk of mild to serious conflicts that can arise between various interest groups (involving the government, the administrative bodies, and two or more groups) at localised level.<sup>57</sup> Water scarcity can further spark the issues where states are already engaged in territorial conflicts.<sup>58</sup> For instance, in the southern and eastern Africa, water stressed states may face new challenges due to prolonged drier conditions. In severe droughts, pastoral conflicts commonly arise over the distribution of vital resources such as watering points and pastures. Many unending resource conflicts are prevalent in the Horn of Africa, which is particularly sensitive to increased warming and water scarcity with exacerbated conditions of resource scarcity.<sup>59</sup>

Persistent drought cycles in the region endanger the lives of millions of poor and marginalised people, especially among pastoral and agro-pastoral communities. As a survival strategy, during the dry seasons, these communities are adapted to migrate with their livestock, from one region to the other. At times, they cross the borders and involve in cattle rustling, issues of watering points and conflicts with other clan members or ethnic groups. Such conflicts are common occurrences in parts of Kenya, Somalia, Ethiopia, and Uganda, where borderlines are porous and arms proliferation is common.<sup>60</sup>

As explained in the earlier section, political instability and conflicts lead to violence and loss of human life and property. Due to climate change and severe resource scarcity, environmental conflicts often internationalise if contained for a long time, with direct or indirect repercussions for international, regional, and national security. In addition, future warming and water stress will affect negatively on the tourism industry, coastal zones, and loss of biodiversity, which are directly linked with various dimensions of human security.

### **c) Changing climate and agricultural production**

Reduced agricultural output is a common consequence of climate change, especially in the developing states having weak institutional systems, poor policies and deteriorating international

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<sup>57</sup> J. Kaloos et al., *Climate Change, Water Conflicts and Human Security*, Regional Assessment and Policy Guide lines for Mediterranean, Middle East and Sahel, United Nations University Institute for Environmental and Human Security, Report No. 10, August 2013.

<sup>58</sup> M. A. Rahman, 'The Geopolitics of Water in the Nile River Basin', *Global Research*, Centre for Research on Globalisation, 15 February 2014, Retrieved online 14 April 2014.

<sup>59</sup> Interview with A. Todege, op cit.

<sup>60</sup> I. Farah, 'Human Security and the Livelihoods of Pastoral Communities in the Horn of Africa', In: M. Mwangi, (ed.), *Human Security: Setting the Agenda for the Horn of Africa*, (Nairobi: Africa Peace Forum, 2009), 181-198.

markets. This is very much significant in Africa where the lives of subsistence farmers, landless poor, women, and children are already trapped in a vicious cycle of distress, food deprivation and other aspects of human insecurities.<sup>61</sup> Since 1960s, economic policies of the African states have concentrated more on the urban development and industrial growth. This has led to the shift of resources and commitments from agriculture with low value subsistence sector to high valued manufacturing sector. This perception gave significant authority to notable urban dwelling communities and left the rural population voiceless, leaving the agricultural commodities cheaper, less competitive, and under-valued in the export markets.

In addition, the African governments imposed heavy tax rates on cash crops (such as cocoa, coffee, cotton, tobacco) and did not support the agriculture sector.<sup>62</sup> However, agriculture is still the backbone of regional economic development and human security. With smallholder farming, agriculture sector provides livelihoods with food and economic security for up to 90 per cent of the Africans that helps the region to rid chronic poverty<sup>63</sup>. Additionally, Africa receives more than 60 per cent of its export earnings from agricultural commodities, which account for 30 to 40 per cent of the continents total GDP. Although in Africa, since 1980s, agricultural production has increased gradually from 2.4 to 3.3 per cent per year, however, African governments allocate only 5 to 7 per cent of their total national budget for this sector.<sup>64</sup>

There is direct link between climate change and agriculture especially in the African context. A large proportion of the farming communities in Africa overwhelmingly rely on the local climate.<sup>65</sup> Due to climatic changes, much of the sub-regions within Africa have undergone rise in the average temperature with longer dry periods and shorter wet seasons. However, with disproportional impacts, some regions may benefit while others will be exposed to serious challenges.<sup>66</sup> Areas, which once produced best quality crops, are undergoing crop failure.

The IPCC predicts that temperature rise will enhance crop yields in some area. However, high temperature and rainfall variability will reduce water availability and pastures in other sub-

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<sup>61</sup> *Africa Human Development Report 2012*, 'Towards Food Secure Future', United Nations Development Programme, New York, 2012.

<sup>62</sup> Ibid.

<sup>63</sup> Interview with A. Opere, op cit. Also, C. J. R. Williams and D. R. Kniveton (eds.), *African Climate and Climate Change: Physical, Social and Political Perspectives*, (London: Springer, 2011), pp. 6-7.

<sup>64</sup> *Agriculture's Critical Role in Africa's Development*, International Food Policy Research Institute (IFPRI), May 2009.

<sup>65</sup> A. Wreford et al., *Climate Change and Agriculture: Impacts, Adaptation and Mitigation*, OECD, 2010.

<sup>66</sup> Ibid.

regions of Africa. For example during 2011 droughts, the Horn of Africa experienced food crisis, which led to humanitarian disaster with large-scale famine in the region. Other interlinked human security threats included economic shocks, health problems like malnutrition, dehydration, and famines, and loss of human and animal life.

Climate change led environmental degradation, desertification, land salinisation and the spread of new pests and diseases are common issues negatively affecting the agriculture output, incomes, and food security.<sup>67</sup> The IPCC warns that with growing trends of warming, heat stress, variations in the precipitation patterns and increased amount of carbon dioxide in the atmosphere, there will be lower yields of maize, wheat, and rice, which will directly affect regional economic security. Crop models indicate that with future trends of climate change and water scarcity, there will be pronounced implications for the Sub Saharan Africa where large portion of the GDP is dependent on crop export, and ninety five per cent of the total population relies on rain fed agriculture.<sup>68</sup>

With reduced production and increased food prices, much of the African population will be under severe economic pressure. Declined incomes, constrained food affordability, and inconsistent supply of food, will increase the number of malnourished women and children. With potential impacts on food, health and economic security, there will be myriad personal and political security challenges for governments and international community to achieve human security. Although, not much evidence of food security related conflicts in Africa's history, however, there is potential for future political instability as most of the African states are establishing democratic regimes with increasing role of the civil society and media.<sup>69</sup>

#### **d) Climate change induced Migration**

Migration is one of the coping mechanisms to adapt to the changing climatic patterns.<sup>70</sup> The most common factor for climate-induced migration is the environmental degradation. In addition, coastal flooding, intense droughts, cyclones, and flash floods are other major costs of climate change impacts that drive millions from their homes. People resort to move when there is a situation of an abrupt or dramatic climate event with catastrophic shifts in the climatic patterns.

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<sup>67</sup> J. Gornall et al, 'Implications of Climate Change for Agricultural Productivity in the Early Twenty First Century', *Philosophical Transactions of the Royal Society*, B 365, pp. 2973-2989, 2010.

<sup>68</sup> *Impacts of Climate Change on Agriculture*, Fact Sheet on Sub Saharan Africa, International Food Policy Research Institute, 2009, Retrieved online, 15 April 2014.

<sup>69</sup> Ibid.

<sup>70</sup> V. Kolmannskog, *Climate Change, Disaster, Displacement and Migration: Initial Evidence from Africa*, Norwegian Refugee Council, December 2009.

Such events push people to places where living conditions are more favorable and survival is highly likely.

Other major causes of climate migration include underdevelopment and population growth in ecologically sensitive areas, leading to scarcity of fundamental resources. With the interaction of these factors, climate change processes (such as desertification, soil erosion, landslides etc.) gradually affect people and act as threat multipliers, whereby people resort to migrate temporarily or on permanent basis. For instance, in the Sahelian states, progressive dry conditions, and prolonged droughts have pushed the mass exodus of local population across the borders, into Europe and beyond.<sup>71</sup>

Similar is the case in the Horn of Africa, where large-scale environmental degradation has attributed to climate change, producing millions of refugees. Particularly, the case of Somalia is a good illustration of climate-led severe humanitarian crisis. With low-lying arid and semi-arid water stressed land, most of the Somali population lives on pastoralist and farming activities. Arid land is also scarce in Somalia and of that, 69 percent is for grazing and the rest is deforested.<sup>72</sup> Due to weather and climate uncertainty, rain fed agriculture and livestock keeping is always under constant pressure.

Somalia is not a party to the UN Framework Convention on Climate Change; therefore, it cannot enjoy the benefits from the information or other privileges offered by the convention. In addition, Somalia does not have a national climate change strategy or any adaptation mechanism. Therefore, with rapidly changing global temperatures, Somalia's natural climate pattern has been experiencing constant cycles of droughts and unpredicted rains often killing much of the livestock and crop failure.<sup>73</sup> In 2011, led by combined impacts of prolonged civil conflict and persistent droughts, country faced severe food insecurity, with persistent famine, which forced millions to the border areas of Somali. In addition, tens of thousands had to migrate across Kenya, Ethiopia and into other neighboring states.<sup>74</sup>

In 1990, the IPCC asserted that climate change would have grave consequences for human mobility. Over the past two decades, frequency and severity of climate change disasters

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<sup>71</sup> *Livelihood Security: Climate Change, Migration, and Conflict in the Sahel*, A Joint Report by UNEP, IMO and OCHA, Geneva, 2011.

<sup>72</sup> J. Corfield, 'Somalia' *Encyclopedia of Global Warming and Climate Change*, Volume 3, Thousand Oaks, CA: Sage Publications, 2008, p. 911.

<sup>73</sup> *Ibid*, pp. 5-6.

<sup>74</sup> B. Piles, 'Horn of Africa Drought: Why is Somalia worst Affected?' *BBC News Africa*, 14 July 2011, Retrieved online, 15 April 2014.

has significantly increased with incalculable direct and indirect human security implications on the African societies. For example, during 2000-2009, there were approximately 50 severe droughts in the eastern Africa that caused millions to flee from their homes.<sup>75</sup> Migration affects people's socio-economic conditions with major human security implications. For instance, the migrants have to live with fewer or no incomes, with scarce food and health provisions. In the receiving areas, the migrants often live in poor hygienic conditions and clean water scarcity.

While reaching the refugee or IDP camps, personal security of women and children is particularly vulnerable due to physical and sexual harassment by the militia groups and gang attacks. Living conditions in the refugee camps are usually poor due to overcrowding. They often face human rights abuses as high crimes in their camps affect their personal security. Although there are significant efforts to protect the rights of the refugees, however, more than often their human security is compromised. For instance, according to international law, the term of environmental or climate migrants is still controversial, therefore, they are treated like ordinary refugees. As climate change is progressing and number of climate migrants is surging, there is a need to legalise their status.<sup>76</sup>

#### **iv) The Mau Forest Complex: Issues and Perspectives**

The Mau Forest Complex is a source of unlimited wealth creation with wide range of goods and services, vital to sustain key dimensions of human security at local, national, and regional levels. Mau's economic and ecological services hold strategic value for the Eastern and the Horn of Africa. Mau's waters are of key significance for many of the trans-boundary lakes and river basins. Despite its strategic importance, due to the following factors, the Mau has lost one quarter of the forest cover.

##### **a) Colonial legacy**

Historical factors underlying the Mau's degradation are led by the colonial legacy. During the early years of the British rule, the European settlers established new labour and agrarian laws in Kenya. Specifically, the Crown Lands Bill of 1908 and the Crown Land Ordinance of 1915 marked the abrogation of the native land rights and gave the settlers highest authority to occupy

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<sup>75</sup> The International Disasters Database, Centre for Research on the Epidemiology of Disasters, Retrieved online, 15, April 2014.

<sup>76</sup> B. Mayer, *International Law and Climate Migrants: A Human Rights Perspective*, Sustainable Development Law on Climate Change, Legal Working Paper Series, March 2011.

much of the agrarian land in Kenya.<sup>77</sup> The same also applied to the forests and reserves. During 1924, and especially in 1932, parts of the Mau Complex were de-gazetted for private ownership. In the following years, thousands of hectares of the virgin forests were converted to private ranches and tea farms. Due to growing population and land scarcity, in the late 1940s and early 1950s, the colonial administration used the Mau (such as Olenguruone in Narok Forest) for human settlements, which specifically marked the beginning of future human invasion and encroachment on the MFC.

### **b) Post-Independence Land Politics**

After Kenya's independence in 1963, including the forests, all Crown land changed hands and directly came under the care of the president. In the early 1960s, Kenya's new government introduced various resettlement schemes for the displaced and landless communities. Due to lack of clear land distribution policies, the newly appointed government of Kenya distributed land by favoring some tribes while discriminating others. Similarly, President Moi's government used the Mau Forest to develop commercial tea farming and human settlements.<sup>78</sup> According to the Kenya's Constitution, forestland can be degazetted for certain developmental purposes, and this clause was applied to excise various parts of the MFC.

This trend continued gradually, and especially in the post 1986 period, the Mau Forest Complex lost thousands of hectares for subsistence agriculture. Additionally, parts of the excised Mau forest were cleared for new settlements and industrial development. However, such schemes were introduced without looking into the wider social, political, economical, and environmental challenges, including local and regional climate change and human security implication. During President Moi's tenure, many of the non-Kalenjin communities were evicted from the area. However, tribal division and political motives drove many of these settlement schemes. Specifically, thousands of hectares of the Mau Forests were utilised in the tea production zones and newly established tea-processing factories. In early 2001, again more than 61,000 hectares were excised to establish settlements for the Ogieks.

However, in many cases, parcels from the Mau forest were subjected to other infrastructural and development projects as well as expansion of group ranches. As a result, various stakeholders and civil society groups raised their concerns for the encroachment and

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<sup>77</sup> H. W. O. Okoth-Ogendo, H. W. O. Okoth-Ogendo, *Tenants of the Crown*, (Nairobi: African Centre for Technology Studies, 1991), pp. 40-44.

<sup>78</sup> Interview with Dr. H. A. M. Ole Kamwaro, Former Chairman of the Narok County, Nairobi, 25 June 2014.

destruction of Kenya's major water towers, leading to loss of biodiversity, irregular water flow, environmental instability, and climate change. It is important to note that much of the Mau's land has been occupied through two different processes; one way was to hold legal documentation supporting the ownership of the forestland, which has been the case with the settlement schemes. Secondly, the encroachers claimed land through illegal access and did not hold any documents of ownership.<sup>79</sup>

By the time Kenya elected President Kibaki in 2003, MFC had already lost more than 100,000 hectares of its forest cover. In early 2004, the issue of Mau's legal and illegal encroachments underwent many inquiries. The land commission of the Ndungu Report, for instance, pointed out key public and private figures that had played major roles in Kenya's historic illegal land allocations, including the forestlands such as the MFC. However, with continuous assault, the key issues remained unresolved and the Mau Complex surfaced as a topic of major global political discourse in the 2009 Copenhagen Conference. Consequently, the government of Kenya ordered massive evictions, especially from Mau's eastern and southwest forest blocks and offered alternate land or compensations to the displaced persons. However, the land ownership remains unresolved, especially for the forest dwelling communities, many of these still being landless.<sup>80</sup>

The issue of land has been at the core of Mau Forest's destruction, as people want to own land legally and have their right to use and protect land.<sup>81</sup> In 2010, with the new constitution of Kenya, land ownership of the indigenous communities remained controversial and an undecided agenda. At the same time, the Mau Complex is under constant human encroachment and source of political battle between the interested parties including the Kenyan government, the NGOs, and the forest dwelling communities. Given the high levels of encroachment and degradation of the MFC, there are also concerns such as critical changes in the functions of the forests.

### **c) Climate Change, Resource Scarcity, and Human Security in the Mau Forest Complex: Challenges and Implications**

Major implications of the land use/cover changes in and around the MFC manifest as progressive rise in the average temperatures, rainfall variability, and growing incidents of frosts with

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<sup>79</sup> Interview with Mr. E. O. Omollo, Deputy Director, Forest Conservation and Management, Kenya Forest Services, Nairobi, 3 February 2014.

<sup>80</sup> Ibid.

<sup>81</sup> Interview with Mr. J. Kioli, Chairman Kenya climate Change Working Group and Executive Director Green Africa Foundation, Nairobi, 28 April 2014.

hailstorms. During the 1960s, and 70s, climate of the area was changing with gradual temperature rise and normal rainfall pattern. However, especially from the late 1980s and in the following years, there has been progressive change in the average day and night temperature with increased warming. Meteorological data demonstrates that since 1960s, there is substantial temperatures rise in major towns like Nakuru, Narok and Kericho which are adjacent to the Eastern, Southwest and Maasai, Mau forests block. For instance, during the study period (1963-2012) the average temperatures in Nakuru increased from 16.5°C to 19.4°C. Similar trends have been observed in Kericho and Narok.<sup>82</sup>

More importantly, climate change and unpredictable precipitation patterns have led to prolonged droughts and flash floods. More than often, such disasters increase the scarcity of vital resources that are precondition to sustain life. The spillover effects of these changes significantly challenge people's livelihoods with severe food insecurity. The study suggests that in the pre-independence period when much of the MFC was least degraded, the area received regular rainfall with two peaks during the year, especially within Narok and Nakuru Counties.

Similarly, the Highlands such as Kericho and the surroundings received daily showers throughout the year. However, as the Mau forests are constantly being cut, burnt and cleared; with the temperature rise, rainfall pattern has significantly become more erratic, delayed and occasionally, there is an off season short rainy season. For instance, Narok and Nakuru have been experiencing severely dry and persistent drought cycles. Consequently, there has been drastic reduction in water flows in perennial rivers originating from the Mau Complex. On the other hand, unpredicted rainfall often leads to heavy flooding with key threats to local and regional human security as demonstrated below.

### **1) Economic security**

Kenya is the financial and communication hub in the region. Its market-oriented economy makes the country better infrastructure provider than other states in the entire Horn of Africa. Agriculture and tourism are the main foreign exchange earners for Kenya where forestry sector adds significantly to the production of energy, manufacturing, construction, and timber products. The Kenya National Human Development Report 2013 reveals that agriculture is country's main employer and source of income; however, frequent climate change shocks significantly reduce average earnings and hinder possible gains in the long-term economic security.

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<sup>82</sup> Data Sourced from the Kenya Meteorological Department.

Statistics indicate that during 2008-2011 drought period, Kenya lost 52 billion shillings, with 2.8 per cent lower economic growth rate.<sup>83</sup> Again, in 2013, due to dramatic climatic change and onset of Maize Lethal Narcosis, Kenya lost 12 billion shillings in the last planting season of the year.<sup>84</sup> These losses become more significant when Kenya needs to invest millions of dollars in climate change adaptation and mitigation plans. Secondly, with fewer industries, Kenya is still fighting to attain the level of a fastest developing state in the Eastern Africa as well as the status of a middle-income country.

Data suggests that due to temperature rise, lower production of key commercial crops such as pyrethrum and tea may impede economic growth at local and national levels. These crops require certain level of temperature to retain the standard of quality and yields. In addition, climate change has significantly lowered incomes of the local farmers and wages of the labour force. Over the last few years, farmers have lost substantial earnings due to drastic decline in the production of other cash crops such as sugar cane and coffee. With higher temperatures and fewer rains, farmers cannot harvest some of the traditional crops and resort for alternative crops that are costly and earn less market value.<sup>85</sup>

Furthermore, due to climate change, new pests and crop diseases are becoming common. Other economic impacts are evident on the transporters, exporters, and local traders. Ordinary citizenry being the main consumers, also feels the pinch when they have to pay more for their daily food priorities.<sup>86</sup> Such situations exacerbate poverty, specifically among the rural communities who do not have any form of social well fare that can cushion the situation of economic insecurities and dilute the losses occurring from climatic variability.<sup>87</sup>

Likewise, flash floods often ruin the physical infrastructure such as roads, bridges, power supply and transportation system with substantial economic and social costs. This translates into opportunity costs in terms of budget allocations on repairs, which otherwise could be spent on alternative needs of people or developmental plans.<sup>88</sup> Additionally, excessive rainfall often damages standing crops and at times, lowers the capability of farmers to transport their

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<sup>83</sup> 'Report Reveals how Sh. 72 b was Lost Through Drought', *Daily Nation*, 7 May 2014.

<sup>84</sup> 'End Food Security', *Sunday Nation*, Nairobi, 7 September 2014, p. 12.

<sup>85</sup> Ibid.

<sup>86</sup> Interview with Mr. J. M. Mbinga, Deputy Director Kenya Forestry Research Institute, Londiani, 13 February 2014.

<sup>87</sup> Interview with Miss B. Cheserek, Environmentalist, Tea Research Foundation of Kenya, Kericho, 14 February 2014.

<sup>88</sup> Interview with Mr. J. Kioli, Chairman Kenya Climate Change Working Group, 28 April 2014.

production to the markets. Consequently, fewer incomes threaten livelihoods of the local communities, as they have to face consequences in terms of lost revenues.<sup>89</sup>

In future, if climate change remains uncontrolled, increased intensity of warming and climate events will further increase water scarcity. Reduced river water may affect sustainability of the biological diversity in the game parks. As a result, Kenya's most attractive tourist sites such as Maasai Mara and Lake Nakuru may not sustain the wildlife. These parks are crucial for regional, national, and local livelihoods and heavily contribute to strengthen economic security in the Narok and Nakuru Counties. Other economic implications include job insecurity for the thousands of locals who work in the hotel and tourism industries.<sup>90</sup> Occasionally, charcoal making, acts of arsonists, community rage, hot, and windy weather patterns trigger forest fires. In addition, climate change led forest fires have caused significant damage to biodiversity and the forest ecosystem.

## **2) Food and health security**

Climatic changes of the Mau region significantly affect food and health security. Around Narok and Nakuru being the semi arid areas of Kenya, with increased frequency of droughts and floods, lower cereal productivity endangers sustainable food supply. For instance, after failure of rains or during flash floods, much of the farming community does not have alternate source of incomes. Due to interconnectedness of all human security components, if incomes are affected, people are unable to afford sufficient and nutritious food, and lack of food causes multiple health issues.

Although, the Kenya Meteorological Department predicts about the onset of drought periods, however, lack of preparedness leaves people food insecure. Recurring drought periods often leave people hungry, starving, and dependent on food aid, which is often insufficient to satisfy the dietary preferences. Every so often, food is available in the reserves, but poor infrastructure hinders timely supply to the affected areas.<sup>91</sup> Specifically, droughts cause loss of pastures and death of livestock. Similarly, heavy rains and flash floods destroy standing crops, leaving no food stocks for the rest of the year. Due to disrupted waters supply, crop failure, and loss of herds, thousands of locals face malnourishment, hunger, and starvation.

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<sup>89</sup> Interview with Mr. J. M. Mbinga, op cit.

<sup>90</sup> Interview with Mr. K. Korir, Manager Sarova Lion Hill, Lake Nakuru National Park, Nakuru, 17 May 2014.

<sup>91</sup> Focus Group Discussion No. 2, (Mixed Community members), The Discussion was held in Oloikirirai village located on the boundary of the Maasai Mau Forest, Narok County Council, 13 June 2013.

Likewise, lower precipitation adds to the suffering of the forest dwelling communities such as the Ogieks. Due to massive loss of biodiversity, these communities can no more rely on Mau's natural yields. For example, many trees species that provided food for the honeybees may have been affected by the degradation of the forests floristic characteristics.<sup>92</sup> It should be noted that honey was a major source of incomes and is a highly nutritious source of food for the forest dwelling communities. However, presently it is a rare commodity and its therapeutic roles may have been lost. Likewise, many of the Mau's animal species are threatened by the increased human influx that forced them deep inside the forests and reduced their habitats. These changes have left the forest communities food insecure and they have to opt for alternate foods like potatoes and other vegetables, which are not their food preferences. Increased poverty, high illiteracy level, and poor coping strategies worsen the situation of food and health security in the areas around the Mau Forest Complex.<sup>93</sup>

Clean water scarcity is also obvious on people's health, as more than often local community members suffer from diseases such as cholera and other vector borne ailments. Due to poor public medical facilities, they usually rely on traditional healers who diagnose the problem ranging from herbal treatment to spiritual powers. While treating their problems, they habitually mislead them and more than often complicate the situation. Additionally, temperature rise is causing increased incidents of malaria and dengue fever in the highlands such as Kericho where these diseases never existed.<sup>94</sup>

Simultaneously, climate change in the Mau Forest has affected many medicinal plants and trees that the locals used for the treatment of some life-threatening diseases. For example, *Prunus Africana* is an evergreen indigenous tree found in the rainforests and highlands of Africa. It was also abundantly available in the Mau Forest Complex. This tree was an important source of timber and its bark was used to treat prostate cancer. However, due to over use and climate change, it is an endangered species.<sup>95</sup>

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<sup>92</sup> M. J. Kinyanjui, 'Assessing Tree Species Dominance along an Agro Ecological Gradient in the Mau Forest Complex', Kenya, *Open Journal of Ecology*, 4, pp. 662-670, 2014.

<sup>93</sup> Ibid.

<sup>94</sup> Interview with Mr. N. Keshei, Cabinet Secretary Narok County Council, 12 June 2013.

<sup>95</sup> J. M. Mbinga et al, 'The Main High Value Tree Species for Rehabilitation of Degraded Mau Forests Complex', In: B. N. Kigomo et al, (eds.), *Forest Restoration Handbook for Moist Forests in Kenya*, Nairobi, Kenya Forestry Research Institute (KEFRI), p. 39, July 2013.

### 3) Environmental security

Forests are generally pollution free and affluent with environmental resources, which have been some major characteristics of the Mau Forest Complex. In addition, biodiversity is an invaluable environmental resource for the natural beauty of forests. Due to the critical role in the pollination process and food chain, it is also vital for the ecological sustenance. Furthermore, environmental security of the local population has direct or indirect ties with the plants and animals. Due to great variety of vegetation cover, Mau forests were originally zoned according to altitude. The montane forests, for instance, existed below 2300 meters, and above this level, there was mixed bamboo and grasslands forest. At higher levels and near the peak of the Mau escarpment, much of the forest had variety of *Juniperus-Podocarpus-Olea*.<sup>96</sup>

During the last three decade, heavy encroachment and large-scale destruction has ultimately influenced the loss of biological diversity of the Mau Forest Complex. For instance, many parts of South Western Mau reserve are still rich in montane forests while other sections have largely been cleared. Consequently, with climate change and loss of forests, many animal and tree species are disappearing. For example, *Juniperus procera* (African Pencil cedar), *Albizia gummifera* (Peacock Flower tree) and *Polyscias fulva* (Parasol tree) are some important native tree species, which were used for construction, furniture wood, bee hives, food boxes, paper and pulp industry, fuel wood and medicinal uses.<sup>97</sup>

Due to over-exploitation, their status in the forest has decreased and ecological services associated with them lost.<sup>98</sup> Furthermore, with increased human influx, illegal hunting, and livestock keeping, some wild animals and bird's species have disappeared permanently into the nearby forests.<sup>99</sup> Deforestation, land excisions, and loss of vegetation cover have significantly reduced rainfall, water infiltration with substantial water runoff and soil erosion. Soil erosion takes away important plant nutrients necessary for good productivity. In addition, soil erosion is a major factor causing siltation of rivers and dams and, flooding in plains especially in cases of least mechanisms to store rainwater.

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<sup>96</sup> M. J. Kinyanjui, 'Assessing Tree Species Dominance along an Agro Ecological Gradient in the Mau Forest Complex', op cit.

<sup>97</sup> J. M. Mbinga et al., 'The Main High Value Tree Species for Rehabilitation of Degraded Mau Forests Complex', In: B. N. Kigomo et al (eds.), *Forest Restoration Handbook for Moist Forests in Kenya*, op cit.

<sup>98</sup> M. J. Kinyanjui, 'Assessing Tree Species Dominance along an Agro Ecological Gradient in the Mau Forest Complex', op cit.

<sup>99</sup> 'Assessment of Vegetation Cover and Biodiversity Hotspots in the Mau Forest Complex', Report prepared by the National Museums of Kenya Diversity Team, March 2009

The study reveals that the forest excisions, growing settlements, and increased industrial activities have affected the quantity and quality of water in the key catchments of the Mau complex, including River Njoro, Mara, Ewaso Ngiro, Sondu and Nyando and the Lakes in the area. For example, before the 1990s, flow of the rivers used to be crystal clear and free from bacteria. Therefore, people made direct use of river water especially for the household purposes.<sup>100</sup> However, due to increased industrial activities and human influx, these rivers are polluted and highly infested with bacteria/viruses. Compound impacts of these activities cause environmental degradation and numerous impacts on human security.<sup>101</sup>

#### **4) Political, personal, and community security**

Political and personal security intricately complements each other and any threat to political security automatically weakens personal security. Likewise, community security aims to free people from harmful traditional practices and protects people's rights, cultural values, identities, and heritage as part of their belonging. In the process, the group leader provides personal protection and community security to its extended community members.

Since early 1900s, much of the colonial and post-colonial government policies created landed and landless classes in Kenya. This vicious cycle continued to foster a milieu for legal and illegal encroachment on the public land, including the forests. In the process, government sponsored settlement schemes caused a lot of resentment among certain communities and failed due to political motives and pervasive corruption. Simultaneously, through the settlement plans, much of the land was allocated to the friends and families of the political elites that stimulated a culture for the landless who used the forests for illegal logging, farming, and housing.

In addition, due to population influx and growing demand for arable land, issues of land grabbing and repeated evictions of the local communities intensified gross human rights violations and suppression, especially in the Rift Valley area and around the MFC. The colonial land appropriations and politically instigated ethnic clashes led to progressive violent and bloody conflicts in the area. Specifically, during the 1990s, and in 2007/08, ethnic and land based conflicts in the area, destabilised national peace with increased episodes of violent crimes. In the 2007-08 post election days, the Mau forests became battle-grounds and thousands of locals had to leave the area. During these conflicts, their houses and property was torched as an excuse for

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<sup>100</sup> Interview with Mr. O. Simanto, Senior Assistant Director, Kenya Forest Services, 8 April 2014.

<sup>101</sup> Ibid.

post-election violence, though in reality it was linked to resources of the Mau. Taking advantage of the situation, the local militia groups looted and burnt crops and many lives were lost.<sup>102</sup> Other threats to people's personal and political security arise due to the competition for dwindling resources of Mau's land. With climate change, incidents of frequent droughts and heavy downpours are constantly adding pressure on land, water, and pastures.

Given the continued climate change related disasters, the pastoralist and agriculturist communities around the Mau often experience incidents of cattle rustling and theft of crops, giving rise to resource based conflicts.<sup>103</sup> These conflicts commonly occur during the dry seasons when majority of the poor people cannot find sufficient means to feed their families. However, this has also become habitual with growing intensity of cattle thefts even during the wet seasons when there is abundance of water, pasture, and healthy livestock. Evidently, this goes on due to poor governance, weak enforcement of laws and wide spread corruption in the area where justice is rarely found and the culture of crimes continues, with common threats to personal, political as well as community security.<sup>104</sup>

In 2009, the government of Kenya launched a strategic rehabilitation plan, which led to massive evictions of the squatters and forest dwelling communities.<sup>105</sup> However, the issue of Mau Forest Complex became greatly politicised, with multi-ethnic alliances, elite fragmentation, and vested interests. For instance, the Maasai want to evict the squatters and support the government in the process of restoration of the Mau, whereas the Kalenjin have been opposing the evictions causing uncertainty for the implementation of the proposed plans.<sup>106</sup>

Although, Kenya is a party to major human rights treaties, however, massive evictions of the squatters and the forest dwelling communities do not adhere to the provisions provided in these treaties. Therefore, saving East Africa's biggest water towers has become controversial and extremely sensitive to local, national, and regional climate change and human security issues.

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<sup>102</sup> Focus Group Discussion No. 2, (Mixed Community members), The Discussion was held in Oloikirirai village located on the boundary of the Maasai Mau, Narok County Council, 13 June 2013.

<sup>103</sup> Interview with D. Ole Tamooh, Chairman Kenya National Climate Change Steering Committee, Former Warden Narok County, 13 June 2013.

<sup>104</sup> Focus Group Discussion No. 1, (The Ogiek Community members) the Group consisted of five members; Peter Maikobi, Francis Nkoiko, Wilson Kursai, Ruth Musilo and Joylene Ngoisilo, The Discussion was held in Oloikirirai village located on the boundary of the Maasai Mau, Narok County Council, 14 June 2013.

<sup>105</sup> P. Kagwanja et al, 'Fighting for the Mau Forests: Land Climate Change and the Politics of the Kibaki succession', *Africa Policy Report*, Africa Policy Institute, Nairobi, June 2010

<sup>106</sup> Ibid.

## **v) Climate Change and Human Security: Existing Norms and Institutions in Africa, Kenya, and the Mau Forest Complex**

In the last two decades, global climate change negotiations led to the adoption of many treaties, meant to minimise the carbon emissions and biophysical impacts, largely based on future scenarios. Likewise, key focus of the IPCC has been to identify likely future impacts of climate change with more common threats to agricultural productivity, food shortages and few health issues, especially in the developing states such as Kenya.

The most recent climate change debate did focus on the growing intensity of climate change, causing human security threats. For instance, the IPCC in its 2014 report assessed human security issues from the perspectives of climate change. The report briefed the issues of human rights, food security, issues of migrants and conflict.<sup>107</sup> Nevertheless, major consequences of climatic changes remained unaddressed. This has also been demonstrated by the case study of the Mau Forest Complex whereby climate change takes various possible paths to undermine people's safety and well-being in the domains of economic, food, health, environmental, political, personal, and community sectors. With growing climate change hazards, there is an urgent need to recognise newer threats to human security that individuals and communities experience in their daily lives. Thus, there exist serious gaps in establishing and implementing international climate change regimes and policies to curb broader threats to human security.

The case of the Mau Forest Complex demonstrates that contemporary climate change is rooted in irresponsible human actions. Simultaneously, climate change poses myriad threats to international cooperation. Global climate regime such as the Kyoto Protocol emphasised to set the carbon emissions targets based on the level of economic and technological development. However, without much success, it expired in 2012 and so far, the international community is in the process to extend it with reasonable amendments.

Although African states are not bound by the Kyoto Protocol to cut carbon emissions, but voluntarily pledged to do so. In addition, there were agreements by setting up projects such as Reducing Emissions from the Destruction and Degradation of Forests (REDD) and the Green Climate Fund. So far, the continent has not been able to benefit much from these programmes. The African Union's response to climate change has been very limited, as it has so far,

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<sup>107</sup> W. N. Adger et al., *Human Security*, Chapter 2, IPCC WGII, AR5, (Cambridge: Cambridge University Press, 2014).

encouraged the member states to implement climate change response strategies, within the national development programmes. However, there has been a gap to harmonise and integrate them into the human rights and security policies. At various occasions of the international climate change negotiation, the AU's Assembly of Heads of States has demanded for the climate compensation for the continent, however, there has not been any positive response in this for the time being.

One way to deal with the issues of climate change and human security in Africa is to establish regional and sub-regional agendas where the role of non-governmental and inter-governmental Organisations can also be substantial. Likewise, at national levels, the governments' intervention is necessary whereby these need to look for viable solutions with identification of wider threats to of human security dimensions posed by climate change. For example, with the aid of international and local institutions (such as Food and Agriculture Organisation and the national ministries) there are many policy options to guide the farmers with research and development. Improved agricultural practices will increase the resilience against climate change and human insecurity especially for economic and food security. Once this end is attained, it will help to provide health security as well as other dimensions of human security.

The Inter-Governmental Authority on Development (IGAD), for example established various mechanisms to deal with some aspects of human security in the Horn of Africa. Key mandates of IGAD include conflict prevention, conflict management and resolution, food security, environmental security and gender protection. IGAD also disseminates modern technological information and farming techniques such as the introduction of drought and heat resistant crop varieties to agriculturists and farmers while fighting recurring droughts and water stress.<sup>108</sup> These sub-regional institutions also collaborate with NEPAD and other organisations and governments to suggest relevant policies.

However, as determined by the case of the MFC, the impact of these institutions is still limited, and cumulative issues of climatic changes more than often lead to wide spread threats to Africa's regional human security. Concurrently, the concept of human security is still new in the developing world and most of these states are reluctant to embrace it as a foreign or domestic policy. For instance, neither the governments of the African states have taken any affirmative

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<sup>108</sup> A. Oloo, 'Regional Institutions and the Quest for Security in the Horn of Africa', In: M. Mwagiru, *Human Security: Setting the Agenda for the Horn of Africa*, op cit, pp. 201-236

step to incorporate human security into its national climate change strategy nor there is any concrete initiative at continental or sub regional level, which can bind the member states for compliance. Therefore, every year, growing frequency of climate led disasters affects human security of hundreds of thousands in Africa.

In Kenya, there is wide range of state and non-state actors that are involved to reduce the climate change impacts. Since the 1990s, Kenya has been a signatory of the UNFCCC, and therefore party to most of the internationally accepted climate change treaties, such as the Kyoto protocol and the Copenhagen Accord. The Climate Change Coordination Unit (CCCU) established in 2008, was meant to assist and harmonise climate change related activities within government departments and other sectors. However, the unit was abolished with the implementation of new constitution of Kenya and a new office has been established in the Deputy President's office. Most of the government institutions are also weak in terms of financial and organisational resources, and have limited human and physical capacity to fight climate change in the country. With the 2010 constitution of Kenya, the new county governments still have to work on mainstreaming climate change into other institutions such as the Kenya Forest Services, National Environmental Management Authority (NEMA), KWS and other institutions for the protection of natural resources from illegal human activities.

In addition, Kenya also performed poorly in attracting Kyoto based projects such as the Clean Development Mechanism (CDM) and Reduced Emissions from Deforestation and Forest Degradation (REDD).<sup>109</sup> Likewise, compared to other developing states, Kenya has not been able to benefit much from the Green Climate Fund. Although, the various ministries of Kenya have established climate change units, anyhow, due to logistical weakness, the performance of these units has been ineffective. Although, Kenya successfully established its national climate change strategy in 2010, however it specifically fails to pinpoint the need for human security policy intervention regarding climate change, which would have provided a necessary tool to tackle direct and indirect threats to various dimensions of human security. Nevertheless, it seeks to involve key actors to protect Kenya's vulnerable natural resources such as forests.<sup>110</sup>

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<sup>109</sup> *Analysis of the Carbon Markets Landscape in Kenya*, Prepared by Carbon Africa for Adam Smith International, The Climate and Development Knowledge, UK, 2012.

<sup>110</sup> Interview with Mr. J. Kioli, Chairman Kenya Climate Change Working Group, (Executive Director, Green Africa Foundation), Nairobi, 28 April 2014.

The case of the Mau Forest Complex evidently shows that Kenya is in dire needs to establish a comprehensive climate change policy. As a second option, Kenya needs to amend or replace the existing draft national environmental policy and integrate climate change led human security issues. More importantly, there is substantial need for climate change law in Kenya, which should aim to control illegal human actions and regulate peoples' behaviours posing threats to natural climate.<sup>111</sup> Thus, a new climate change policy with the aid of law will directly enhance the protection of Kenya's environmental resources including the Mau Forest Complex. Furthermore, climate change policy and legal instruments will oversee irresponsible human actions especially the illegal use of forestlands and forest cover changes leading to large-scale deforestation and logging.

## **6.2 Conclusion**

With a key focus on the case of Kenya's Mau Forest Complex, this study broadly examined the interplay between climate changes and human security in Africa. Based on the examination of the major issues arising in the critical analysis, this study concludes that changes in the human induced climate have severe negative impacts on Africa's human security. The analysis also reveals that climate change follows various paths and influences the demand as well as supply end of environmental resources, fundamental for human security and well-being of individuals.

The critical analysis of the case study of the Mau Forest Complex demonstrates that the land cover/use changes are evident with increased warming of the average temperatures, rainfall variability in and around the area. Thus, the scarcity of forest resources has led to significant decline in the sustainability of environmental resources with serious threat to human security. Due to regional significance of the Mau Forest Complex, future socio-economic well being of the entire East Africa and in the Horn of Africa is also under stress.

The case study of the MFC further indicates that majority of the African states including Kenya do not have particular human security institution. In addition, the region has not been able to endorse human security policies or legislative mechanism regarding the protection of its nationals from the wide spread climatic changes. Due to poor governance and political interference, corruption is widespread in the region and especially in Kenya. Due to these factors, there are growing concerns for violation of existing laws especially to protect the environmental resources such as forests. Although, in Kenya there are many state and non-state

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<sup>111</sup> Ibid.

actors, who have taken many positive initiatives and are also involved in putting huge efforts to find solutions to handle issues of climate change and emerging human security threats. However, the impact of these players is generally slow and lacks effectiveness. Thus, study suggests that internationally, regionally and nationally, there is need to establish and enforce climate change and human security, regimes, policies and legislation.

# CHAPTER SEVEN

## CONCLUSION

### 7.0 Summary

This study broadly examined the critical relationship between climate change and human security in Africa. More specifically, the research provided an overview of the conceptual and theoretical links between climate change and human security in the African context. In addition, the study examined the causes, impacts, and outcomes of the changing climatic conditions in the Mau Forest Complex (MFC) and the corresponding impacts on individuals. This would advise local, national, regional, and global discussions on climate change, its impacts on human security and possible adaptation and mitigation strategies.

Chapter one forms the foundation of the study; and consists of the background, statement of the research problem, objectives of the study, literature review, hypotheses, justification, theoretical framework, research methodology and chapter outline. Chapter two is based on the discussion of the concept of human security concept, its origin, its development over time, and its significance in today's world. The study pinpoints that human security in Africa is severely threatened by myriad issues including internal conflicts, chronic poverty, poor governance, under-development, diseases, mass migration, poor quality education, and environmental disasters. These issues deteriorate the living conditions of the African people and undermine their human security. Simultaneously, the implementation of human security norms especially in Africa is faced with multiple challenges.

Chapter three discussed the historical perspective of climate change debates. The study looked at major climatic changes that have taken place over the centuries and in the present times. The chapter goes to an in-depth analysis of the science behind climate change, identifying forces driving the phenomenon. In addition, it examined the role of existing institutions, and regimes that set the norms to mitigate and adapt to climate change. Chapter four assessed climate change led human security issues in Africa. It is noted that Africa is faced by many challenges including financial constraints, illiteracy, poor governance, inaccessibility to adequate financial resources and poor technological capability, therefore climate change impacts have led to water stress, land degradation, desertification, malnutrition, hunger, poor health, resource scarcity, and migration. At times, multiplicity of these factors triggers violence and intra-state conflicts

especially in arid and semi-arid areas. Additionally, this chapter depicts that for the last few decades, anthropogenic climate change has become one of the potential threats to the survival and welfare of the African people.

The fifth chapter of the study focused on the MFC. The chapter analysed the impacts of human encroachments in the key water tower of Kenya. It illustrated how the encroachment of the forest resources causes changes in the local and regional climate and how these imply on the various aspects of human security. This chapter also identified how climate change related change of forest and other environmental resources may influence human insecurity.

Chapter six provided a critical analysis of the key emerging issues from the study, linking climate change, environmental resource scarcity and human security. The study promoted the environmental resource scarcity theory, developed the thesis that climate change has significant impacts on arable land, forests, and freshwaters in Africa as well as in the MFC. Furthermore, these scarcities multiply with other factors such as poor governance, political instability, poverty, weak institutions and consequently, threaten various aspects of human security. Thus, climate change led resource scarcity is one of the fundamental factors of human insecurity in Africa and especially in the case of the MFC. Chapter seven rests upon the summary, key findings, and recommendations.

## **7.1 Key Findings**

Based on the data analysis, the findings support the objectives as well as confirm the three hypotheses stated for the purpose of this study. The data provides sufficient evidence that firstly, **human activities served as the key determinants of climatic change in Kenya's MFC.** The study findings identify that on the case of the MFC, a wide range of human activities, including extensive deforestation, logging, forest fires, and issues of land excisions have been powerful factors in the local climatic changes and human insecurity. Origins of these factors are embedded in the colonial legacy as well as in the post independence governance structures.<sup>1</sup>

The study findings depict that due to weak governance, lack of political will, poor implementation of forest protection policies and lack of climate change legislation, the MFC has been extensively degraded with numerous climate changes impacts. The meteorological data reveals that compound impacts of deforestation of the MFC and climate change are evident in 2-

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<sup>1</sup> Interview with Dr. H. A. M. Ole Kamwaro, Former Chairman of Narok County, Nairobi, 25 June 2014.

3°C degrees rise in the local temperature and erratic rainfall pattern.<sup>2</sup> As a result, prolonged dry periods, floods, and incidents of severe frost spells have immensely affected the human security, and survival of the local communities living in the areas around the Mau Forest Complex.

Secondly, **climate change has led to significant scarcity of environmental resources and human insecurity both in Africa, and specifically in the case of the MFC.** The case of the MFC clearly suggests that major implications of climatic changes are evident in acute scarcity of vital environmental resources in significant ways. For instance, climatic changes deplete and degrade environmental resources and affect the supply end. This has been observed as drying up of rivers due to depletion of the underground water resources, extensive soil erosion, sedimentation, and inconsistent water supply to the trans-boundary water bodies. In addition, these scarcities have amplified resource conflicts among the local communities, especially over the dwindling resources of water and pastures. Poor agricultural production, loss of livelihoods, food insecurity, and diseases are common threats, posed to the weak and marginalised people. In addition, climate led processes such as droughts and floods further deteriorate the availability of such resources, which are the key means of survival and security for the local population.

In particular, study findings demonstrate that rising temperatures, unreliable precipitation and heavy frosts are unfolding serious implications for the grain yield and tea industry of Kenya. Likewise, drying up of the rivers threatens the existence of many species of wildlife and natural vegetation with major impacts on local and regional tourism. Therefore, this study determines that rapidly changing climate in the Mau Forest Complex threatens huge changes in living conditions and patterns of security, therefore, pose pronounced risks to the local, national, and regional human security.

Lastly, **there is no doubt that climate change is a key driver of human insecurity in Africa as has been demonstrated by the case study of Kenya's MFC.** Although, there are other interlinked factors such as poor governance, poverty, lack of quality education and conflicts, however, climate change considerably adds to the misery of the African societies and acts as a catalyst to Africa's human security. Therefore, this study clearly shows that climate change is real and its impacts are widespread in Africa as well as in the MFC.

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<sup>2</sup> Data sourced from Kenya Meteorological Department.

## 7.2 Recommendations

Recognising the nexus between climate change and human security in general, and specifically in the MFC implies that policies and allocation of funds are critical for securing people and communities, especially to increase people's resilience for climate change mitigation and adaptation. The case of the Mau Forest Complex demonstrates that it is important to take effective measures for the restoration and rehabilitation of environmental resources such as forests, which provide uncountable economic and ecological benefits and human security to millions in Africa and around the world. The overhead costs of inaction may go beyond the immediate climate change costs that can potentially involve externalities of broader human insecurities involving conflicts, human rights abuses, increased crimes, destruction of infrastructure and reduced economic growth.

Therefore, the study findings have major institutional and policy implications. Although, under the aegis of the UNFCCC, successive rounds of discussions have formalised treaties to limit the GHG emissions,<sup>3</sup> however, there are compelling arguments between various groups of states. Although, most of the developed and rapidly developing countries agree that climate change is unequivocal but there is lack of consensus to limit the progressive use of fossil fuels and compromise their economic activities. Due to better economic, financial, and technological capabilities, developed states are preparing for future climate change. However, much of the developing and underdeveloped regions of the world are least prepared to counter the potential climatic changes and the wider human security implications.<sup>4</sup>

In the recent climate change negotiations, developed countries agreed to assist the poor states by providing Green Climate Funds and long-term finances as has been indicated in the previous as well as very recent (COP19) Warsaw Climate Conference during 2013.<sup>5</sup> However, for the time being due to many vague and stringent policies most of the poor states are unable to access this fund. Thus, one of the key findings of the study is that for the delivery of climate funds, there exists a looming gap for the implementation of the climate change action plans and international climate funding policies especially when dealing with the least developed states.

There is also lack of globally agreed forum and institutional jurisdiction for tackling integrated impacts of climate change and human security. Although, the international climate

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<sup>3</sup> *United Nations Framework Convention on Climate Change*, New York, United Nations, 1992.

<sup>4</sup> W. N. Adger et al., *Human Security*, Chapter 2, IPCC WGII, AR5, (Cambridge: Cambridge University Press).

<sup>5</sup> Warsaw Climate Conference (COP19), Press Release, Warsaw, 23 November 2013

change regime recognises human security as a rightful governance issue, however, the UNFCCC<sup>6</sup> has not formalised any policy framework to provide human security, which can act to guide the member states to buffer these issues. Thus, human security policies need to be mainstreamed into international, regional, and national climate change regimes. Simultaneously, various global and regional climate change action plans perceive climate change as a major threat to the existence of life and human welfare, but the concept has not been translated into relevant policies and legislations especially in Africa.

Therefore, at the global and regional levels, there is need for the institutional makeup, which should explicitly deal with climate change and human security. Even though some of the developed states have succeeded to mainstream human security into their policies, however, most developing states still need to deal with arising threats to human security specifically led by growing intensity of climate change. Kenya being one of the climate change hotspots, essentially needs broad measures to combat emerging climate changes and interacting threats to human security, aimed at human needs, values, and welfare.

With the establishment of Vision 2030, Kenya has made various strides for greater economic developmental issues with forest rehabilitation and regeneration. For instance, the Forest Act 2005, Kenya's 2010 Constitution, the devolution, and population planning programmes are few of the positive steps taken by the previous government. Kenya is now better prepared to attract global adaptation funds such as REDD and has successfully established its Climate Change Response Strategy and Climate Change Plan; however, findings of this study suggest that climate change needs to be addressed through the implementation of appropriate human security policy and legislation, which both the documents did not address.

Additionally, the case of the MFC indicates that there is further need to build institutions, responsible to take care of climate change issues. For this purpose, states also need to get rid of issues of governance and corruption, which weaken the political will to fight human security threats. Therefore, the lessons learnt from the case of the MFC are that the global society should enhance the efforts to develop climate change and human security policy framework and legislation. Furthermore, there is need to raise parliamentary discussions to formulate climate change law and integrate it into the relevant sectors.

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<sup>6</sup>*United Nations Framework Convention on Climate Change*, New York, United Nations, 1992

### **7.3 Recommendations for Future Research**

- 1) This study demonstrates that climate change in the Mau Forest Complex is directly affected by the human induced activities particularly large-scale deforestation that have reduced the forest. This link needs to be established further by examining the other factors. Changes in the global rain, and temperature patterns and their relationship to local climates and the human security in any other study areas are potential topics for the future researchers.
- 2) Future research needs to broaden its scope on varying threat areas. For instance, with increased use of e-technology, researchers can examine the role of information technology and telecommunication industries in relation to the changing climate.
- 3) Future research can look at issues of climate governance especially from the African sub-regional human security perspectives. The East African Community's climate change initiative can provide a good case for such areas of study.
- 4) This study did not explore the specific effects of climate change and human activities on the details of the forest's biological diversity. Future academic studies may create specific information that would guide policy-making in relation to buffer climate change effects on biodiversity in Africa.
- 5) In the policy arena, the case of the Mau Forest Complex should be used to develop mitigation and adaptation strategies for climate change especially to attract climate funds such as REDD+. Thus future research can place a key focus on such programmes that can guide developing countries' policy making to control deforestation and provide a conducive environment to generate climate funds.

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## **Focus Group Discussions**

Focus Group Discussion No. 1, (The Ogiek Community members) the Group consisted of five members; Peter Maikobi, Francis Nkoiko, Wilson Kursai, Ruth Musilo and Joylene Ngoisilo, Oloikirirai village located on the boundary of the Maasai Mau Forest, 14 June 2013.

Focus Group Discussion No. 2, (Mixed Community members), Oloikirirai village located on the boundary of the Maasai Mau Forest, 13 June 2013.

## **List of Interviewees**

Mr. A. Tadege, Climate Change Adaptation Specialist, IGAD Climate Prediction and Adaptation Centre, Nairobi.

Mr. B. Omondi, Senior Assistant Director Watershed Management, Kenya Forest Services, Nairobi.

Miss. B. C. Cheserek, Environmentalist, Tea Research Foundation of Kenya, Kericho.

Mr. D. Ole Tamooch, Former Warden Narok County.

Dr. Alfred. O. Opere, Head of Meteorology Department, University of Nairobi.

Dr. David M. Kamau, Soil Chemist, Tea Research Foundation, Kericho.

Dr. Edward. K. Mengich, Principal Research Scientist, KEFRI, Londiani.

Dr. H. A. M. Ole Kamwaro, Former Chairman of the Narok County, Nairobi

Mr. E. Chebelyow, Former Director Brook Bond, Kericho.

Mr. E. O. Omollo, Deputy Director, Forest Conservation and Management, Kenya Forest Services, Nairobi.

Hon. Philip Ole Lemain Former Senator Narok County, Nairobi.

Mr. J. M. Mbinga, Deputy Director Kenya Forestry Research Institute (KEFRI), Londiani.

Mr. J. Kioli, Chairman Kenya Climate Change Working Group, (Executive Director, Green Africa Foundation), Nairobi.

Mr. J. C. Njuguna, Research Officer, KEFRI, Londiani.

Mr. K. Korir, Manager Sarova Lion Hill, Lake Nakuru National Park, Nakuru.

Mr. J. Maina, Hydrology Department Kenya Forestry Research Institute (KEFRI), Londiani.

Mr. Charles, Manager Kericho Tea Hotel, Kericho.

Mr. N. Keshei, Cabinet Secretary Roads, Narok County.

Mr. O. Simanto, Head Extension Management, Kenya Forest Services, Nairobi.

Miss Salome, Warden KWS, Kericho County.

Mr. P. P. Lekenit, County Director of Environment, NEMA, Narok County.

Mr. P. Mukira, Assistant Head of Mau Conservancy, Kenya Forest Services, Nakuru.

Miss Schola Kosgei, Former DC Narok County.

Mr. S. Minis, Chief Forester Narok County.

Mr. T. Leonard, County Environment Officer NEMA, Narok County.

## **Appendix 1: Focus Group Discussion Questions**

1. Describe the climate of the Mau Forest Complex.
2. What it used to be like during the colonial period?
3. Did the colonials interfere with the Mau Forest Complex?
4. Who has destroyed the forests (governments, politicians, forest dwelling communities, or someone else)?
5. In your opinion, how was the situation of land excisions in the early years of independence?
6. Did you notice any significant change in the forest cover over the years and especially in the last 20 years?
7. How much forest has been destroyed over the years particularly since Kenya's independence?
8. What are the consequences of forest destruction?
9. Led by the forest destruction, do you experience any changes in the local climate?
10. If yes, in what context, increase, or decrease in temperature?
11. Any change in the rainfall?
12. Was it better before or now (in the context of food, health, livelihoods)?
13. Has agricultural production affected by these changes?
14. Do you notice any significant changes in the pastoral activities (availability of watering points and pastures)?
15. Have you noticed any crimes and conflicts due to these changes?
16. Has your life style changed with these changes (cultural and traditional patterns)?
17. Do you think people can adapt to these changes?
18. Has the local government taken any measures (Forest protection laws and policies)?
19. Do you get any special information about climate change?
20. What can you do help the government to reverse the damage in the Mau Forest Complex?

## **Appendix 2: Interview Questions for Key Informants**

### **Scholars and specialists of the field**

1. How do you perceive climate change?
2. What major climatic changes are being felt globally?
3. Has climate change affected Africa generally and Kenya particularly?
4. What are the key impacts of such changes, especially on the African societies?
5. Do you think that climate change threatens people's security and survival?
6. How has the agricultural productivity affected in Africa and in Kenya?
7. What are the major implications on the economic security?
8. Do you see any effects on food and health sectors?
9. Do you notice any climate change led political instability at regional or national scales?
10. What key measures have been undertaken in terms of climate change institutions, regimes and policies at global, regional sub-regional and national levels?
11. Has the Government of Kenya undertaken any specific steps to deal with the impacts of climate change?
12. What is the outcome of these policies in terms of implementation, monitoring, and evaluation?

### **Various organisations and government offices**

1. Please brief the history of the Mau Forest Complex.
2. How does the complex contribute to local, national, and regional economy?
3. What are the ecological services of the Mau at local, national, and regional scales?
4. How did the colonial government treat the Complex?
5. Did they make any laws, which later led to destruction of the forest?
6. How was the situation during President Kenyatta's tenure, and later when President Moi over took power?
7. How did President Kibaki deal with the issue of Mau's encroachment?
8. What is the difference between a gazetted and ungazetted forest?
9. How do you differentiate between legal and illegal encroachment of a forest?
10. What are the key impacts of converting large-scale farms into kitchen gardens?
11. What are the major climate change and human security implications for the people living in and around the Mau Forest Complex?
12. How has the tea farming affected by climate change?
13. Is tea farming good for the environment?
14. What are the implications for the tourism industry?
15. Any other impacts on people's livelihoods, health, food, water etc?
16. What is the role of your organisation in protecting the forest from further destruction?

### Appendix 3. Location of the Mau Forest Complex.

