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EFFECTS OF CLIMATE VARIABILITY ON HUMAN MIGRATION DYNAMICS: A CASE STUDY OF IFO REFUGEE CAMP, DAADAB COMPLEX - KENYA

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DECLARATION

This project is my original work and has not been presented for the award of a degree in this University or any other Institution of higher learning for examination.

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

Signature …… Date ……

Dr. Shazia Chaudhry

DEDICATION

This project is dedicated to my family members for their support and encouragement.

I dedicate this project to my family and many friends. A special feeling of gratitude to my loving wife and daughter, Fartun and Hafsa, whose words of encouragement and push for firmness ring in my ears. I also thank my project supervisor, Dr. Shazia for her continuous guidance throughout my work.

I thank my parents, who taught me that the best kind of knowledge to have is that which is learned for its own sake.

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Above all, I thank Allah for granting me health and opportunity to finalize the work.

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ABSTRACT

Climate Variability is the short to medium term shift in weather patterns in a specific region or globally. Unlike global warming, which refers increase of surface temperature of the earth's surface, climate variability refers to changes in regions, including precipitation, temperatures and cloud cover among others. Experts in the field of climate studies consider variability to be caused by human activities that have resulted in increased concentration of greenhouse gases in the atmosphere including carbon dioxide, water vapor, methane, Ozone, and nitrous oxide Climate variability is directly or indirectly attributed to human activity which changes what makes up the global atmosphere and is observed over different periods of time. The main aim of the study was to examine the impacts of climate variability on human migration and further assess the situation in the Dadaab refugee complex. The specific objectives were to find out the relationship between climate variability and human migration, to assess the impact of climate variability on IFO refugee camp, and to find out how refugees in the Daadab complex respond/adapt to climate variability in the IFO refugee camp, in Dadaab, Kenya. This study employed descriptive research design and it sought to describe the extent to which climate variability and related factors lead to migration and related challenges. The use of descriptive study enabled the researcher to find out facts without manipulating data, inquire and search opinions, describe, analyze and interpret the influence and relationship between the variables involved in the study. A survey methodology was used in this study where individual respondents will be sampled from each of the target respondents' category in reference to the size of the target samples. Data was collected personally by the researcher and responses were done directly into English from Kiswahili during the interviews. After collection data was coded showing the study locations, the different types of interviews and sex of the respondents. The study found that Climate change is undermining the livelihoods and security of many people, exacerbating income differentials and deepening inequalities. Over the last two decades the number of recorded natural disasters has doubled from some 200 to over 400 per year. The study further found that people may become displaced either within their own countries or across international borders due to change in climate. While the latter type of movement is less likely, at least in the initial phases of displacement, regard must also be had to the situation of migrants who find themselves outside their country of nationality as disaster strikes there, and are thus unable and/or unwilling to return home. The study established in the larger context that climate change can be seen as an impact multiplier and accelerator. In other words, in addition to its own negative impacts, climate change may exacerbate the risk of conflict which can, in turn, cause further displacement. The study established that while moving or fleeing to a safer location may provide temporary relief from the negative impacts of climate change, prolonged displacement is not a long-term solution. Protracted displacement often exacerbates existing vulnerabilities, creates dependency, and leads to social tensions and other serious protection, humanitarian and human rights challenges. The study concluded that existing research strongly suggests that environmentally influenced migration is closely linked with adaptive capacity. As such, the nature and scale of future climate migration will depend considerably on the extent to which the global community engages in proactive capacity-building in vulnerable populations and regions. The analogs suggest a variety of possible migration

outcomes in the absence of greenhouse gas mitigation and capacity-building efforts. The study recommended that Better access to local meteorological data and downscaled weather forecasts is needed to assist adaptation actions such as altering agricultural planting practices in light of seasonal weather forecasts, determining fire-danger rating indices and monitoring water flows to support decisions related to hydropower management. Better access to this information would also assist in monitoring long-term shifts in climatic patterns. The study also recommended that Direct and continual engagement of policy-makers in pilot projects allows for hands-on learning about effective actions and the development of strong working relationships. Policy-makers are then better able to draw upon these lessons and relationships as opportunities arise, facilitating the process of mainstreaming adaptation into policy- and decision-making.

CHAPTER ONE

INTRODUCTION OF THE STUDY

1.0 Introduction

The act of persons leaving their original place to settle in a different place is referred to as migration. Attempt to understand migration has paid attention to the push factors to the phenomenon. Social and political factors including violations of human rights, war and unemployment among others are the most cited reasons for migration. Climate related migration push factors have in the recent past received attention too. When individuals are pushed to migrate due to climatic reasons become climate refugees. Climate refugees belong to a large group commonly referred to as environmental refugees. This category of refugees consists of individuals migrating due to natural disasters. It is estimated that the number of environmental refugees surpasses that of political refugees fleeing from conflicts. As a matter of fact, United Nations High Commissioner for Refugees (UNHCR) reported that in 2009, over 36 million persons were displaced by natural disasters.[1]The focus on climatic reasons is not surprising considering that alteration in climate will have a significant effect on natural disasters, agriculture, economic activity and diseases.[2]

The discourse on the nexus between migration and climate variability boils down to a persons' life satisfaction.[3]Generally, migration rides on the opportunity and capability to migrate. Understandably, life satisfaction is sought where individuals feel safe.

[1]UNHCR 2009
[2]Reuveny, R. 2007. Climate Change-Induced Migration and Violent Conflict. Political Geography 26(6): 656-673.
[3]Luechinger, S. and Raschky, P.A. 2009. Valuing flood disasters using the life satisfaction approach. Journal of Public Economics, 93(3): 620-633.

Obviously, worsening leaving conditions may force migration, as such, willingness and opportunity are affected by environmental change. The question is, when such change is witnessed, where do the individuals go? Flows of migration due to climatic shocks and weather variability have been documented;[4] the focus though has been on movement of persons within the state and thereby suggesting just internal migration resulting from climate change and variability.[5]

The migration from Syria has been linked to the droughts between 2006 and 2010. It is suggested that it is the drought that led to the uprising and the consequent migration. According to De Châtelthe[6] Syrian uprising was not just due to the drought, but rather the failure by the government to respond to the drought that led to uprising and conflict.[7] The Syrian case is just an illustration of one case of climate related migration.

Today, there is more migration than ever before, in Africa, countries are losing thousands of people due to migration, Somalia and Libya for instance are losing their citizens to Europe or to South Africa and other parts of the world. The Intergovernmental Panel on Climate Change reports suggest a link between climate variability and increasing drought intensity and duration, more heat waves, and heavier rainfall events and the large scale

[4] Reuveny, R. (2007). Climate change-induced migration and violent conflict. *Political geography*, *26*(6), 656-673.
[5]Adamo, S.B. and Izazola, H., 2010. Human migration and the environment.
Population and Environment, 32(2-3): 105-108.
[6] De Chatel, P. F. (1973). Low temperature specific heat of Ni3Al and Ni3Ga. *Journal of Physics F: Metal Physics*, *3*(5), 1039.
[7]Kelley, C.P., Mohtadi, S., Cane, M.A., Seager, R. and Kushnir, Y. 2015.Climate change in the Fertile Crescent and implications of the recent Syrian drought. Proceedings of the National Academy of Sciences, 112(11): 3241-3246.

human migration. If not taken into account adequately, the adverse climatic effects will thus have a significant impact on Africa that heavily rely on rain-fed for its food security.

1.1 Statement of the Research Problem

Climate variation and change has far-reaching consequences for human societies, sectors and agencies as well as countries like Kenya. Climate variation is possibly a major driver for movement of the human population thus disrupting human life. Kenya is a country that has been hosting refugees for long and they have been living in refugee camps relying on humanitarian aid and assistance from the host governments and humanitarian actors. The factors that influence movement of refugees as a result of climate variability vary significantly within each region and are highly dependent upon their political, economic and social position. Climate related disaster threatens human life.

In Ifo Refugee camp, the influences of weather and climate on human health have been significant and varied. They range from the clear threats of temperature extremes and severe storms to connections that may seem less obvious. For example, weather and climate affect the survival, distribution, and behavior of mosquitoes, ticks, and rodents that carry diseases like West Nile virus or Lyme disease which has greatly affected the livelihood in the refugee camp. Climate and weather has also affected water and food quality in particular areas of the camp, with implications for human health. In addition, the effects of global climate change on mental health and well-being are integral parts of the overall climate-related human health impact.

Disruption of human life has been observed while in some places huge movement of human population is evident. Despite efforts to highlight the effects on of climate variability on human life, little has been done to highlight the problem among refugee communities living in the Daadab refugee complex and the serious challenges they face. It is thus, against this backdrop that the study seeks to fill this gap by interrogating the effects of climate variation on human migration at the Ifo refugee camp in the Daadab, Kenya.

1.2 Research Questions

The study will be guided by the following research questions:

i. How does climate variability influence human migration?

ii. To what extent does climate variability affect the refugees in the Ifo refugee camp?

iii. How do refugees respond/adapt to climate variability in the Ifo refugee camp?

1.3 Objectives of the Study

1.3.1 Main Objectives

The main objective of this study is to examine the impacts of climate variability on human migration and further assess the situation in the Dadaab refugee complex.

1.4 Specific Objectives

i. To find out the relationship between climate variability and human migration.

ii. To assess the impact of climate variability on IFO refugee camp.

iii. To find out how refugees in the Daadab complex respond/adapt to climate variability in the IFO refugee camp, in Dadaab, Kenya.

1.5 Literature Review

1.5.1 The Concept of Climate Variability

Climate Variability is the short to medium term shift in weather patterns in a specific region or globally. Unlike global warming, which refers increase of surface temperature of the earth's surface, climate variability refers to changes in regions, including precipitation, temperatures and cloud cover among others.[8]

Experts in the field of climate studies consider variability to be caused by human activities that have resulted in increased concentration of greenhouse gases in the atmosphere including carbon dioxide, water vapor, methane, Ozone, and nitrous oxide Climate variability is directly or indirectly attributed to human activity which changes what makes up the global atmosphere and is observed over different periods of time. The Intergovernmental Panel on Climate Change (IPCCS) defined climate variability as 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. It refers to any change in climate over time, whether due to natural variability or as a result of human activity.[9]

[8] Board on Natural Disasters (1999). "Mitigation Emerges as Major Strategy for Reducing Losses Caused by Natural Disasters". *Science*. **284** (5422): 1943–7.
[9] J. Patz; A.K. Githeko; J.P. McCarty; S. Hussein; U. Confalonieri; N. de Wet (2003).. Woodward, eds. "Climate Change and Infectious Diseases". *Climate Change and Human Health: Risks and Responses*. Geneva: World Health Organization.

1.5.2 Causes and Effects of Climate Variability

Climate variability has changed in the past, is changing at present and will most likely change in the future. Climate variability may be slow and gradual, rapid and catastrophic, short-term or long term and might take different contexts at local, regional and global levels. This could be as a result of natural factors or human factors. Most scholars and researchers on climate variability agree that human activity are mainly responsible for the rising temperatures on earth and human behavior continue to be a major factor in climate variability.

Some of the human factors contributing to climate variability take different forms such as greenhouse gas emissions and changes in land use and management. Greenhouse gases are emitted from numerous industries, are available in the transport sector and come as also come as a result of deforestation due to human activities. These activities increase the concentration of different greenhouse gases.

Effects on physical and chemical properties of the atmosphere have the potential to affect the quality of life and even the very existence of certain life forms. Weather and climate-related disasters result in high death, a reduction in food production, water and land pollution, and destruction of production capacity and infrastructure.

Potential catastrophic effects of present and future climatic variability pose a threat to human life and the natural environment despite the present and future climate variability patterns being unclear, it is evident that current trends associated with environmental

pollution changes the climate and potentially have adverse effects on climatic conditions in different regions of the world. Some of the resulting consequences of the variability at local and regional levels include changes in planting and harvesting seasons, availability of water and disturbances in the functions of the ecosystem such as extreme temperature changes, floods, droughts and fire outbreaks. This in turn potentially impact on the structure and function of both natural and human-made environments.

The effect is more pronounce on those countries that are categorized under developing countries. Because developing countries are most vulnerable, countries to the effects of climate variability and they have the least capacity to adapt to these changes.

1.5.3 Global Aspects of Climate Variability

Climate Variability is an emerging issue globally and has warranted an immediate international intervention. Most states and governments, industries, communities and organizations across the world are working round the clock together to come up with and implement interventions aimed bringing greenhouse gas emissions to manageable levels and avoid dangerous climate variability (Office of Climate change (OCC), 2010).

Several international conferences, seminars, symposia and workshops have since been organized and held to debate and come up with interventions to tackle climate variability. Some of them include the World Climate Summit in Geneva[10], the Conference on

[10] Vienna Convention for the Protection of the Ozone Layer, Mar. 22, 1985, Int'l Legal Materials 26, 1529 (1987); Montreal Protocol on Substances that Deplete the Ozone Layer, adopted Sept. 16, 1987, Int'l Legal Materials 26, 1550 (1987).

Industries and Climate in Vienna in 1980, the Vienna convention in Austria in 1985, the Montreal Protocol in Canada in 1987, the constitution of IPCC led by UNEP and WMO in 1988, the Earth Summit of 1992 in Brazil, the Kyoto Protocol of 1997 in Japan among others.

Almost all these meetings held agree that mitigation and adaptation measures must be pursued to tackle the climate variability problem and create an effective and inclusive international climate variability regime. According to the various resolutions, greater attention must focus both on scientific and policy perspectives because of the fact that climate variability has emerged in the recent past as a major problem mainly related to long-term disturbance of the global geo-biochemical cycles and associated effects on the climate system. Due to potential impacts of climate variability, adaptation must be an integral component of an effective strategy to address climate variability, along with mitigation. However, even if substantial efforts are undertaken to reduce further greenhouse gas emissions, some degree of climate variability is unavoidable and will lead to adverse impacts, some of which are already being felt.

1.5.4 Factors Influencing Refugee Movement

Causes of migration are varied, complex and contextual.[11]Migration is not always the first option for immigrants but rather a last resort.[12]Thus a number of factors may push individuals to migrate most of which are related to unbearable living conditions. A

[11]Hartmann, B. 2010. Rethinking climate refugees and climate conflict: rhetoric, reality and the politics of policy discourse. Journal of International Development, 22(2): 233-246.

[12] Black, R., Adger, W.N. and Arnell, N.W., 2013. Migration and extreme environmental events: New agendas for global change research. Environmental Science and Policy, 27: S1-S3.

number of studies have focused on the factors that may push individuals to migrate clearly outlining the aspects of willingness and opportunities.

Most countries liberalized their immigration admission policies after the end of World War II; consequently, it increased the rate of immigration from a larger set of countries. Perhaps a more recent factor is the creation of the European Union, which has resulted in the freedom of movement within the union. On the same vein, large immigrant inflow was witnessed in the West as the Cold War waned from former Eastern bloc countries. Ease in transportation courtesy of cheap commercial air travel has equally had its contribution to the migration phenomenon. Globalization is a significant contributor to the higher cross-border mobility. As such, all these factors can be classified as opportunities that make migration possible. Coupled with willingness, the opinion to emigrate will be influenced.[13]The willingness to migrate has been described as stressors by available literature because they are the reasons that affect people's living satisfaction.[14]

Labor emigrations are the primary reasons for economic emigration. Literature suggests that high levels of unemployment, low business activity, declining economic growth, and poverty are some of the factors that push people to flee out of their countries of birthin

[13]Most, B.A., and Starr, H. (1989) Inquiry, Logic and International Politics. Columbia, SC: University of South Carolina Press.

[14]Hunter, L.M., J.K. Luna, and R.M. Norton. 2015. Environmental Dimensions of Migration. Annual Review of Sociology, 41(6): 1-21.

search of better living standards in other countries.[15]Consequently, this may lead to brain drain when some of the highly qualified and trained individuals might leave their home country looking for higher life standards in other countries. Roncoli and colleagues have indicated that this was the case when a large number of Burkinabe people migrated to Ivory Coast[16].

Political reasons have been cited as another factor for emigration, the main reason fronted for massive dislocation of populations.[17]Whatever the cause of conflict, often it results in dislocation of individuals. Survival structures are usually broken down by conflict, families loose their members, social nets are broken, provision of basic services is disrupted and many other negative consequences are realised as a result of conflict.

Displacement of persons both internal and external are common phenomenon in conflicting areas like was the case in Liberia, the Central African Republic, or Cambodia that experience conflict in the recent past. For instance, estimates in 2010 reveal that a total of approximately 27 million internal displaced population (IDP).[18] The factors that push individuals to migrate first push for internal migration, but when they become intense, individuals become more inclined to move beyond the borders of their countries. It is therefore appropriate to claim that international migration are induced by events that

[15] Gibson, J. and McKenzie, D. 2011. The microeconomic determinants of emigration and return migration of the best and brightest: Evidence from the Pacific. Journal of Development Economics, 95(1): 18-29.
[16] J. Patz; D. Campbell-Lendrum; T. Holloway; J. Foley (2005). "Impact of Regional Climate Change on Human Health". *Nature*. **438** (7066): 310–317
[17] Raleigh, C.A. 2011 The Search for Safety: The Effects of Conflict, Poverty and Ecological Influences on Migration in the Developing World. Global Environmental Change 21(S1): S82-S93
[18] Ibid

affect a whole country, otherwise individuals will opt for alternatives within their countries of origin.

1.5.5 The Role of Climate Variability on Refugee Movement

It is not a disputed reality that human activities drive climate variability. However, what seems unclear and is somehow challenging to give an appropriate perspective are the consequences of climate variability. This phenomenon is not easily understood by everybody equally and its potential and actual consequences are not easily noticed. While existing literature suggests that climate variability is a threat to international security, [19]the proponents of this notion suggests that the consequences of climate variability will be addressed by technological innovation.

Climate variability manifests itself through different ways for instance increase in temperatures leads to rise in sea levels and is commonly evident by melting ice. Additionally, high temperatures potentially lead to high chances of drought and related conditions and water shortages. The living conditions of human beings are consequently altered by increases in temperatures.[20]

As already stated, environmental refugees are persons that for reasons relating to environmental factors of unusual scope (drought, desertification, soil erosion, water shortages, cyclones, storm surges, floods and climate variability) can no longer gain a

[19] Homer-Dixon, T. F. 1999. Environment, Scarcity, and Violence. Princeton, NJ: Princeton University Press.
[20] Henry, S., Schoumaker, B., and Beauchemin, C. 2004 The Impact of Rainfall on the First Out-Migration: A Multi-Level Event-History Analysis in Burkina Faso. Population and Environment 5(5): 423-460.

secure living in their traditional homelands. When people cannot continue staying in their settlement areas as a result of environmental threats, the only option available to them is to seek survival and sustenance in other locations either within their own countries or beyond and whether on a semi-permanent or permanent basis.[21]

Throughout history, human settlement has been changing. Environmental migration is thus not a new phenomenon. The writings of Aristotle are a proof to the fact, when he wrote that lands beyond the tropics are uninhabitable inferring that only temperate areas were habitable.[22]Further, drought and dust storms forced approximately 2.5 million North Americans out of the Great Plains,[23]another example is the 2005 Hurricane Katrina that resulted in 1.5 million people being displaced temporarily and about 500,000 permanently.[24]Though the examples are internal, there is a lacuna of studies for an analysis of transnational migration.

Climate change and variability is a global threat, affecting countries directly at large. The impact of climate change and variability does not only affect sections of a country but a country as a whole.[25]The influence of climate variability and change in a country also affects economic and political characteristics which are both drivers of emigration and as

[21] Ibid
[22] Isenberg, Andrew C. 2014. ed. The Oxford Handbook of Environmental History. Oxford University Press.
[23]Reuveny, R. 2007. Climate Change-Induced Migration and Violent Conflict. Political Geography 26(6): 656-673.
[24]McLeman, R. 2014 Climate and Human Migration: Past, Experiences, Future Challenges.Cambridge University Press.
[25]Nordås, R. and Gleditsch, N.P. 2007. Climate change and conflict. Political Geography, 26(6): 627-638.

such plays a role in emigration path. All these mechanisms may lead to transnational emigration .

The possibility of climate change and variability to exacerbate resource scarcity is not new, it will also lead to mass population dislocation and eventually lead to violent conflict.[26]Climate change and variability is thus a source factor of human disasters.[27]Considering the many effects of climate change and variability, emigration both within and across states are likely.[28]

Madam and Loughry[29]examined the effect of climate change and variability on migration in the small islands of Kiribati and Tuvalu, their study revealed that climatic change and variability together with socio-economic factors has forced people to move elsewhere. The media has described these islands as the "shrinking islands". It is claimed that the islands will be uninhabitable by the middle making the inhabitants the world's first climate refugees.[30]

1.5.6 Relocation and Resettlement of Displaced Persons

Migrating people are commonly faced by unintended costs during resettlement process due to various reasons such as changes in income, altering of social networks and change

[26]Salehyan, I. 2008. From climate change to conflict? No consensus yet. Journal of Peace Research, 45(3): 315-326.
[27] Ibid
[28]Nordås, R. and Gleditsch, N.P. 2007. Climate change and conflict. Political Geography, 26(6): 627-638.
[29] McAdam J, Loughry M. 2009. We aren't refugees. Inside Story, June 30 2009. Available at: www.inside.org.au/we-arent-refugees/
[30] Ibid

in income levels.[31]For instance, the 1980 attempt by Ethiopia to resettle famine affected populations is considered a state-created disaster, possibly increasing the number of deaths during the famines.[32]Another example is the Bangladeshi case where the affected refused to receive any resettlement assistance from the government or any other agency, and even those that opted to move to urban areas were disadvantage in labor markets. Kinship ties commonly play a key role in the decision to resettle in urban areas, the ability to cope with urban resettlement will highly depend on the strong tie with the host in the urban population.[33]

The question that remains unresolved is the attempt by the resettled to return back to their original settlement despite the potential of the original settlement experiencing same situations in the future.[34]A case in point is the Chinese situation where authorities found that there was a reverse flow of flood migrants in almost every case of resettlement due to poor planning.[35]Another example is the Tristan de Cunha population that was relocated to Britain in 1961 following an eruption, most had returned to the disaster area after two years.[36]

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[31]Wisner, B., P. Blaikie; T. Cannon and I. Davis. 2004. *At risk: Natural hazards, people's vulnerability and disasters, 2nd edition*. Routledge: Taylor and Francis.

[32] Van Leeuwen, M. 2001. Rwanda's Imidugudu programme and earlier experiences with villagisation and resettlement in East Africa. *Journal of Modern African Studies* 39(4):623-644.

[33]Zaman, M. and R. Weist. 1991. Riverbank erosion and population resettlement in Bangladesh. *Practising Anthropology* 13(3):29-33.

[34] Chan, N. W. 1995. Flood disaster management in Malaysia: an evaluation of the effectiveness of government resettlement schemes. *Disaster Prevention and Management* 4(4):22-29.

[35]Heming, L, P. Waley and Phil Rees. 2001. Reservoir resettlement in China: past experience and the Three Gorges Dam. *The Geographical Journal* 167(3):195-212.

[36] Chan, N. W. 1995. Flood disaster management in Malaysia: an evaluation of the effectiveness of government resettlement schemes.

While resettlement may be effective in reduction of the vulnerability of the affected by disaster, it is in most cases coupled with a decrease in living standards and thus increasing economic vulnerability in the resettled individuals. This is occasioned by a decrease in social capital for the resettled, unequal access to resources and opportunities faced by migrants, unemployment, acquisition of land and basic necessities like water.[37]Additionally, resettled populations mostly attempt to return to their native places and thus posing a challenge to the concerned agencies.

In summary, the distressed condition designates a sharp impact, great vulnerability and needed assistance to evade further suffering.[38]Forced migrations are characterised differently depending on the severity of the hazard, the resilience ability of households, evacuation opportunities and the perpetuating vulnerabilities. Compensation opportunities determine community and household responses to hazards.[39]Displaces returning to their native homes after the disaster is a common phenomenon.[40] Involuntary migration makes the displaced to suffer marginalization and socio-economic impoverishment. The displaced will not have equal access to land and other factors of production.[41]Urban displaces are the hardest heat by the economic impoverishment, they

[37]Badri, S.A. A. Asgary. A.R. Eftekhari and J. Levy, 2006. Post-disaster resettlement, development and change: a case study of the 1990 Manjil earthquake in Iran.
Disasters 30(4): 451-468.
[38]Suhrke, A. 1993.*Pressure points: Environmental degradation, migration and conflict*. Cambridge, American Academy of Art and Science.
[39]Turton, D. 2003. Refugees and 'Other Forced Migrants': Towards a Unitary Study of Forced Migration. Paper presented at the Workshop on Settlement and Resettlement in Ethiopia, January 28-30. Addis Ababa.
[40] Ibid
[41]Hutton, D. and E. Haque. 2004. Human Vulnerability, dislocation and resettlement: Adaptation processes of river-bank erosion- induced displaces in Bangladesh. *Disasters* 28 (1): 41-62.

have to withstand accumulative and increasing and limited opportunities to relieve debt and attain savings which might ease the displacement hardships.[42]

1.5.7 Climate Variability and Human Migration in Dadaab

Scholars have attempted to establish the link between climate variability and security especially in the environmental security literature. Climate variability is generally considered to be linked to human security through the resulting impacts for instance leading to scarcity in resources due to over concentration of human population in some locations. Barnett, Adger and Dabelko[43] pointed out aspects to consider when analyzing climate variability and security to include: violent conflict, forced mass migration, and the potential risks to human security. According to Gemenne et al.[44]climate variability may increase the risk of violence as well as the potential mechanisms through which climate variation may increase that risk. Other scholars focusing on climate and security noted that forced and mass migration occurred as a result of the changing climate hence climate-induced migration which has caused and led to the spread violent conflict. This has resulted in low living conditions or in some cases loss of territory triggered by mass migration as a result of climate variability.

In Ifo Refugee camp recent research broadly agrees that four main climate links to conflict in the camp may emerge. First, reduced water supply and growing demand will lead to increasing competition between different sectors of society, different communities

[42]Greenberg, M. and D. Schneider. 1996. *Environmentally devastated neighbourhoods: Perceptions, policies and realties*. New Brunswick, NJ: Rutgers University Press.

[43]

[44]

and different countries. Under certain conditions, such as poor governance and existing ethnic division, these stresses may turn violent. Secondly, reductions in crop yields and increasingly unpredictable weather patterns around the world have led to higher prices for food and greater food insecurity in the camp. Thirdly, changes in sea level, increased natural disasters and the reduced have caused large-scale and destabilizing population movements in the camp. Finally, the cumulative impact of all these challenges on the prevalence of poverty and the ability of governments to provide services to their citizens could be a factor that tips fragile parts of the camp towards socioeconomic and political collapse.

1.5.8 Changing Perspectives on Climate Variability Induced Movement

The IPCC warned that human migration may be the gravest effects of climate change and variability as millions are displaced by shoreline erosion, coastal flooding and severe drought.[45]While the IPPC position has constantly changed since 1990, due to its recognition of a number of complex interactions mediating migratory decision-making. A more nuanced depiction of migration has been adopted by subsequent reports by refocusing on human vulnerability.[46]The epitome of this refocus saw the elimination of human migration as a climate change consequence in the 2001.[47]More broadly,

[45]IPCC. 1990. Policymakers' summary of the potential impacts of climate change. Report from Working Group II to IPCC, Intergovernmental Panel on Climate Change, Commonwealth of Australia.
[46]IPCC. 2001a. *Climate change 2001: Synthesis report*. Cambridge, Cambridge UP.
[47] Ibid

vulnerable demographics are contextualized by a number of statuses of economic development, land entitlement; public health challenges hence the new focus.[48]

Perhaps the lessened language may have been occasioned by lack of compatibility of the climate change science to social consequences. The vulnerability of a community to climate change disasters is partially based on the community's physical risk. Vulnerabilities of groups and differentiated capabilities have been the bedrock in consideration of both national and local reactions to climate changes. Vulnerability relates to the level of risks individuals, households and communities are exposed to in case of adverse changes in their environment. The concept is a construction grounded on the ability to forestall, cope, resist and recover from hazards.[49]It is best salient through a scalar approach: it is built on 'everyday issues', such as livelihoods and marginal social status which may contribute to poor land management practices, resource pressures and increasing reliance on degraded resources. It is compounded by sporadic concerns such as droughts or floods.[50]The marginalized and the poor are the most affected by these episodic changes.

Literature suggests that the genesis of vulnerability is location and social disadvantages often visible in income poverty.[51]Income poverty thus reduces access to resources and

[48]Lutz, W. 2004.Information on related development, demographic and governance futures. *Proceedings of the IPCC expert meeting on the science to address UNFCCC article 2including key vulnerabilities*. Buenos Aires, Argentina: Munasinghe Institute for Development (MIND).
[49]Adger, W. N. 2000. Institutional adaptation to environmental risk under the transition in Vietnam. *Annals of the Association of American Geographers* 90: 738-758.
[50]Bailey, R. and S. Bryant. 2003. *Third world political ecology-2nd edition*. New York: Routledge.
[51]Cutter, S. 1996. Vulnerability to environmental hazards.*Progress in Human Geography* 20(4):529-539.

subsequently lessens the range of options available to groups in times of difficulty. Disaster literature has witnessed growth in vulnerability models, but still its assessment are not widely accepted as indicators or methods of measurements.[52]Vulnerability measures are not static since not all the poor are vulnerable, and those that are, are vulnerable in different ways.[53] Yet, emphasis is placed on the premise that economic, social and physical factors predict vulnerability. In the developing world, vulnerability considerations include type of employment, assets, and future income potential. The social aspects shaping vulnerability include type of political institutions, marginalization, minority status, education, gender, and age. Finally, physical vulnerability considers the geography of livelihoods and hazards, previous disasters, resource depletion and scarcity, and established infrastructure.[54]

The approach gets credence from the fact that, the present world is highly politicized such that the fruits associated with environmental change are not evenly distributed among actors.[55]This is obvious if one observes that the greatest contributors to climate change is the developed while the major culprits are the developing world, particularly those that heavily depend on the environment for their economy. Pressure is being mounted on developing countries to incorporate adaptive and mitigation policies against climate change. Attempt for this incorporation has strained the budgets of the developing

[52]McLeman, R. and B. Smit. 2006. Migration as an adaptation to climate change. *Climatic Change* 76(1-2): 31-53; Downing, T.E., L. Ringius, M. Hulme and D. Waughray. 1997. Adapting to climate change in Africa: prospects and guidelines. *Mitigation and Adaptation Strategies for Global Change* 2:19-44..
[53]Bankoff, G., G. Frerks, D. Hilhorst. 2004. *Mapping vulnerability: Disasters, development and people.* Earthscan.
[54] Ibid
[55]Bailey, R. and S. Bryant. 2003. *Third world political ecology-2nd edition*. New York: Routledge.

economies, coupled with unstable political environment; the developing world has become more vulnerable to the effects of climate change. Disaster prone countries are of course more vulnerable to these effects and more vulnerability studies are drawn from these countries.

Within countries, researchers emphasize that the effects of chronic and sudden onset environmental disasters are exacerbated by uneven development and the narrow margin of sustainable livelihoods already present within least developed states.

1.6 Literature Gap

In the recent years, there has been a lot of research about climate change and variability. However, there have been few studies that attempts to link human migration and climate variability especially within the context of refugees in Kenya. Migration as a result of climate variability is an issue that requires special focus in order to provide a comprehensive understanding of the link and the underlying factors on how climate variability impact on human life leading to migration. This study thus seeks to fill these gaps in a bid to widen knowledge and understanding of climate variability and human migration in the context of refugees.

1.7 Hypothesis of the Study

This study shall test the following hypothesis:

H1: Climate variability influence human migration.

H2: Climate variability affects the refugees in the IFO refugee camp.

H3: There are ways through which refugees respond/adapt to climate variability in the IFO refugee camp.

1.8 Justification of the Study

Reviewed literature has suggested that climate change will result in more emigrations, displacement and voluntary relocation of communities of the affected areas. The Dadaab refugees while might have moved because of political and economic reasons; climatic considerations must be made while repatriating them. Horn of Africa has borne the brunt of climate change in the recent past, consequences such as prolonged drought has been experienced in places like Somalia. Considerations thus have to be made to establish the effect of such events in voluntary repatriation. While attention has been given to emigration and displacement, little attention has been paid to the effect of climate change on planned relocation such as the repatriation of refugees in Daadab. This study seeks to fill this gap by contributing to the mobility and climate change discourse by focusing on the planned repatriation of Daadab refugees. The findings of this study will be of significance to policy makers that are involved in planned relocations; the paper will also lay ground for future researchers that may be interested in understanding planned relocation and climate change nexus.

1.9 Theoretical Framework

This research is founded on two theoretical models; the systems theory and the network theory as explained below:

1.9.1 The Systems Theory

This theory explains how persons interact with their environment. According to the theory, persons are in continual transaction with their environment. The theory considers systems as interrelated parts or subsystems constituting an ordered whole with each subsystem impacting on the other parts of the system hence have some level of influence on the whole system. The theory further stipulates that systems can have closed or open boundaries with some systems tend to move toward equilibrium.

The theory offers a framework that is used to understand on the push and pull factors of the human population as it enables us to see the whole system and how this relates to other close parts instead of the separated parts. This theory is useful for developing holistic view of persons in environment and enhances understanding of interactions between micro-meso-macro levels of organization.

This theory is significant for the current study in that it will inform the researcher on how well people interact with their environment. It will inform the researcher on how the various actions undertaken by people impact on the changes of the climate. In the case of the Ifo refugee camp in Daadab the researcher will understand how human interaction with the environment they live in affected the changes in climate and what impacts the change have towards the human health.

1.9.2 Network Theory

The network theory is a theory toward migration which emphasizes the existence of social networks within a shared community. According to Massey, migrant networks are "sets of interpersonal ties that connect migrants, former migrants and non-migrants in origin and destination areas through ties of kinship, friendship, and shared community of origin. Subsequently the existence of such networks increases the propensity of migration, since they provide information, support by job and house searching as well as potential social integration in the destination location.

In summary, this theory looks at networks as a result of a migration process on one hand as well as factors that lead to additional movement on the other hand. This theory is useful in this study because it will assist the study in distinguishing between conditions that initiate migration and conditions which perpetuate it across time and space since they may be quite different. Although the initial factors may have not ceased to exist in the course of migration process, then new conditions may arise that function as independent causes themselves.

1.10 Methodology of the Research

1.10.1Research Design

Kerlinger[56] research design as a plan and strategy that is used to investigate phenomena so as to obtain answers to particular research questions. It specifies methods and procedures for acquiring information needed for solving the problem. This study

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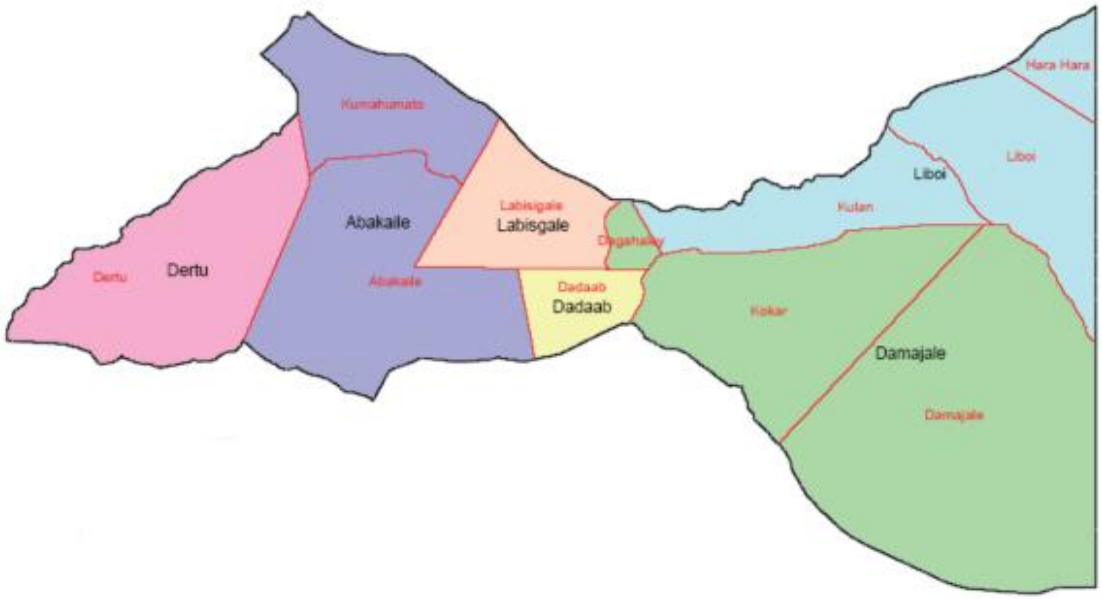
employed descriptive research design and it sought to describe the extent to which climate variability and related factors lead to migration and related challenges. The use of descriptive study enabled the researcher to find out facts without manipulating data, inquire and search opinions, describe, analyze and interpret the influence and relationship between the variables involved in the study. A descriptive study was seen to further help in establishing if there is any influence between the different factors under investigation. It will also ensure that research questions were well captured during the process of data collection.

1.10.2 Research Site and Target Population

This study was conducted in the IFO refugee camp situated in Daadab ward of Dadaab Constituency in Garissa County, Kenya. Other constituencies in Garissa County include: Garissa Township, Fafi, Lagdera, Balambala and Ijara. The county is further sub-divided into five administrative wards namely Abakaile, Liboi, Damajale, Dertu, Labisgale and Dadaab ward where the study will be conducted. The County is mostly inhabited by ethnic Somalis. According to the 2009 National population census, Daadab ward occupies an area of 160 square kilometers and hada population of 60,390 persons.

Map 1: Daadab constituency administrative and political units



Source: Independent Electoral and Boundaries Commission (IEBC)

According to the UNHCR, the IFOrefugee camp in Daadab ward had a refugee population of 84,965 persons as of April 2017.The Ifo camp is one of the five refugee camps that have been hosting over 245,126 refugees. Other camps are Dagahaley, Hagadera, Ifo II and Kambioos. All these refugee camps arerun by the UNHCR, and its operations are financed by foreign donors.

1.10.3 Sample Size and Sampling Technique

A sample refers to a small number of the population that is used to make a conclusion in relation to the population. Sampling is the process of obtaining the sample with the intention of estimating unknown characteristics of the population. The sample is the portion of the population targeted to collect information to infer something about the larger group. Random sampling and purposive sampling were used in the study. This has

been considered the most appropriate technique to help in conducting the study well. The following are the respondents targeted by the study:

Table 1.1: Sample Size

No	Target group	Target sample size
1	Community level respondents (in refugee camps)	80
2	Humanitarian actors (UN agencies, NGOs, Local CSOs, etc.)	6
3	Government officials: • National government: • County government:	 2 2
	Total:	90

Source: researcher 2017

There are many reasons why the study adopted purposive sampling method. The issues concerning ones refugee and migration status are very personal and as such respondents may not be willing to share information on their private life. Choosing participants purposively will assure them privacy and enhance responses.

1.10.4 Data Collection Procedures

A survey methodology was used in this study where individual respondents will be sampled from each of the target respondents' category in reference to the size of the target samples. What was important in the study was getting a representative sample. All

questionnaires will be administered through face to face interviews with all the respondents. Open and closed ended questions have been chosen because they allow flexibility as well as restricting respondents to relevant issues. Closed ended questions will include themes like demographic information of participants such as age, gender, levels of education, and feelings of the participants about other study variables and the effects of climate variability on their migration status.

All research tools were designed to capture all the key aspects highlighted in the explanation of independent and dependent variables. The recommendations will be based on what can support the study in understanding what could be the relationship between climate variability and human migration.

The researcher will travel to the study areas for familiarization purposes and administer the tools firstly to Key Informants and immediately followed by the target respondents. This has been chosen deliberately so as to seek more information or even clarification from the major stakeholders on the issues not adequately addressed in the questionnaires.

Before administering the questionnaire, consent of participants will be sought and the participants will be allowed to participate voluntarily and may decide to withdraw from the process. Confidentiality of the data will be provided by assuring anonymity.

1.1.0.5 Data Analysis

Data was collected personally by the researcher and responses were done directly into English from Kiswahili during the interviews. After collection data was coded showing the study locations, the different types of interviews and sex of the respondents. Computer spreadsheets (MS Excel) was used to allow cleaning using pivot tables. This computer programmes have been chosen because they are easily accessible and are easy to use with small sample sizes.

Outcomes were summarized using descriptive statistics as continuous variables. Categorical variables will be organized and presented using frequency tables, graphs, and pie charts. Inferences from the sample in form of inferential statistics to the population were made in order to make speculations, reason and establish relationships and predictive power of selected variables. The findings were not generalized because the sample was not be randomly selected.

Qualitative data was analyzed using the ‘content analysis’ involving summarizing and classifying data in several stages. First the researcher read through interview transcripts in each response category in order to identify key issues as a whole. This assisted the study in coming up with themes from the data.

An index of numbered themes and sub themes were drawn up. Each transcript was read in detail as noted earlier and the appropriate number from the index entered in the margin

against every piece of data, which could also be the whole phrase. Using Microsoft word programme, files corresponding to the main themes were created.

1.11 Scope and Limitations of the Research

The geographical extent of this study will be limited to Kenya, with much of the information to be collected within the Daadab refugee complex. The study will be limited to several matters relevant to the study. In terms of primary data collection, it will be limited in its geographical scope to Kenya, even though its implications will be valid for the other Eastern Africa region

1.12 Ethical Approach

Information obtained from this study was used strictly for academic purposes. The information was not divulged to any third parties in any way. Listing of names of the respondents was optional and confidential.

1.13 Chapter Outline

This Section provides the layout of the research study.

Chapter one introduced the topic of our research study by first setting the broad context of our research study, statement of the problem, research objectives, justification, theoretical framework, hypotheses and the methodology of the study.

Chapter two assessed the impact of climate variability on IFO refugee camp

Chapter Three delved into detail on the matter of response and adaptation to climate variabilities.

Chapter four addressed the adoption to climate variability in the IFO refugee camp, in Dadaab, Kenya.

Chapter five provided the summary of findings, conclusion and recommendation of the study.

CHAPTER TWO

CLIMATE VARIABILITY AND HUMAN MIGRATION

2.1 Introduction

Climate variability is a change in the statistical distribution of weather patterns when that change lasts for an extended period of time (i.e., decades to millions of years). Climate variability may refer to a change in average weather conditions, or in the time variation of weather within the context of longer-term average conditions. Climate variability is caused by factors such as biotic processes, variations in solar radiation received by Earth, plate tectonics, and volcanic eruptions[57]. Certain human activities have been identified as primary causes of ongoing climate variability, often referred to as global warming. Climate change has the potential to affect both environmental security and economic security through its impacts on the natural and built environments. Those threats to human security, in turn, pose traditional security threats to the governments that must deal with them.

Climate impacts on environmental security: changes in precipitation, sea- level rise, and extreme weather events can degrade food production and fresh water supplies in vulnerable regions. Impacts on the built environment occur through riparian flooding, coastal storms, or the melting of permafrost[58]. Threats to economic security follow as a consequence of environmental degradation, and also from the impacts of climate change

[57] Little, P., K. Smith, B. Cellarius, D. Coppock, and C. Barrett. 2001. Avoiding disaster: Diversification and risk management among East African herders. Development and Change 32:401-433.
[58] McLeman, R. 2014 Climate and Human Migration: Past, Experiences, Future Challenges. Cambridge University Press.

on food, energy, and infrastructure costs. For instance in Lake Victoria reduced rainfall compounded by excess releases at the outflow of the lake made in order to meet power generation demands has led to a drop in water levels which in turn has affected various economic sectors. This chapter provides research perspectives on climate variability and human migration in Kenya and with specific reference to Dadaab refugee Complex. It starts by putting in context 'climate variability' and 'human migration' and examines its relationship. It further looks at various responses that are in place to adapt and respond to climate variability and human migration as well existing intuitional frameworks dealing with the issue under consideration[59].

2.2 Climate Variability and Human Migration

The relationship between climate change and conflict remains highly controversial because the effect of climate on conflict is heavily relies on the political, socio-economic and institutional parameters of every country. However, scholars have attempted to study this relationship only in different parts of the world and suggest that the developing world have certain political, economic and institutional conditions that closely fit this description[60]. For instance most developing countries are heavily reliant on agriculture and their political institutions in most cases have low abilities and capacities to deal with and respond to economic shocks in the event that they occur. Additionally, the social safety nets and their insurance systems are commonly considered to be weakly and less

[59] Petty, C. and K. Savage. 2007. Livelihoods in crisis: A longitudinal study in Pader, Uganda (Inception Report). London, HPG Working Paper.
[60] Roncoli, C., Ingram, K. and Kirshen, P. 2001. The costs and risks of coping with drought: livelihood impacts and farmers' responses in Burkina Faso. Climate Research, 19(2): 119-132.

developed compared to those of the developed world. Such overreliance on agriculture makes them to be more likely to affected climate and related shocks evident in the developing world. Alongside the weak political, social and economic structures and systems, they therefore have low capacities to manage and recover from shocks[61].

Africa is one of the most vulnerable regions to climate variability in the world. Previous studies suggested that Africa is mainly vulnerable to the impacts of climate variability due to several factors such as poverty, recurrent droughts and inequitable land distribution[62].

Due to exposure and vulnerability to climate hazards, most members of the populations respond to climatic variations by migrating to other parts of the world. Scholars suggest that rising temperatures and drought related consequences promote internal migration, potentially through their negative effects on sources of livelihood such as low crop yields.

Environmental factors are increasingly recognized as a possible driver of cross-border and internal human migration. Indeed, adverse environmental conditions, ranging from natural disasters and extreme weather events and variations in climate, might induce people to use migration as an adaptation strategy. Understanding better the effects of the environment on human migration is crucial to better monitoring and predicting internal and international migration flows and, especially in the context of developing countries,

[61] Shipton, Parker. 1990. African Famines and food security. Annual Review of Anthropology,
[62] Zaman, M. and R. Weist. 1991. Riverbank erosion and population resettlement in Bangladesh. Practicing Anthropology 13(3):29-33.

is important in the effective management of issues related with movement of the people. A better understanding of the relationship between environment and migration facilitates the development of relevant strategies and appropriate policies that can be used to respond to potential challenges that comes as a result of climate variability[63].

Environmental factors influence individual decisions on migration as well as shape migration flows through a complex web of relationships. Extreme environmental conditions could gradually reduce the safety of places where people live and expose communities, affects the health status of many individuals and also reduce household assets that is of great value and importance by degrading land and property.

Environmental factors may impact economic activities being carried out by humans and consequently lead to individual decisions to migrate. For instance changes in climatic conditions may reduce agricultural productivity and raise food-commodity prices. The impact can be more severe in developing countries that do not have adequate capital to invest in better technologies that be utilized in mitigating and adapting to resulting consequences[64]. This could negatively affect income and employment opportunities of people working in different sectors such as the agricultural sector and industrial sector, most of which could be relying on it. This ultimately influence consumptions at household levels that could also lead to movement of populations from rural to urban areas hence affect decisions on migration urban households resulting in international

[63] Most, B.A., and Starr, H. (1989) Inquiry, Logic and International Politics. Columbia, SC: University of South Carolina Press.
[64] Nordås, R. and Gleditsch, N.P. 2007. Climate change and conflict. Political Geography, 26(6): 627-638.

migration. Additionally, recent studies indicate that environmental factors may also limit movement of the most vulnerable populations due to financial constraints[65].

2.3 Contextualizing the Different Types of Migration

Movement of the human population may occur and take many forms and this mainly is considered in the context of the destination of the migrant as international (involving crossing a national boundary to another county) or internal migration which involves staying within the national boarder[66]. Migrants may also decide to stay for a temporarily period of time or decide to stay permanently in the destination location. Migrants may also been considered according to their reason for migrating which may be due to political, social, economic, or environmental reasons.

Existing literature on migration also distinguishes between forced and voluntary migration. Forced migration may include some situations where the migrating persons may be faced with potential threat of death for instance due to armed conflict in case they continue remaining in their present place of residence. On the other hand, voluntary migration may occur in situations where the individual have a choice and is willing to migrate[67]. In this case it is the decision element which motivates and encourages the individual to move.

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[65] Paul, B. K. 2003. Relief assistance to 1998 flood victims: A comparison of performance between the government and NGOs. The Geographical Journal 169:75-89.
[66] Little, P., K. Smith, B. Cellarius, D. Coppock, and C. Barrett. 2001. Avoiding disaster: Diversification and risk management among East African herders. Development and Change 32:401-433.
[67] Hutton, D. and E. Haque. 2004. Human Vulnerability, dislocation and resettlement: Adaptation processes of river-bank erosion- induced displaces in Bangladesh. Disasters 28 (1): 41-62.

Migration may also be considered in terms of outcomes of development. People may decide to move to move to places that improve them economically and uplift their livelihood status hence a positive impact on the economic development of the individual.

2.3.1 Consequences of Internal Migration

Internal migration is a common occurrence mainly in the developing world and it can occur in different ways. There are seasonal migrants who may move away and return home after a particular period of time commonly in less than six months. There are also migrants that may decide to completely shift their work and residence completely to a new location. It is therefore through such internal migration that individuals may seek to engage in alternative livelihood activities so as to survive and improve their standards of living. To some extent, this may be considered to support mainly poor families living in the rural areas[68].

It has generally considered by many scholars that climate variability in future will increase risk mainly for rural families especially in the developing world hence the need to diversify and look for alternatives through internal migration[69]. A common challenge to migration include inadequate or total lack of information on income returns in the labor markets of the receiving destinations and networks of migrant workers may play a leading role in providing information on existing opportunities.

[68] Bailey, R. and S. Bryant. 2003. *Third world political ecology-2nd edition*. New York: Routledge.
[69] Agrawal M. 1999. Social vulnerability to climate change and the architecture of entitlements. *Mitigation and Adaptation Strategies for Global Change* 4: 253-266..

Patterns of migration may also be determined by how well institutions in receiving destinations are structured and managed as they are responsible for handling migrant issues. Land tenure systems and structures, for example, may increase or decrease migration depending on their own perceptions and attitudes towards migrants and their possibility to allow migrants exploit opportunities presented in the available land[70].

2.3.2 Consequences of International Migration

Discussions and debates on the relationship between climate variation and migration in most cases seem to focus majorly on international migration particularly on flows from the developing world to the developed countries. Compared to the number of people in developing countries engaging in internal migration, the number of people engaging in international migration is quite small. The main reasons for people migrating abroad are closely related to efforts to increase their living standards and improve income stability among others. Differences in income levels between developed and developing countries is a major incentive motivating people to leave from low income countries to countries with potentially high income levels.

On average, an individual migrating from developed countries to developing countries is generally seen to have above average levels of education as well as levels of income in relation to the developed nature of their region of origin. This sort of international transfer of the human capital mainly of the comparatively highly educated and learned individuals especially from developed world has been termed “brain drain”. Migration of

[70] Hendrix, Cullen S., and Sarah M.. 2007. Trends and Triggers: Climate Change and Civil Conflict in Sub-Saharan Africa. Political Geography 26 (6):695-715.

talented people from developing countries may have both positive and negative consequences in countries of origin as they are using human capital that could positively be utilized locally[71].

On the other hand, migration may also bring advantages to the economies of the developing world. Families with relatives abroad are benefiting through remittances made to them hence reducing income differences and challenges that they could be having. Remittances from the Europe, Gulf region and the USA to Kenya, for example, constitute a major part of Kenya's GDP as it increases investments in the country. This impact on the social welfare of household members as the household now have an improved ability to spend in education and health as well as purchase durable goods that can be used to reduce levels of poverty and household welfare in general[72].

2.4 Climatic Events that Matter in Relation to Migration

Climatologists suggests that climate variability involves frequent changes in in the environment commonly leading to warm temperatures, common occurrence of drought related conditions, floods and common incidences of heavy rains and storms. Such extreme weather patterns and events are already occurring globally. Many scholars have attempted to carry out research on such phenomena so as to learn and understand more better on their consequences on human life as well as the conditions that shape them[73].

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[71] Agrawal M. 1999. Social vulnerability to climate change and the architecture of entitlements. *Mitigation and Adaptation Strategies for Global Change* 4: 253-266..

[72] Wandiga et.al 2004. Vulnerability to climate induced highland malaria in East Africa. Report of the assessment of impacts and adaptation to climate change in multiple regions and sectors

[73] Adamo, S.B. and Izazola, H., 2010. Human migration and the environment. Population and Environment, 32(2-3): 105-108.

Occurrences of weather patterns and events in the short term as well as occurrences in the long-run affect people's decision to migrate because they may have both direct and an indirect effect on their livelihood, standards of living and also have an influence on income in future. Some of the common climate events of relevance in migration include frequent periods of extreme heat and temperatures, frequent occurrence of droughts, floods and storms as well as changes in mean temperatures in the long run[74]. Such and other variations affect livelihoods through the resulting consequences on sources of livelihood. The effect of the Climate variability on migration depends on the ability of the affected country as well as of its individual citizens to adapt to these changes and to mitigate their outcomes for instance by going for options such as credit to engage in alternative activities such as trade.

2.5 Climate Variability and Migration in Kenya

There is a substantial evidence that climate has been changing in recent decades, both in terms of its means and extremes, and this trend will not only persist, but will also intensify in near future. According to recent estimates, this unprecedented climate variability will first occur in the tropics and among low-income countries, where the projected mean climate may continuously move outside the bounds of historical variability already in 2034, about 17 years earlier than the global average[75]. Through their implications for agricultural production, these changes will exert additional pressure on the populations in developing countries, both because majority of the poor rely on rain-

[74] Bates, D.C. 2002.Environmental refugees? Classifying human migrations caused by environmental change. Population and environment, 23(5): 465-477.

[75] Chan, N. W. 1995. Flood disaster management in Malaysia: an evaluation of the effectiveness of government resettlement schemes. *Disaster Prevention andManagement* 4(4):22-29.

fed agriculture and also because the share of food in the budget of the poor may amount to two-thirds. Therefore, climate change and climate variability should be perceived as an important source of risk for rural households in developing countries[76].

Climate variability-induced migration occurs because of, or is exacerbated by, a number of different changes in the physical climate and environment, including: Increased droughts, environmental degradation and slow-onset disasters such as desertification, which undermines agricultural livelihoods and reduces food security; Higher temperatures in water and air, and increasing acidity of the seas; Contraction of snow-covered areas and melting of sea ice, leading to rising sea levels that can make coastal areas and low-lying island states unliveable; Increased frequency and intensity of weather-related natural hazards such as tropical cyclones, hurricanes, mudslides and flooding; and Conflict and social upheaval, directly or indirectly related to climate change-related factors, such as competition for scarcer natural resources, changing livelihood patterns, increased social tensions and the possible concentration of vulnerable populations, especially in poor urban areas[77]. These changes to the environment and climate can increase displacement as people move to locations, generally within the borders of their own countries, in search of better human security and improved livelihood opportunities. People may also be displaced again when they move to urban centers already under pressure, or when planned relocations are unsuccessful. Sometimes

[76] Colson, E. 2003.Forced migration and the anthropological response. *Journal of Refugee Studies* 16 (1): 1-18.
[77] Colson, E. 2003.Forced migration and the anthropological response.*Journal of Refugee Studies* 16 (1): 1-18.

displacement is cyclical as people move back and forth from their original communities in search of security and livelihoods.

2.6 Effect of Climate Variability on Migration

2.6.1 Distress Migration

Emigration as a result of natural disasters is normally forced migrations. The environmental refugees issue focuses on migration patterns consisting of distressed and impoverished individuals seeking aid. What is clear about disaster induced migration are the fact that they are usually internal displacement rather than international, and that they are normally temporal rather than permanent, permanent displacement only occurs as a result of state poor response to the effects of climate hazard.[78]

Places hardest hit by frequent disasters is expected to have an increased migration and subsequent instability in the receiving end.[79]The lacuna of empirical research on disaster induced migration does not suggest that migration will follow disasters. A distinction has been made in relation to where and what is affected, migration patterns for the affected, the coping mechanism for those left behind, and the return process of those forced migration. What can be deduced from the available literature is that people will not wholly move out of disaster areas[80] and different strategies will be employed by different affected communities based on their pre-disaster characteristics. Social networks,

[78]Oliver-Smith, A. 2004. Theorizing vulnerability in a globalized world, A political ecological perspective. In *Mapping Vulnerability: Disasters, Development and People*, ed.
Bankoff, G., Frerks, G., and Hilhorst, D., 10–24. London: Earthscan.
[79]Homer-Dixon, T. 1994. Environmental scarcities and violent conflict: Evidence from cases. *International Security* 19(1):5-40.
[80] Hunter, L. M. 2005. Migration and environmental hazards.*Population and Environment* 26(4): 273-302.

relatives, histories of migration and trade, shared political alliances, and ethnic identity or origin, all encourage and direct post disaster movement.[81]

Disaster migration decisions are shaped by local and external institutions.[82]In a post disaster decision, communities can be displaced and heavily rely on social capital, economic structure, and community network to structure decisions; they may opt to access aids through agencies and stay within camps; or they may consider potential resettlement options. The resettlement option is the least developed and is rare perhaps because it is a more permanent option that requires individuals to settle elsewhere.[83]

2.6.2 Local Displacement

Local displacement is characterized by moving to the nearest safe location and is usually the most common response to immediate threat. These kinds of migration differ a great deal by country, region, and group and, in some cases, age and gender. In local displacement, people move close to their native places and as such distance to possible hosting areas is a crucial factor for distress migrants.[84]Local displacement are usually temporal and are normally occasioned by loss of utilities, structural damage, need for

[81]Hitchcox, L. 1990. *Vietnamese refugees in Southeast Asian camps*. London: Macmillan.

[82]Colson, E. 2003.Forced migration and the anthropological response.*Journal of RefugeeStudies* 16 (1): 1-18.

[83]Oliver-Smith, A. 2004. Theorizing vulnerability in a globalized world, A political ecological perspective. In *Mapping Vulnerability: Disasters, Development and People*, ed.
Bankoff, G., Frerks, G., and Hilhorst, D., 10–24. London: Earthscan.

[84] Paul, B. K. 2005. Evidence against disaster-induced migration: The 2004 Tornado in North-Central Bangladesh. *Disasters* 29(4): 370-385.

provisions and danger. The choice of destinations is based on personal social capital networks, community relations and the availability of emergency provisions.[85]

In distress migration, social capital networks are critical. Friends and relatives come in handy in times of distress; emigrants opt to stay with them for a short period before going back to their homes.[86]Post-disaster stability is highly possible if the affected are highly connected. The networks inform the emigration pathways for the affected because such networks promise insurance against uncertainties.[87] Literature suggest that in times of distress the composition of movement is different, women and children normally move to the closest destination, those without dependents tend to move first followed by the older men then families.[88] Those with strong cultural roots are likely to resist relocation.[89]

2.6.3 Seeking Aid

The number of those seeking aid during disasters vary depending on location, instability, infrastructure, pre-disaster assets, and past experiences with aid distribution. Normally, during disasters, humanitarian aid is not always available everywhere, a reason that push individuals to migrate.[90] Location is a significant factor in individuals seeking aid, while the destination may be vague, affected families may seek emergencies from camps. Urban areas are normally popular destinations for forced migrants. Research on Kenyan

[85] Perch-Nielsen, S. 2004. Understanding the effect of climate change on human migration: The contribution of mathematical and conceptual models.Department of Environmental Studies.Zurich, Swiss Federal Institute of Technology. M. Sc. Environmental Physics.
[86] Ibid
[87]Colson, E. 2003.Forced migration and the anthropological response.*Journal of Refugee Studies* 16 (1): 1-18.
[88]Shipton, Parker. 1990. African Famines and food security. *Annual Review of Anthropology*, 13:353-394.
[89]Kirschenbaum, A. 1996. Residential ambiguity and relocation decisions: Population and areas at risk. *International Journal of Mass Emergencies and Disasters* 14(1): 79-96.
[90]Ezra, M. and G. Kiros. 2001. Rural out-migration in the drought prone areas of Ethiopia: a multilevel analysis. *International Migration Review* 35(3):749-771.

and Somali reactions to climate hazards and drought conditions notes a swelling of population around market towns, due to both a growing dependence on aid and markets for a sustainable lifestyle.[91]Literature is replete with similar facts in regional urban pushes, migrants that move to the urban areas mostly go to slum areas and thereby creating other problems in their new settlement.[92]

Other reasons for individuals to stay put despite natural hazards are multiple, a close look at affected communities during the 1988 Bangladesh flood revealed that some families opted to stay behind based on risk assessments; among the factors considered include possibility of individuals losing family possessions, food insecurity, reduced privacy in camps, disease, and crime among others.[93]On the other hand, individuals are not likely to migrate where relief efforts are smooth and without irregularities[94]with the affected feeling that there is equity in the way aid is distributed.[95]Economic reasons can also account for migration of the individuals. Aid efforts can stimulate local markets and employment opportunities in relief camps and in effected villages. Suggestions have been made that incorporation of local contexts in relief planning would be effective. Such

[91]Little, P., K. Smith, B. Cellarius, D. Coppock, and C. Barrett. 2001. Avoiding disaster: Diversification and risk management among East African herders. *Development and Change* 32:401-433.
[92]Shipton, Parker. 1990. African Famines and food security. *Annual Review of Anthropology*, 13:353-394.
[93]Thomalla F. And H. Schmuck. 2004. We all knew that a cyclone was coming": disaster preparedness and the cyclone of 1999 in Orissa, India. Disasters 28(4):373-387.
[94] Paul, B. K. 2003. Relief assistance to 1998 flood victims: A comparison of performance between the government and NGOs. *The Geographical Journal* 169:75-89.
[95]Ibrahim. F. 2003. Notes from the field.*South Asia Newsletter* Spring: 8-12.

incorporations would mean dispersed provision of assistance as opposed to concentrated assistance.[96]

2.7 Climate Variation at IFO Refugee Camp

IFO is one of the newest refugee camps in Dadaab. It was opened in July 2011, to decongest IFO 1 and Dagahaley camps. Ifo is divided into two sub-camps, Ifo 2 East and Ifo 2 West, and demarcated into 18 sections comprising of four to nine blocks each. In IFO refugee camp, the impacts of climate change are already being felt by communities, who are seeking ways to adapt to the changes and to build resilient livelihoods. The Adaptation Learning Program for Africa (ALP) is working to increase the capacity of vulnerable households to adapt to climate change and variability[97]. As part of its community-based adaptation process, ALP conducted participatory research and analysis on climate change vulnerability and adaptive capacity with the communities in IFO refugee camp in 2011.

Increasing exposure to climate shocks and stresses is only one dimension of increasing vulnerability to climate change in IFO refugee camp. The adaptive capacity of pastoralists and agro-pastoralists is dynamic, affected by a range of social, environmental, economic and political variables, many of them beyond the control of the community. Analysis of vulnerability must go beyond exposure and sensitivity to climate impacts, to explore the different dimensions of adaptive capacity and identify barriers that

[96]Black, R. and M. Sessay. 1998. Refugees and environmental change in West Africa: The role of institutions. *Journal of International Development* 10: 699-713.
[97] Cutter, S. 1996. Vulnerability to environmental hazards.*Progress in Human Geography* 20(4):529-539.

communities face in applying their existing capacity to respond to climate impacts. This leads to identification of adaptation options that reinforce and build upon existing adaptive capacity[98].

Poor people in IFO refugee camp are in an ongoing process of making decisions to sustain their livelihoods in the face of multiple, evolving challenges. Climate change is among the most serious of these challenges, exacerbating existing problems, exposing people to new and evolving risks and creating further complexity in decision-making. In order for people to respond to and anticipate changes and to engage in adaptive decision-making, they require information, knowledge and skills that enable them to actively address climate risks to their livelihoods[99]. Adaptation efforts must aim to facilitate access to information and the development of the skills and knowledge needed for adaptation, while also working with institutions and policies to ensure an enabling environment for local adaptation efforts.

Within communities and households, women and men have differing levels of adaptive capacity. Somali society places limitations on women's voice, movement and participation in public and household decision-making, which in turn creates constraints on their adaptive capacity. This limits the ability of families and communities to realize the potential contribution of women's specific knowledge and skills to adaptation efforts. Analysis of vulnerability and adaptive capacity must uncover these differences and build

[98] Ellen, M. and Harris, G. 2001. Rural out-migration in the drought prone areas of Ethiopia: a multilevel analysis. *International Migration Review* 35(3):749-771.
[99] Ellen, M. and Harris, G. 2001. Rural out-migration in the drought prone areas of Ethiopia: a multilevel analysis. *International Migration Review* 35(3):749-771.

understanding of the specific roles, responsibilities and challenges faced by women and men in securing their livelihoods and adapting to climate change.

As the impacts of climate change become more apparent and households are increasingly required to shift from their traditional livelihood strategies and practices, there is potential for changes in gender roles and relations[100]. These changes have both positive and negative implications, with the potential for increased empowerment of women, but also the possibility of repercussions for women as they move beyond traditional roles and responsibilities. Adaptation efforts must take these ongoing changes in gender relations into account and facilitate dialogue and negotiation within communities to enable positive change for women and avoid potential backlash[101].

Having multiple options for securing food and income provides people with alternatives when one strategy fails. However, in the absence of the necessary information and support, the effectiveness of diversification as a strategy for building livelihood resilience may be limited. Engaging in new activities requires new skills and knowledge. New activities may also involve new risks and create additional pressures on ecosystem services. These must be understood in order to ensure the right mix of strategies in the household livelihood portfolio[102]. Community-Based Adaptation actors must support communities to make decisions around diversification in an informed and forward-

[100] Heming, L, P. Waley and Phil Rees. 2001. Reservoir resettlement in China: past experience and the Three Gorges Dam. The Geographical Journal 167(3):195-212.
[101] Kelley, C.P., Mohtadi, S., Cane, M.A., Seager, R. and Kushnir, Y. 2015.Climate change in the Fertile Crescent and implications of the recent Syrian drought. Proceedings of the National Academy of Sciences, 112(11): 3241-3246.
[102] Heming, L, P. Waley and Phil Rees. 2001. Reservoir resettlement in China: past experience and the Three Gorges Dam. The Geographical Journal 167(3):195-212.

looking manner, taking into account existing and future stress on resources, equity in access to resources and opportunities and changing climate risks over time.

2.8 Conclusion

Analysis of vulnerability and adaptive capacity in IFO refugee camp has proven to be a critical step in the Community-Based Adaptation process facilitated by Adaptation Learning Programme in Garissa County. By engaging communities and other local stakeholders in a process of dialogue and reflection on climate change, livelihoods and gender, Adaptation Learning Programme has uncovered the critical issues that influence the vulnerability and adaptive capacity of women and men in pastoral and agro-pastoral communities. Many of these issues originate outside the communities themselves, highlighting the need for Community-Based Adaptation initiatives to engage with stakeholders and institutions at higher levels to create an enabling environment for local actions[103].

The analysis has revealed the inherent adaptive capacity that exists in the pastoral and agro-pastoral communities in the region. In each community, there is evidence of the types of traditional knowledge and adaptive decision-making that are essential for Community-Based Adaptation. However, there is also evidence of degradation of traditional knowledge and risk management systems with recurrent shocks and inappropriate development. In the face of increasing risk and uncertainty brought about by climate change, there is a critical need to support and strengthen existing adaptive

[103] McLeman, R. 2014 Climate and Human Migration: Past, Experiences, Future Challenges. Cambridge University Press.

capacity, while bringing in scientific information, new knowledge and innovative ideas and approaches to respond to the evolving context.

Within communities, variations in vulnerability and adaptive capacity exist, based on livelihood options available, access to resources and information and a range of other factors related to power and opportunities. Gender inequality means that women are often at a disadvantage due to restrictions on their mobility and choice. Marginalization of women and other socially or economically disadvantaged groups reduces possibilities for household and community resilience that is equitable and sustainable over the longer term[104].

[104] Paul, B. K. 2003. Relief assistance to 1998 flood victims: A comparison of performance between the government and NGOs. The Geographical Journal 169:75-89.

CHAPTER THREE

RESPONSE AND ADAPTATION TO CLIMATE VARIABILITIES

3.1 Introduction

Response and adaptation[105] simply refers to the measures that directly or indirectly relates to efforts to deal with the causes of climate variabilities with the main aim of responding to changes experienced in relation to changes in climate. Adapting to climate change is about taking action in the real world, whereby we seek to reduce any negative consequences or threats, and maximize any positive consequences or opportunities. Adaptation may generally take different dimensions such as mitigating, coping and adapting. Some of the measures may be realized through reducing emissions of greenhouse gases and enhancing 'sinks'.

The human population responds to variations in the climate and develops various strategies to ensure they survive during difficult times resulting from climatic variations. Due to the fact that climate variability is not new to many, people have been coping with it as long as there have been people. However, the strategies used to respond to short-term climate variability might not be adequately sufficient when faced with climate variabilities. Coping with climate variability may therefore not be similar as adapting to climate variabilities. Coping strategies are considered as the various methods that are used by families to survive in the face of unexpected shocks and stress elements while

[105] Adaptation is defined by the Intergovernmental Panel on Climate Change (IPCC) as "adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities (Third Assessment Report, Working Group II).

adaptation deals with making necessary adjustments mainly in the long run so as to improve security of their livelihood.

This chapter will address issues to do with response and adaptation to climate variability which includes Migration as an adaptation strategy in response to climate variability, Aid and support as an adaptation to climate variabilities, Coping mechanisms to climate variability, Utilization of traditional knowledge as a response and coping mechanism to climate variabilities, Combating the impacts of climate variability, and Barriers to adaptation and response to climate variabilities. The chapter will give a conclusion that summarizes on what the chapter entails.

3.2. Climate Variability and Adaptation Strategies

3.2.1 Migration as an Adaptation Strategy in Response to Climate Variabilities

Migration has overtime been considered by many people as an important element used by mankind to adapt and respond to climate variabilities provided that they change their respective geographical location in a manner that seems to benefit them mainly through increasing productivity of the people. Whether the economic consequences of migration are positive or negative, migration allows people to adapt efficiently to climate variabilities majorly[106].

However, this is based on the prevailing social, economic, political and economic conditions of the potential institutions and locations expected to receive the migrants.

[106] McLeman, R. 2014 Climate and Human Migration: Past, Experiences, Future Challenges. Cambridge University Press.

Migration may be considered to lead to positive economic consequences only in the migrating individuals move into economically productive areas and actively engage in its productivity[107]. On the other hand, migration may have negative economic consequences in the migrants goes to locations or areas where their potential labor is not needed therefore not being utilized efficiently and effectively. Migration can only be efficient and productive if certain conditions are realized for instance such as availability of sufficient information about potential migration destinations, existing alternatives and options to migration, among others. Challenges encountered in the receiving areas may make the migrants unproductive.

3.2.2 Aid and Support as an Adaptation to Climate Variabilities

According to Official Development Assistance (ODA)[108], the humanitarian and development support from both Non-Governmental Organizations (NGOs) and the government might have an impact on vulnerability to climate variabilities in the receiving communities. In the recent past, there has been as been a shift from the traditional aid given in the form of huge infrastructure projectssuch as dams or roads to an approach that may be considered on one hand as attempts to have some level of control in the receiving countries and on the other hand efforts to reach out directly through NGOs.

[107] Luechinger, S. and Raschky, P.A. 2009. Valuing flood disasters using the life satisfaction approach. Journal of Public Economics, 93(3): 620-633.

[108] ODA is defined by OECD/DAC as those flows to countries and territories and to multilateral development institutions which are provided by official agencies, including state and local governments, or by their executive agencies.URL: fttp://www.oecd.org/dac/stats/34086975.pdflast accessed 25 June 2017.

Aid and support that comes in form of ODA and NGO projects have been generally criticized in the recent past. The NGO implemented activities are perceived to be temporary in nature and are therefore not sustainable. They are also seen to lack local ownership and participating as they are in most cases initiated by the NGOs. The sustainability challenge majorly relates to difficulties in ensuring that there are tangible long-term benefits especially after closure of the funding[109]. Therefore upon withdrawal, it is somehow challenging for the local community to maintain the benefits realized for such activities. For instance, if an NGO fund and support education as a service for refugees, the beneficiaries might need to play a role in the construction of the classrooms and provision of security. Local ownership therefore concerns the level at which a local community or target beneficiaries feels ownership to the project. If the beneficiaries lack a feeling of ownership to the project, they might feel less able to influence the sustainability of the project. Sustainability and ownership is thus interrelated.

Several NGOs and development agencies, such as the UNHCR, UNDP, and USAID are now involving adaptation to climate change in their aid efforts at the Daadab refugee complex. Aid and support to refugees through projects might influence the local vulnerability context in both positive and negative manners and therefore should be keen to local situations and conditions, consider active participation of the local people and ensure ownership and sustainability is realized so as to avoid increasing differential vulnerability to climate change.

[109] Kirschenbaum, A. 1996. Residential ambiguity and relocation decisions: Population and areas at risk. International Journal of Mass Emergencies and Disasters 14(1): 79-96.

Barnets[110] argues that aid can influence local adaptive capacity in recipient communities or countries. Klein[111] further argues that instead of incorporating adaptation to climate change into ongoing activities and plans of development aid institutions, adaptation should be 'mainstreamed' into development and humanitarian efforts in a comprehensive manner.

3.2.3 Coping Mechanisms to Climate Variability

Most communities have attempted to use different coping mechanisms as a way of responding to impact of climate variabilities in order to reduce the effects of the variations in climate. Traditional coping methods are often based on experience accumulated over the years and transmitted from generation to generation. Coping mechanisms in reaction to the stress caused by climate variability comes from different studies. These studies suggested some of the coping mechanisms to include collection of wild foods, purchasing food from the market, in-kind (food) payment, support from relatives and friends, sales from livestock and household valuables, migration and wage labor in exchange for food, reduction in the number of meals served each day, reduction in number of meals consumed among others. Some farmers have also managed to cope up by rationing water during drought, harvesting and collecting the rain water, adjustment in land and crop management. Communities have also employed coping mechanisms such as reliance on social networks through exchange of information, provision of

[110] IPCC. 1990. Policymakers' summary of the potential impacts of climate change. Report from Working Group II to IPCC, Intergovernmental Panel on Climate Change, Commonwealth of Australia.
[111] Hunter, L.M., J.K. Luna, and R.M. Norton. 2015. Environmental Dimensions of Migration. Annual Review of Sociology, 41(6): 1-21.

emotional support and comfort, advancement of cash loans, migrating temporarily and relying on friends for support.

3.2.4. Utilization of Traditional Knowledge as a Response and Coping Mechanism to Climate Variabilities

Climate variabilities affects the ability of rural communities to satisfy those need that are environmentally based. Despite the fact that changes have being occurring over generations, rural farmers have also been adapting to these changes throughout their life by the use of local environmental knowledge. The knowledge is readily available to rural farmers and a climatically smart tool for sustainable development and the management of climate change and variability[112]

However, environmental problems are local in nature and vary geographically, temporarily and agronomically but rural farmers, through continued experimentation, trial and error and sustained interactions with their local environment, have developed a vast local knowledge about nature in their locale that they use in coping with and solving their problems, among which are climate-related problems.

Warren et al.[113] define local environmental knowledge as a knowledge that is unique and specific to a given culture or society, developed through careful observation and experience of the natural ecosystem. It contrasts with the international knowledge system

[112] Greenberg, M. and D. Schneider. 1996. *Environmentally devastated neighbourhoods: Perceptions, policies and realties*. New Brunswick, NJ: Rutgers University Press.
[113] Warren, B., P. Blaikie; T. Cannon and I. Davis. 2004. At risk: Natural hazards, people's vulnerability and disasters, 2nd edition. Routledge: Taylor and Francis.

generated by universities, research institutions and private firms. Stringer[114] refer to indigenous knowledge as an environmentally derived technology concerned with farming needs towards operational resources for farm risk management decisions, while Beckford and Barker[115] define indigenous knowledge as dynamic and complex bodies of knowhow, practices and skills that are developed and sustained by people/communities with shared histories and experiences. Furthermore, they argued that the knowledge developed provides a framework for decision making in a plethora of social, economic and environmental situations and livelihoods among rural people.

Such traditional technological skills give local environmental knowledge unique characteristics that are distinctive from other forms of technological skills in modern science and other forms of knowing. The literature provides widespread and persuasive characteristics that distinguish local environmental knowledge from other forms of knowledge. According to Ellen and Harris[116] local environmental knowledge originates from a specific group of people with specific experiences developed within the area in which they live. Relocating this knowledge to another locale has the consequence of dis-locating it.

[114] Stringer A. 1993. Pressure points: Environmental degradation, migration and conflict. Cambridge, American Academy of Art and Science.
[115] Beckford, P. T. and Barker, I. 1994. *At Risk: natural hazards, people's vulnerability, and disasters.* London: Routledge.
[116] Ellen, M. and Harris, G. 2001. Rural out-migration in the drought prone areas of Ethiopia: a multilevel analysis. *International Migration Review* 35(3):749-771.

3.2.5. Combating the Impacts of Climate Variability

Adaptation refers to a planned action, anticipating threat or averting its impacts and infers some measure of progress or consistency of responsibility. The potential threats may be as a result of being exposed to physical and chemical factors existing in the environment, as well as a result of interacting with other species. People that have been in a particular environment for long are forced to adjust so as to cope with potential constraints in the environment[117]. Adaptive approaches in this case looks at various aspects including conservations interventions, use of various tools to communicate and understand issues related to the environment, formulating supportive decisions on environmental interventions as well as providing supportive frameworks and policies that will facilitate measures and actions aimed at turning around the ecosystem.

Among most vulnerable group in the developing world, adaptation is seen from the perspective of not being able to embrace and carry put intervention measures hence social disruption and displacement of the population.

3.3 The Role of Institutions in Adaptation to Climate Variability

There are several institutions and various structures and mechanisms than can be used establish and cooperation in society by controlling behavior of individuals within a given human collectivity. In relation to climate variability, the institutions help in the interpretation of scientific knowledge and come up with alternative adaptation

[117] Downing, T.E., L. Ringius, M. Hulme and D. Waughray. 1997. Adapting to climate change in Africa: prospects and guidelines. *Mitigation and Adaptation Strategies forGlobal Change* 2:19-44.

strategies[118]. Their roles are to influence coping and adaptation to climate variability including information gathering and dissemination, resource mobilization and allocation, skills development and capacity building, providing leadership skills, and relating with other decision makers and institutions.

According to Agrawal[119], local government actors engage in active roles in facilitating adaptation practices including aspects such as; planting and conservation of trees, support in the selection specific crop varieties, better implementation of forest laws, soil and water conservation, controlled burning, logging ban, information sharing, development of water sources, research and capacity building. The capacity of communities to respond to climate stressors depends on knowledge flow through a broad range of institutions and the ability of institutions to act collectively at multiple scales.

3.4. Barriers to Adaptation and Response to Climate Variabilities

In an effort to respond to climate variabilities, some of the challenges encountered include: lack of awareness among communities and some institutions responsible for tackling climate and related issues, lack of buy-in or commitment to adaptation among communities and institutions, inadequate financing of adaptation activities due to competing priorities, limited skills and adaptive capacity of a given system, and legislative or institutional barriers. In contrast to adaptation limits which will in general

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[118] Cutler, P. 1993. Responses to famine: Why they are allowed to happen. In *The challenge of famine: Recent experiences, lessons learned*, ed. J.O. Field, 72-87. West Hartford, CT:Kumarian Press.

[119] Agrawal M. 1999. Social vulnerability to climate change and the architecture of entitlements. *Mitigation and Adaptation Strategies for Global Change* 4: 253-266.

be irresolvable, it is possible to overcome barriers to adaptation through, for example, building adaptive capacity within existing institutions and through changes in legislation, regulations and incentives[120].

Adaptation is inevitable to address the impacts of climate variability and change but adaptation efforts are impeded in many ways. Limits and barriers to adaptation restrict people's ability to identify, assess and manage risks in a way that maximizes their wellbeing[121]. Limits are obstacles that are in some sense absolute, while barriers are mutable. Limits and barriers to adaptation arise due to certain characteristics of the people involved, the nature of the specific systems involved and/or the larger context within which the people and systems operate. Barriers to adaptation can prevent the development and implementation of adaptations from taking place. Due to presence of barriers high adaptive capacity does not necessarily translate into successful adaptation.

Some distinguish limits and barriers to adaptation, while others use the terms interchangeably. This study considers limits as "the conditions or factors that render adaptation ineffective as a response to climate change and are largely insurmountable[122]. These limits are faced when thresholds or tipping points associated with social and/or natural systems are exceeded. On the other hand, "barriers are the conditions or factors that render adaptation difficult as a response to climate change" but they are often

[120] Adamo, S.B. and Izazola, H., 2010. Human migration and the environment. Population and Environment, 32(2-3): 105-108.
[121] Ellen, M. and Harris, G. 2001. Rural out-migration in the drought prone areas of Ethiopia: a multilevel analysis. *International Migration Review* 35(3):749-771.
[122] Greenberg, M. and D. Schneider. 1996. *Environmentally devastated neighbourhoods: Perceptions, policies and realties.* New Brunswick, NJ: Rutgers University Press.

mutable or can be "overcome with concerted effort, creative management, change of thinking, prioritization, and related shifts in resources, land uses, institutions, etc.

Limits and barriers to adaptation can be natural, technological, economic, social or formal institutional. Natural limits range from ecosystem thresholds to geographical and geological limitations[123]. Dramatic climate change may alter physical environment so as to limit adaptation possibilities. The limits of adaptation will also depend on the inherent sensitivity of some ecosystems, habitats and species. The impacts of climate change can surpass critical thresholds and cause ecosystem regime shifts, which in turn can limit economic and social adaptation especially of communities those directly depend on ecosystems such as fisheries and agriculture.

Technological barriers (sometimes classified as limits if unaffordable) to adaptation include lack of hard engineering structures, e.g., but lack of smaller equipment, tools and techniques may also constrain adaptation. Although some adaptations may be technologically possible, they may be constrained by economic and cultural barriers. Technological barriers may also lead to inaccurate information due to, for example, limitations in modelling the climate system or lack of accurate weather forecasts. Insufficient information and knowledge on the impacts of climate change may continue to hinder adaptation particularly in Asia[124].

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[123] Cutler, P. 1993. Responses to famine: Why they are allowed to happen. In *The challenge of famine: Recent experiences, lessons learned*, ed. J.O. Field, 72-87. West Hartford, CT:Kumarian Press.
[124] Ellen, M. and Harris, G. 2001. Rural out-migration in the drought prone areas of Ethiopia: a multilevel analysis. *International Migration Review* 35(3):749-771.

Economic barriers constrain adaptation of low-income households and communities. Mahon[125] contended that cost of vessel insurance, gear replacement, repairs, operation, safety measures and increased investment were all barriers to adaptation among fishing communities. In agricultural communities, lack of financial capital is one barrier to adaptation, such as adoption of improved crop varieties and diversification of livelihoods. In recent years microfinance has emerged in many developing countries but it does not often reach the poorest and most vulnerable groups. Budget constraints can also pose a barrier when adaptation measures involve high upfront cost. Those with limited financial capital will focus on short-term gain rather than on the potential long-term benefits of reduced vulnerability[126].

Some studies have pointed out the significance of social barriers to adaptation. Adger et al[127]. suggest that ethics (how and what people value), knowledge (how and what people know), risk (how and what people perceive) and culture (how and what people live) are key aspects of social barriers. Thus social barriers are concerned with the social and cultural processes of society including informal institutions and human capital. People perceive, interpret, and think about risks and adaptation to them depending on their worldviews, values and beliefs. People frequently underestimate the possibility of the occurrence of climate events even if they are aware of the risks. Some empirical studies

[125] Agrawal M. 1999. Social vulnerability to climate change and the architecture of entitlements. *Mitigation and Adaptation Strategies for Global Change* 4: 253-266..
[126] Bates, D.C. 2002.Environmental refugees? Classifying human migrations caused by environmental change. Population and environment, 23(5): 465-477.
[127] Adger, W. N., Lorenzoni, I., & O'Brien, K. L. (Eds.). (2009). *Adapting to climate change: Thresholds, values, governance*. Cambridge University Press.

have shown that individuals may not seek information on these possibilities of the occurrence of climate events before making their decisions.

Formal institutional barriers may constrain adaptation because they define the processes and rules that govern and regulate access and entitlement to livelihood assets. The ways in which actors are able to access assets play a role in determining their vulnerability and ability to cope with and adapt to stress[128]. Institutions can restrict the choice of livelihood strategies for some people; on the other hand they can open up opportunities for others and favour some groups over others. Institutional barriers have limited the ability of the rural communities to cope with extreme climate events by limiting access to markets and in terms of unfavourable development policies.

3.5. Conclusion

The chapter makes a contribution to current debates on the knowledge surrounding response and adaptation strategies in relation to climate variabilities and human migration. The chapter suggests that a good response and adaptation strategy should include measures that address the underlying factors of vulnerability to climate change, particularly on a local scale. With the current climate variabilities, migrants are obliged to change and better adapt their strategies in order to cope with the new emerging conditions and challenges.

[128] Colson, E. 2003.Forced migration and the anthropological response.*Journal of Refugee Studies* 16 (1): 1-18.

CHAPTER FOUR

ADOPTION TO CLIMATE VARIABILITY IN THE IFO REFUGEE CAMP, IN DADAAB, KENYA

4.1. Introduction

Adaptation to climate is the process through which people reduce the adverse effects of climate on their health and well-being, and also take advantage of the opportunities that their climatic environment provides. One of the more commonly used definitions for adaptation, in the climate change context, is suggested by the IPCC who define adaptation as an adjustment in human or natural systems in response to observed or expected changes in climatic stimuli and their effects and impacts in order to alleviate adverse impacts of change or take advantage of new opportunities[129].

This includes the ability to prepare for climate impacts and opportunities in advance, as well as the ability to respond to its effects. Effective adaptation strategies imply reducing present and future vulnerability to climate change and include coping strategies or changes in practices and processes in light of the perceived climatic change[130]. Such actions can be taken by individuals, households, governments and other stakeholders. Adaptation may include policy measures that reduce vulnerability and enhance adaptive capacity, or the ability of people and systems to adjust to climate change. The IPCC identified factors that determine the capacity of social, ecological, or economic systems

[129] Thomalla F. And H. Schmuck. 2004. We all knew that a cyclone was coming": disaster preparedness and the cyclone of 1999 in Orissa, India. Disasters 28(4):373-387.
[130] Stringer, A. 1993. Pressure points: Environmental degradation, migration and conflict. Cambridge, American Academy of Art and Science.

to adapt to climate change impacts. There is a complex mix of conditions that determine a society or community's ability to adapt to climate change and impacts.

4.2. Adaptation to Climate Variability in IFO Refugee Camp

Adaptations vary according to the system in which they occur, who undertakes them, the climatic stimuli that prompts them, and their timing, functions, forms, and effects. In unmanaged natural systems, adaptation is autonomous and reactive; it is the process by which species and ecosystems respond to changed conditions. This chapter focuses on adaptations consciously undertaken by humans, including those in economic sectors, managed ecosystems, resource use systems, settlements, communities, and regions[131]. In human systems, adaptation is undertaken by private decision makers and by public agencies or governments. Adaptation depends greatly on the adaptive capacity or adaptability of an affected system, region, or community to cope with the impacts and risks of climate change. The adaptive capacity of communities is determined by their socioeconomic characteristics.

Enhancement of adaptive capacity represents a practical means of coping with changes and uncertainties in climate, including variability and extremes. In this way, enhancement of adaptive capacity reduces vulnerabilities and promotes sustainable development. Adaptation to climate change has the potential to substantially reduce many of the adverse impacts of climate change and enhance beneficial impacts though neither without

[131] Nordås, R. and Gleditsch, N.P. 2007. Climate change and conflict. Political Geography, 26(6): 627-638.

cost nor without leaving residual damage[132]. The key features of climate change for vulnerability and adaptation are those related to variability and extremes, not simply changed average conditions. Most sectors and regions and communities are reasonably adaptable to changes in average conditions, particularly if they are gradual. However, these communities are more vulnerable and less adaptable to changes in the frequency and/or magnitude of conditions other than average, especially extremes. Sectors and regions will tend to adapt autonomously to changes in climate conditions[133].

Human systems have evolved a wide range of strategies to cope with climatic risks; these strategies have potential applications to climate change vulnerabilities. However losses from climatic variations and extremes are substantial and, in some sectors, increasing. These losses indicate that autonomous adaptation has not been sufficient to offset damages associated with temporal variations in climatic conditions[134]. The ecological, social, and economic costs of relying on reactive, autonomous adaptation to the cumulative effects of climate change are substantial. Planned anticipatory adaptation has the potential to reduce vulnerability and realize opportunities associated with climate change, regardless of autonomous adaptation. Implementation of adaptation policies, programs, and measures usually will have immediate benefits, as well as future benefits. Adaptation measures are likely to be implemented only if they are consistent with or integrated with decisions or programs that address non-climatic stresses. The costs of

[132] McLeman, R. and B. Smit. 2006. Migration as an adaptation to climate change. Climatic Change 76(1-2): 31-53.
[133] de Loë and Kreutzwiser. Adapting to climate change in Africa: prospects and guidelines. *Mitigation and Adaptation Strategies forGlobal Change* 2:19-44.
[134] Downing, T.E., L. Ringius, M. Hulme and D. Waughray. 1997. Adapting to climate change in Africa: prospects and guidelines. *Mitigation and Adaptation Strategies forGlobal Change* 2:19-44.

adaptation often are marginal to other management or development costs. The capacity to adapt varies considerably among regions, countries, and socioeconomic groups and will vary over time. The most vulnerable regions and communities are those that are highly exposed to hazardous climate change effects and have limited adaptive capacity[135].

Countries with limited economic resources, low levels of technology, poor information and skills, poor infrastructure, unstable or weak institutions, and inequitable empowerment and access to resources have little capacity to adapt and are highly vulnerable. Enhancement of adaptive capacity is a necessary condition for reducing vulnerability, particularly for the most vulnerable regions, nations, and socioeconomic groups. Activities required for the enhancement of adaptive capacity are essentially equivalent to those promoting sustainable development. Climate adaptation and equity goals can be jointly pursued by initiatives that promote the welfare of the poorest members of society for example, by improving food security, facilitating access to safe water and health care, and providing shelter and access to other resources[136]. Development decisions, activities, and programs play important roles in modifying the adaptive capacity of communities and regions, yet they tend not to take into account risks associated with climate variability and change. Inclusion of climatic risks in the design and implementation of development initiatives is necessary to reduce vulnerability and enhance sustainability.

[135] Luechinger, S. and Raschky, P.A. 2009. Valuing flood disasters using the life satisfaction approach. Journal of Public Economics, 93(3): 620-633.
[136] IPCC. 1990. Policymakers' summary of the potential impacts of climate change. Report from Working Group II to IPCC, Intergovernmental Panel on Climate Change, Commonwealth of Australia.

Current knowledge of adaptation and adaptive capacity is insufficient for reliable prediction of adaptations; it also is insufficient for rigorous evaluation of planned adaptation options, measures, and policies of governments. Climate change vulnerability studies now usually consider adaptation, but they rarely go beyond identifying adaptation options that might be possible; there is little research on the dynamics of adaptation in human systems, the processes of adaptation decision-making, conditions that stimulate or constrain adaptation, and the role of non-climatic factors[137]. There are serious limitations in existing evaluations of adaptation options: Economic benefits and costs are important criteria but are not sufficient to adequately determine the appropriateness of adaptation measures; there also has been little research to date on the roles and responsibilities in adaptation of individuals, communities, corporations, private and public institutions, governments, and international organizations. Given the scope and variety of specific adaptation options across sectors, individuals, communities, and locations, as well as the variety of participants private and public involved in most adaptation initiatives, it is probably infeasible to systematically evaluate lists of particular adaptation measures; improving and applying knowledge on the constraints and opportunities for enhancing adaptive capacity is necessary to reduce vulnerabilities associated with climate change[138].

[137] Hutton, D. and E. Haque. 2004. Human Vulnerability, dislocation and resettlement: Adaptation processes of river-bank erosion- induced displaces in Bangladesh. Disasters 28 (1): 41-62.

[138] Hunter, L.M., J.K. Luna, and R.M. Norton. 2015. Environmental Dimensions of Migration. Annual Review of Sociology, 41(6): 1-21.

4.3. Public Adaptation Decisions, Uncertainty, and Risk Management in IFO Refugee Camp

Planning of adaptation invariably is complicated by multiple policy criteria and interests that may be in conflict. For example, the economically most efficient path to implement an adaptation option might not be the most effective or equitable one. Moreover, decisions have to be made in the face of uncertainty. Uncertainties that are pertinent to adaptation are associated with climate change itself, its associated extremes, their effects, the vulnerability of systems and regions, conditions that influence vulnerability, and many attributes of adaptations, including their costs, implementability, consequences, and effectiveness[139]. Given these uncertainties, it is not surprising that adaptation strategies frequently are described as forms of risk management. For example, adaptations to deal with climate change impacts or risks to human health can be biological (acquired immunity), individual (risk-aversion options), or social. Most social adaptation strategies are measures to reduce health risks via public health programs. Similarly, public adaptations via "disaster loss mitigation" are mainly risk management initiatives such as improved warning and preparedness systems, less vulnerable buildings and infrastructure, risk-averse landuse planning, and more resilient water supply systems. Perez et al.[140] also describe adaptations to climate change and extremes as modifications to existing risk management programs.

[139] Henry, S., Schoumaker, B., and Beauchemin, C. 2004 The Impact of Rainfall on the First Out-Migration: A Multi-Level Event-History Analysis in Burkina Faso. Population and Environment 5(5): 423-460.

[140] Perez et al. Rethinking climate refugees and climate conflict: rhetoric, reality and the politics of policy discourse. Journal of International Development, 22(2): 233-246.

As de Loë and Kreutzwiser[141] and others point out, it remains unclear whether practices designed for historical climatic variability will be able to cope with future variability. To recognize these uncertainties, decision tools to help evaluate adaptation options include risk-benefit and multi-criteria analyses. Such evaluations are further complicated by the existence of secondary impacts related to the adaptation itself. For example, water development projects (adaptations to water supply risks) can have significant effects on local transmission of parasitic diseases, including malaria, lymphatic filasiasis, and schistosomiasis. Improved water supply in some rural areas of Asia has resulted in a dramatic increase in Aedes mosquito breeding sites and, consequently, outbreaks of dengue. Langen and Tol[142] provide examples of technical response options to climate hazards that are counterproductive in the longer term. Existing resource management programs do not necessarily consider changed risks or recognize local interests and inequities. Wilhite[143] analysis of programs in the United States, Australia, and Brazil shows the ineffectiveness of reactive crisis management approaches and the need for proactive and cooperative planning. Nonetheless, it is widely accepted that planned adaptations to climate risks are most likely to be implemented when they are developed as components of (or as modifications to) existing resource management programs or as part of national or regional strategies for sustainable development.

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[141] de Loë and Kreutzwiser. Adapting to climate change in Africa: prospects and guidelines. *Mitigation and Adaptation Strategies forGlobal Change* 2:19-44.
[142] Langen and Tol. *At Risk: natural hazards, people's vulnerability, and disasters.* London: Routledge.
[143] Wilhite. Adapting to climate change in Pacific Island countries: The problem of uncertainty.*World Development* 29(6): 977-993

4.4. Determinants of Adopting to Climate Variability in IFO Refugee Camp

Adaptation to climate change and risks takes place in a dynamic social, economic, technological, biophysical, and political context that varies over time, location, and sector. This complex mix of conditions determines the capacity of systems to adapt. Although scholarship on adaptive capacity is extremely limited in the climate change field, there is considerable understanding of the conditions that influence the adaptability of societies to climate stimuli in the fields of hazards, resource management, and sustainable development[144]. From this literature, it is possible to identify the main features of communities or regions that seem to determine their adaptive capacity: economic wealth, technology, information and skills, infrastructure, institutions, and equity

4.4.1. Economic Resources

Whether it is expressed as the economic assets, capital resources, financial means, wealth, or poverty, the economic condition of nations and groups clearly is a determinant of adaptive capacity. It is widely accepted that wealthy nations are better prepared to bear the costs of adaptation to climate change impacts and risks than poorer nations. It is also recognized that poverty is directly related to vulnerability. Although poverty should not be considered synonymous with vulnerability, it is "a rough indicator of the ability to cope". Holmes[145] recognizes that Hong Kong's financial strength has contributed in the past to its ability to better manage environmental hazards through conservation and

[144] Forced migration and the anthropological response.*Journal of Refugee Studies* 16 (1): 1-18.
[145] Holmes. Social vulnerability to climate change and extremes in coastal Vietnam.*World Development* 27: 249-269.

pollution control. Bohle et al.[146] state that, by definition, it usually is the poor who are among the most vulnerable to famine, malnutrition, and hunger. Deschingkar[147] describes a situation in India in which pastoralist communities are "locked into" a vulnerable situation in part because of a lack of financial power that would allow them to diversify and engage in other sources of income. At a local level, Pelling[148] concludes that the highest levels of household vulnerability in coastal Guyana also are characterized by low household incomes in conjunction with poor housing quality and little community organization. Neighborhoods with higher levels of household income are better able to manage vulnerability Adaptation to Climate Change in the Context of Sustainable Development and Equity through the transfer of flood impacts from health to economic investment and loss. Kelly and Adger[149] demonstrate the influence of poverty on a region's coping capacity; poor regions tend to have less diverse and more restricted entitlements and a lack of empowerment to adapt. There is ample evidence that poorer nations and disadvantaged groups within nations are especially vulnerable to disasters.

4.4.2. Technology

Lack of technology has the potential to seriously impede a nation's ability to implement adaptation options by limiting the range of possible responses. Adaptive capacity is likely to vary, depending on availability and access to technology at various levels (i.e., from

[146] Bohle et al. Institutional adaptation to environmental risk under the transition inVietnam.*Annals of the Association of American Geographers* 90: 738-758.

[147] Deschingkar. Introduction and overview: Enhancing the knowledge base. In Migration, Environment and Climate Change: Assessing the Evidence; Laczko, F., Aghazrm, C., Eds.; International Organization for Migration: India

[148] Pelling. Demographic effects of natural disasters: A case study of Hurricane Andrew. Demography **1996**, 33, 265–275.

[149] Kelly and Adger. Migration as a contribution to resilience and innovation in climate adaptation: Social networks and co-development in Northwest Africa.

local to national) and in all sectors. Many of the adaptive strategies identified as possible in the management of climate change directly or indirectly involve technology (e.g., warning systems, protective structures, crop breeding and irrigation, settlement and relocation or redesign, flood control measures). Hence, a community's current level of technology and its ability to develop technologies are important determinants of adaptive capacity. Moreover, openness to the development and utilization of new technologies for sustainable extraction, use, and development of natural resources is key to strengthening adaptive capacity. For example, in the context of Asian agriculture and the impact of future climate change. Regions with the ability to develop technology have enhanced adaptive capacity.

4.4.3. Infrastructure

Adaptive capacity is likely to vary with social infrastructure. Some researchers regard the adaptive capacity of a system as a function of availability of and access to resources by decision makers, as well as vulnerable subsectors of a population. For example, the Philippine island of Mindanao uses hydroelectric power to generate more than 90% of its electricity, which in turn supports local development and industry. During El Niño, drought conditions resulted in suspension of production by the hydroelectric plant and severely increased the economic vulnerability of the region. In the coastal area of Hong Kong, the capacity to adapt to the risk of typhoons differs for existing urban areas and for new coastal land reclamation. For existing urban areas, there is no possibility of retreat or accommodation, although during urban renewal the formation level of the ground could be raised, thereby decreasing the vulnerability of settlements. At the community level,

Pelling[150] notes that the lack of flexibility "in formal housing areas where dwelling form and drainage infrastructure were more fixed" reduced the capacity to respond to contemporary environmental conditions.

4.4.4. Information and Skills

Successful adaptation requires recognition of the necessity to adapt, knowledge about available options, the capacity to assess them, and the ability to implement the most suitable ones. In the context of climate variability and change, this idea may be better understood through the example of the insurance industry: As information on weather hazards becomes more available and understood, it is possible to study, discuss, and implement adaptation measures. Building adaptive capacity requires a strong, unifying vision; scientific understanding of the problems; an openness to face challenges; pragmatism in developing solutions; community involvement; and commitment at the highest political level[151]. Lack of trained and skilled personnel can limit a nation's ability to implement adaptation options. In general, countries with higher levels of stores of human knowledge are considered to have greater adaptive capacity than developing nations and those in transition.

4.5. Lessons from Adaptation Experiences to Climate Variability

Research in many sectors and regions indicates an impressive human capacity to adapt to long-term mean climate conditions but less success in adapting to extremes and to year-

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[150] Pelling. Demographic effects of natural disasters: A case study of Hurricane Andrew. Demography **1996**, 33, 265–275.
[151] Williams, A. Turning the tide: Recognizing climate change refugees in international law. J. Law Policy **2008**, 30, 502–529.

to-year variations in climatic conditions. Climate change will be experienced via conditions that vary from year to year, as well as for ecosystems and human systems these variations are important for adaptation. Thus, although human settlements and agricultural systems, for example, have adapted to be viable in a huge variety of climatic zones around the world, those settlements and systems often are vulnerable (with limited adaptive capacity) to temporal deviations from normal conditions (particularly extremes). As a result, adaptations designed to address changed mean conditions may or may not be helpful in coping with the variability that is inherent in climate change[152].

All socioeconomic systems (especially climate-dependent systems such as agriculture, pastoralism, forestry, water resources, and human health) are continually in a state of flux in response to changing circumstances, including climatic conditions. The evidence shows that there is considerable potential for adaptation to reduce the impacts of climate change and to realize new opportunities. Adaptation options occur generally in socioeconomic sectors and systems in which the turnover of capital investment and operating costs is shorter and less often where long-term investment is required. Although an impressive variety of adaptation initiatives have been undertaken across sectors and regions, the responses are not universally or equally available[153].

For example, the viability of crop insurance depends heavily on the degree of information, organization, and subsidy available to support it. Similarly, the option of

[152] Perch-Nielsen, S.; Bätting, M.; Imboden, D. Exploring the links between climate change and migration. Clim. Chang. **2008**, 91, 375–393.
[153] Grant, A.J.; Mitchell, M.; Nyame, F. New regionalisms, micro-regionalisms, and themigration-conflict nexus: Evidence from natural resource sectors in West Africa. In International Political Economy of New Regionalisms;

changing location in the face of hazard depends on the resources and mobility of the affected part and on the availability and conditions in potential destination areas. Many response strategies have become less available; many others have become more available[154]. Individual cultivator response to climate risk in India has long relied on a diverse mix of strategies, from land use to outside employment (sometimes requiring temporary migration) to reciprocal obligations for support; many of these strategies have been undermined by changes such as population pressure and government policy, without being fully replaced by others illustrating the oft-remarked vulnerability of regions and populations in transition. In Kenya, effective smallholder response to drought has shifted from traditional planting strategies to employment diversification.

Not only is there rarely only one adaptation option available to decision makers but also "rarely do people choose the best responses the ones among those available that would most effectively reduce losses often because of an established preference for, or aversion to, certain options". In some cases there is limited knowledge of risks or alternative adaptation strategies. In other cases, adoption of adaptive measures is constrained by other priorities, limited resources, or economic or institutional barriers. Recurrent vulnerabilities, in many cases with increasing damages, illustrate less-than-perfect adaptation of systems to climatic variations and risks. There is some evidence that the costs of adaptations to climate conditions are growing[155].

[154] Shaw, T., Grant, A., Cornelissen, S., Eds.; Ashgate: Farnham, UK, 2011. Hendrix, C.; Glaser, S. Trends and triggers: Climate, climate change, and civil conflict in Sub-Saharan Africa. Political Geogr. **2007**, 26, 695–715.

[155] Shaw, T., Grant, A., Cornelissen, S., Eds.; Ashgate: Farnham, UK, 2011. Hendrix, C.; Glaser, S. Trends and triggers: Climate, climate change, and civil conflict in Sub-Saharan Africa. Political Geogr. **2007**, 26, 695–715.

There is strong evidence of a sharp increase in damage costs of extreme climatic or weather events. Growing adaptation costs reflect, at least in part, increases in populations and/or improvements in standards of living, with more disposable income being used to improve levels of comfort, health, and safety in the short run. It is not clear whether the expansion in adaptations is likely to be effective and sustainable in the long run. In any event, although adaptations to changed and variable climatic conditions are undertaken, they are not necessarily effective or without costs[156].

Societal responses to large environmental challenges tend to be incremental and ad hoc rather than fundamental. In all of the climate analog cases examined by Glantz (1988), "Ad hoc responses were favoured over long term planned responses. As a result, there has been a tendency to 'muddle through. 'This has not necessarily been an inappropriate response, but it is probably more costly in the long term than putting a long-term strategy together in order to cope with climate related environmental change." In each case, moreover, action was not taken without a catalyst or trigger that dramatically indicated the seriousness of a threat. Other studies also indicate the ad hoc nature of adaptations and the importance of a catalyst. These findings suggest that problems that demand early or long-term attention often fail to receive it, and the most efficient responses are not taken[157]. That the earlier action would have been more efficacious, however, presupposes that the best strategy was evident to the decision makers and that premature responses closing off useful options would not have been taken instead.

[156] Perch-Nielsen, S.; Bätting, M.; Imboden, D. Exploring the links between climate change and migration. Clim. Chang. **2008**, 91, 375–393.
[157] Perch-Nielsen, S.; Bätting, M.; Imboden, D. Exploring the links between climate change and migration. Clim. Chang. **2008**, 91, 375–393.

There is little evidence that efficient and effective adaptations to climate change risks will be undertaken autonomously. A consistent lesson from adaptation research is that climate is not the singular driving force of human affairs that is sometimes assumed but neither is it a trivial factor. Climate is an important resource for human activities and an important hazard. Climate change is a source of significant stresses (and perhaps significant opportunities) for societies, yet it has always been only one factor among many. The consequences of a shift in climate are not calculable from the physical dimensions of the shift alone; they require attention to human dimensions through which they are experienced[158]. The significance of climate change for regions depends fundamentally on the ability and likelihood of those regions to adapt. To what degree are societies likely to adapt autonomously to avoid climate change damages? Some studies show faith in market mechanisms and suggest considerable capacity of human systems to adapt autonomously. Other studies highlight the constraints on "optimal" autonomous adaptation, such as limited information and access to resources, adaptation costs, and residual damages; these studies emphasize the need for planned, especially anticipatory, adaptations undertaken or facilitated by public agencies.

4.6. Conclusion

Although climate change vulnerability studies now usually consider adaptation, they rarely go beyond identifying adaptation options that might be possible. There is little research on the dynamics of adaptation in human systems, the processes of adaptation

[158] Grant, A.J.; Mitchell, M.; Nyame, F. New regionalisms, micro-regionalisms, and themigration-conflict nexus: Evidence from natural resource sectors in West Africa. In International Political Economy of New Regionalisms;

decision-making, the conditions that stimulate or constrain adaptation, and the role of non-climatic factors. There are serious limitations in existing evaluations of adaptation options. Economic benefits and costs are key criteria, but they are not sufficient to adequately determine the appropriateness of adaptation measures. There also has been little research to date on the roles and responsibilities of individuals, communities, corporations, private and public institutions, governments, and international organizations in adaptation. Given the scope and variety of specific adaptation options across sectors, individuals, communities, and locations and the variety of participants private and public involved in most adaptation initiatives, it is probably infeasible to systematically evaluate lists of particular adaptation measures. Improving and applying knowledge on the constraints and opportunities for enhancing adaptive capacity is necessary to reduce vulnerabilities.

CHAPTER FIVE

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

5.1. Introduction

This chapter presents analysis of the data on the effects of climate variability on human migration dynamics: a case study of IFO refugee camp, Daadab complex Kenya**.** The chapter discusses the findings of the study based on the objectives which were examining the relationship between climate variability and human migration, assessing the impact of climate variability on IFO refugee camp, how refugees in the Daadab complex respond/adapt to climate variability in the IFO refugee camp, in Dadaab, Kenya. The chapter is divided into various subheadings defined by the findings relevant to each research objective.

5.2. Summary of Findings

5.2.1. Relationship between Climate Variability and Human Migration

The study found that Climate change is undermining the livelihoods and security of many people, exacerbating income differentials and deepening inequalities. Over the last two decades the number of recorded natural disasters has doubled from some 200 to over 400 per year. Nine out of every ten natural disasters today are climate-related. The United Nations recently indicated that as many as 20 million people may have been displaced by climate-induced sudden-onset natural disasters in 2008 alone. As temperatures rise and land becomes less productive, the process of urbanization will accelerate, generating additional competition for scarce resources and public services in cities across the

globe[159]. The incidence of vector-borne diseases will also increase as a result of climate change, as will the cost of food and energy. Increased social tension and political conflict is thus likely, though it may remain difficult to trace the origins of such tensions to climate change. The study established that just as human movements which are induced or strongly influenced by the process of climate change will vary in character, so will a range of responses and, potentially, new approaches. As in the past, populations will implement adaptation strategies to avert or deal with displacement as a result of unpredictable disasters such as cyclones, floods and mudslides. In regions affected by the longer-term consequences of climate change, people will also move in large numbers, but will do so over longer periods of time and in more diverse directions. Some will move to more hospitable areas in home countries while others will seek to leave their own country and enter other States. Since new forms and patterns of movement are emerging, the concepts traditionally used to categorize different types of movement are becoming increasingly blurred. New legal frameworks may need to be negotiated.

The study further found that people may become displaced either within their own countries or across international borders due to change in climate. While the latter type of movement is less likely, at least in the initial phases of displacement, regard must also be had to the situation of migrants who find themselves outside their country of nationality as disaster strikes there, and are thus unable and/or unwilling to return home. Where hydro-meteorological disasters or environmental degradation cause internal displacement, as States have primary responsibility for their citizens, national and local authorities have

[159] Interview with government officials on September 2017

a vital role to play in responding to such scenarios. IDPs should receive protection and assistance in accordance with the 1998 Guiding Principles on Internal Displacement. As a result of recurring disasters, some States may exercise the sovereign obligation to protect their citizens by designating areas as high-risk zones, too dangerous for human habitation, owing to their location, for example, in flood-prone or landslide prone areas. People may have to be forcibly evacuated and displaced from their lands, prohibited from returning to them, and relocated to safe areas[160]. It is likely that the affected persons would qualify as IDPs and, once again, be protected by the 1998 Guiding Principles on Internal Displacement. The most likely durable solutions would be integration in the places of displacement or relocation to new areas inside the country, since return will normally not be possible.

5.2.2. The Impact of Climate Variability

The study established in the larger context that climate change can be seen as an impact multiplier and accelerator. In other words, in addition to its own negative impacts, climate change may exacerbate the risk of conflict which can, in turn, cause further displacement. Subsequently, the effects of climate change may lead to increased competition over scarce resources and the loss of livelihoods which may increase the risk of conflict and violence, causing additional displacement. The study further established that Climate change also intensifies both sudden-onset and slow-onset disasters, both of which cause displacement. Sudden-onset disasters such as cyclones and floods are expected to become both more intense and more unpredictable as a result of climate

[160] Interview with government officials on September 2017

change. Slow-onset disasters tend to prompt people to move in search of livelihoods, food security and safety a trend that is already happening throughout much of the world. Further the study established that Climate change-related displacement takes place in complex contexts and it is difficult to draw direct causal relationships. For example, flooding may increase as a result of the effects of climate change, (such as increased glacier melting), but also because of human action such as deforestation. As it is difficult to disentangle the particular factors causing displacement, it is important to adopt a holistic approach to understanding the impact of climate change on the movement of people.

5.2.3. Adaption to Climate Variability

The study established that while moving or fleeing to a safer location may provide temporary relief from the negative impacts of climate change, prolonged displacement is not a long-term solution. Protracted displacement often exacerbates existing vulnerabilities, creates dependency, and leads to social tensions and other serious protection, humanitarian and human rights challenges. Finding durable solutions to displacement is a human rights issue[161]. The study further established that IDPs living in settlements or camps may be vulnerable to sexual and gender-based violence or other threats to their personal safety. They may feel that humanitarian assistance (assistance that sometimes goes on for too long at the expense of early recovery and durable solutions) is an incentive to stay[162]. As climate change displacement continues, the urgency of finding solutions and avoiding marginalization, instability and other problems

[161] Interview with community members in IFO refugee camp on September 2017
[162] Interview with community members in IFO refugee camp on September 2017

with protracted displacement become national, and potentially regional, security imperatives. In the context of internal displacement, three durable solutions are generally recognized: return, local integration or settlement in another part of the country. However, in the context of climate change, durable solutions are likely to be more complex. A combination of solutions may be necessary, including seasonal or temporary movements, including to the community of origin. Different solutions may be used by different members of family, as when some family members return to the place of origin (permanently or on a seasonal basis), while others work in another location. Solutions must therefore be flexible, and based on free and informed consent.

The study further established that states and other actors faced by climate variability must adapt to climate change threats and risks. This may mean employing disaster risk-reduction and management policies early on to pre-emptively minimize displacement. In some cases this may also mean implementing planned relocations in response to slow-onset disasters. Climate change adaptation funds should be used to support adaptation measures related to climate change-induced internal displacement and other forms of human mobility. Financing bodies should support national governments, engage with communities, and insist on a comprehensive approach which encompasses prevention to durable solutions[163]. Financing bodies and research institutions should also continue to support, and engage in research and policy which addresses human mobility and climate change. Disaster risk reduction and disaster preparedness measures should also seek to prevent displacement to the extent possible. National disaster management systems, laws

[163] Interview with community members in IFO refugee camp on September 2017

and policies should also draw on human rights approaches and encourage local community involvement. Meaningful participation on the part of local governments, communities, civil society and the private sector is essential to addressing climate change impacts on vulnerable populations.

5.3 Conclusion

As the impacts of anthropogenic climate variability become increasingly experienced across a range of human populations and environments, greater attention will be paid to climate-related population redistribution. Existing research on historical and contemporary environment-migration connections provides important insights as to the causal, temporal, and spatial dimensions of this association. On causal connections, analogs suggest climatic conditions and changes represent but one set of 'push' and 'pull' factors acting upon migration. Ultimately, environmental factors interact with socioeconomic, cultural, and political processes to shape migration decision-making. Temporally, a wide variety of migration patterns are revealed, ranging from short-term, temporary environmentally related migration to permanent relocation resultant of, for example, natural disasters. On the spatial aspects, the analogs described above are consistent with research that suggests the majority of future climate-related movements will likely be internal or intraregional as opposed to geographically extensive movements crossing international boundaries.

In addition, existing research strongly suggests that environmentally influenced migration is closely linked with adaptive capacity. As such, the nature and scale of future climate

migration will depend considerably on the extent to which the global community engages in proactive capacity-building in vulnerable populations and regions. The analogs suggest a variety of possible migration outcomes in the absence of greenhouse gas mitigation and capacity-building efforts. Rural-to-urban and peri-urban migration rates may increase, particularly within developing regions where exposure to climate-related risks and dependence on local natural resources are both high. Depending on the nature of climate change and rate of onset, populations inhabiting low-lying coastal regions, small island states, and floodplains will increasingly be at risk of displacement, necessitating international discussion of relocation options.

Patterns of 'nonmigration' are also of particular importance in considering future climate-related population movements. In the four case studies presented here, permanent migration is the livelihood option chosen by only a fraction of households affected by environmental change. Because socio-demographic characteristics shape the probability of permanent migration so strongly, targeting efforts to enhance adaptive capacity at particularly vulnerable households may well have the effect of reducing involuntary climate-induced migration in many settings.

Although our knowledge of the interactions between climate change and migration patterns is growing, considerable work still needs to be done. There is a high degree of variability and inconsistency in many of the projections currently being made of future climate-related migration, reflecting challenges in scaling from local examples to global estimates and measures. Additional research is also needed to refine our understanding of

the specific ways in which households and their members assess and evaluate migration options in comparison with other adaptation alternatives and the critical thresholds at which distress migration becomes the predominant adaptation option. To expand upon what may be learned from known migration-event analogs, a much wider range of empirical, longitudinal studies of current and ongoing climate-migration interactions across regions and communities are needed. Research initiatives such as these would greatly enhance the development of adaptation policies and programs in coming years by eliminating much of the still-remaining guess work about how climate change-related migration will unfold.

5.4. Recommendations

The study made the following recommendations:

Improved access to relevant climatic information at the local level is imperative.

Better access to local meteorological data and downscaled weather forecasts is needed to assist adaptation actions such as altering agricultural planting practices in light of seasonal weather forecasts, determining fire-danger rating indices and monitoring water flows to support decisions related to hydropower management. Better access to this information would also assist in monitoring long-term shifts in climatic patterns.

Catalyzing local partnerships and embedding adaptation initiatives in existing programs

Direct and continual engagement of policy-makers in pilot projects allows for hands-on learning about effective actions and the development of strong working relationships.

Policy-makers are then better able to draw upon these lessons and relationships as opportunities arise, facilitating the process of mainstreaming adaptation into policy- and decision-making[164]. Embedding pilot projects in larger government initiatives can also ensure the long-term sustainability of a project's outcomes.

Poverty reduction policy

Climate change have a direct relationship with poverty because climatic change consequences, such as increased intensity and frequency of storms, drought, and flooding, altered hydrological cycles, and precipitation variance have implications for future food availability. Food availability in turn has a direct bearing on poverty levels, especially for the most vulnerable groups[165]. This, then, shows that the two initiatives are closely interlinked, because efforts aimed at adapting to the adverse effects of climate change have a direct impact on poverty reduction. Both initiatives also are based on stakeholder consultations and are therefore country owned. They also are funded by resources from the developed world.

Undertake education on climate change

Education plays an essential role in increasing the adaptation capacity of communities and nations in regard to climate change by enabling individuals to make informed decisions. In particular, the education of girls and women has proven to have a significant impact on the capacity of communities to adapt to climate change and develop

[164] William F. Ruddiman (2005). Plows, plagues, and petroleum: how humans took control of climate. Princeton, N.J: Princeton University Press. ISBN 0-691-13398-0.
[165] Edwards, Paul Geoffrey; Miller, Clark A. (2001). Changing the atmosphere: expert knowledge and environmental governance. Cambridge, Mass: MIT Press

sustainably. Quality education designed with the purpose of empowering people to address climate change and sustainability issues improves the adaptation capacities of affected communities[166]. It should be enhanced by educational programmes that explicitly prepare communities for natural disasters. Furthermore, it needs to incorporate indigenous knowledge, and promote sustainable lifestyles and development in which the importance of heritage is recognized as an integral part of their identity and an important asset that can help building resilience. Finally, climate change education for sustainable development can stress the unique cultural and natural heritage of African Countries, which plays an important role in the building of community resilience. While education plays a key role in strengthening adaptation and mitigation capacities, such capacities are also needed to equip education systems and infrastructures to prepare for climate change[167]. Entire school communities including local education authorities, administrative staff, teachers and parents - must be prepared to ensure a climate-safe and climate friendly school environment. Adaptation needs also must be taken into account when constructing new schools which are safe and have a climate-resilient design. Education for mitigation should be supported by sustainable school and campuses that serve as a learning laboratory for students to demonstrate and further deepen understanding of the principles learned in the classroom. Furthermore, the capacity of education systems to respond to new migration streams caused by climate change impacts or to new skill requirements due to a changing environment - needs to be included in education strategies for adaptation to climate change.

[166] Ruddiman, W. F. (2003). "The anthropogenic greenhouse era began thousands of years ago". Climate Change 61 (3): 261–293.

[167] Wagner, Frederic H., (2009). Climate Change in Western North America: Evidence and Environmental Effects ISBN 978-0-87480-906-0

Contraction and Convergence policy

The concept of Contraction and Convergence is a long-term framework towards the ultimate object of climate change policy in terms of 'safe' emissions levels. The concept has gained some interest amongst politicians and climate change experts and is seen as potentially superseding the arbitrary short-term target setting of the current Kyoto Protocol process. Under a Contraction and Convergence regime an international agreement would define to what level atmospheric greenhouse gas concentrations could rise before becoming unacceptable. Once this is defined, an estimate would be made of how much reduction in global greenhouse gas emissions is required to meet the target, taking into account the effect of sinks, and how quickly the target should be reached [168]. This represents the 'contraction' element, and in itself it does not differ substantially from the aims to stabilize "greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system." The key differentiating factor of Contraction and Convergence is the proposal that ultimately the 'right' to emit carbon dioxide is a human right which should be shared equally. Therefore, emissions targets should ultimately be allocated to countries on the basis of their populations. Emissions rights would be on a per capita basis and therefore require convergence from the present very unequal per capita levels to a universal per capita level. During the convergence period, which should not be protracted, emission permits would be progressively adjusted from status quo to these new levels. Permits could be traded, and this would cause a major economic transfer from countries that have used

[168] Tompkins EL (2005) Planning for climate change in small islands: Insights from national hurricane preparedness in the Cayman Islands: adaptation to climate change: perspectives across Scales. Glob Environ Change 15 (2):139-149

fossil fuels to create wealth to those still struggling to alleviate poverty. After convergence, each country would receive the same allocation of carbon dioxide emission rights per head of population and further trading in permits is envisaged.

Development co-operation policy

It is relevant for adaptation, in particular as developing countries are generally the most vulnerable to the impacts of climate change. Organization for Economic Co-Operation and Development analysis indicates that a significant portion of official development assistance (ODA) is directed towards activities potentially affected by climate risks, such as water supply and sanitation, or energy and transport infrastructure, yet very little attention is paid to adaptation concerns within these investment decisions. Strong and early international action is needed to stabilize green house gases emissions at a level that would prevent dangerous interference with the climate systems by human activity. Countries are working together through the UNFCCC to develop a comprehensive framework for action post 2012. A number of countries including the European Union, Canada and Japan have underscored the need to at least halve global emissions by 2050.

Climate change resilience and adaptive capacity

Higher temperatures bring more droughts and the spread of heat-related, infectious diseases; result in the loss of homes, jobs and food. The far-reaching effects of climate change hit poor people the hardest. They have the fewest resources and the least capacity to prepare for, plan for, and withstand climate change crises. Climate Change Resilience Initiative aims to catalyze attention, funding and action to promote resilience to climate

change on several levels. Climate change resilience is enhanced when ecological governance sustains the resilience of ecosystem and community in dynamic equilibrium, and where these healthy systems are linked up across regions. Climate resilience comes from having the capacity to mitigate or adapt to changes in climate. It signifies the capacity of climatic systems to absorb disturbances and surprises from the climatic patterns[169]. It can mean the ability to reorganize so as to retain the same essential function, structure and identity. Climatic resilience is a state of dynamic equilibrium which enables climatic systems to grow and evolve while keeping their coherence.

Adaptive capacity is the ability or potential of a system to respond successfully to climate variability and change, and includes adjustments in both behavior and in resources and technologies. The presence of adaptive capacity has been shown to be a necessary condition for the design and implementation of effective adaptation strategies so as to reduce the likelihood and the magnitude of harmful outcomes resulting from climate change. Adaptive capacity also enables sectors and institutions to take advantage of opportunities or benefits from climate change, such as a longer growing season or increased potential for tourism. The two aspects of climate resilience and adaptive capacity fit in climate change adaptation in that both address the measures that can be applied to reduce the adverse effects of climate change and promote sustainable development.

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APPENDIX 1: INTRODUCTION LETTER

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6th September, 2017

TO WHOM IT MAY CONCERN
RE: AHMED ABDULLAHI SHEIKH – R52/82017/2015

This is to confirm that the above named person is a bona fide student at the Institute of Diplomacy and International Studies (IDIS), University of Nairobi pursuing **M.A. in International Conflict Management.** He is working on research project titled: **"EFFECTS OF CLIMATE VARIABILITY ON HUMAN MIGRATION DYNAMICS: A CASE STUDY OF IFO REFUGEE CAMP DAADAB COMPLEX - KENYA".**

Any assistance given to him to facilitate data collection for his research project will be highly appreciated.

Thanking you in advance for your cooperation.

Yours sincerely,

UNIVERSITY OF NAIROBI
APPROVED
DATE:.....
SIGN:.....
INSTITUTE OF DIPLOMACY & INTERNATIONAL STUDIES

Prof. Maria Nzomo
Director, IDIS
&
Professor of International Relations & Governance