



United Nations
Economic Commission for Africa



International Migration and Development in Africa:

The Migration and Climate Nexus



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List of Acronyms

ACPC	African Climate Policy Centre
ACGSD	African Centre for Gender and Social Development
AU	African Union
AUC	African Union Commission
ECA	Economic Commission for Africa
ECWAS	Economic Community of West African States
ENSO	El Nino Southern Oscillation
EU	European Union
HSD	Human and Social Development Section
ICPD	International Conference on Population and Development
IOM	International Organization for Migration
IPCC	International Panel on Climate Change
MDGs	Millennium development Goals
NAPA	National Adaptation Programme of Action
NEPAD	New Partnership for Africa's Development
ODA	Official development Assistance
OECD	Organization of Economic Cooperation and Development
WHO	World Health Organization
UNDP	United Nations Development Programme
UNFCCC	United Nations Convention on Climate Change
UNFPA	United Nations Population Fund

Forward

This is the third report on international migration and development in Africa. It focuses on the migration and climate nexus as an important theme for development policy in Africa. Like its predecessors, *Implications for Development in Africa* (2006) and *Impacts of the Financial Crisis, Human Rights, and Regional Integration* (2009), this report represents the United Nations Economic Commission for Africa's (ECA) contribution to the policy dialogue on development in Africa.

The focus on the migration and climate nexus is not arbitrary. Rather, it is motivated by concerns about the implications of increasing migration streams and climate change for development in Africa. Migration is both an important source of development financing, as well as a means for building human capital through transferring knowledge and technology. Although migration is indispensable for development in Africa, it is also draining the continent of its best and brightest people. Indeed, migration is intrinsically connected with economic and social development in Africa. Therefore, development policy will have to maximize the benefits while minimizing the costs of international migration.

Traditionally, migration has been understood as movements associated with conflict, economic hardship, and income disparities both between and within countries, especially between rural and urban areas. Factors related to the environment and climate change have been considered of secondary importance in explaining the patterns of migration and population distribution in the continent. However, recent research provides unequivocal evidence of the migration and climate nexus and its crucial importance for development in Africa. This report aims to highlight the often overlooked dimensions of this nexus and its linkages to development policy in Africa.

It is hoped that this report will alert policy makers, planners, and researchers in Africa to this relatively neglected topic and to its importance for protecting both human welfare and the environment. There is urgent need to factor the interconnected relationship of migration and climate into long-term policy strategies and development plans in Africa.

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Executive Secretary of the Economic Commission for Africa

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Executive Summary

In Africa, neither migration nor climate change has received adequate attention. Though it contributes to poverty reduction and development finance (through remittances, skills transfer, etc.), migration is not adequately mainstreamed in national or regional development plans or strategies. Likewise, the impacts of climate change on sectors of the economy, such as health and agriculture, do not appear in plans and strategies at the sector and macro/national levels, or in the assessment of progress of international development agendas such as the MDGs. This national and regional neglect mirrors the relative absence of climate change in the international migration and development discourse. International reports, such as the report of the Global Commission on International Migration, and recommendations of the High Level Dialogue on international migration and development have not explicitly mentioned the impacts of climate change. Similarly, migration was barely mentioned in the climate change negotiations that took place in Kyoto, Copenhagen, and Cancun.

Most of the key issues in the migration and climate nexus suffer from the paucity of time series data and policy research, and from the lack of adequate techniques for measuring the actual links involved in these related processes. These factors, among others, inhibit effective planning and policy making, as well as appropriate responses to the challenges at hand. In addition, neither the policy makers nor the public are sufficiently sensitized to the migration and climate change issues. Research is needed to bridge the gaps between policy and action, and to create knowledge and awareness of the issues and concerns. Furthermore, there is a need to sensitize policy makers and the public to the importance of the migration-climate nexus for development and for the survival and livelihood of the people.

In focusing on this theme and targeting planners and policy makers in Africa, this report argues that the migration and climate nexus is multidirectional and has profound policy implications for development and human welfare on the continent. While climate change is the result of both human and natural activities, migration, is often viewed only as a response to social and economic factors. However, the impetus may also be natural, i.e. climate change induced, as well. It is important to understand that climate change may provoke migration, but the act of migration causes climate change as well. Causality in the migration and climate nexus is, therefore, multidirectional.

Moreover, there are a plethora of intervening factors that modulate the migration and climate nexus in Africa. This report provides succinct analyses of the important factors in the migration and climate nexus: vulnerability, poverty and conflict, population growth and distribution, rapid urbanization, youth and gender. These factors impact climate change and the propensity to migrate. They are also critical variables in identifying those most likely to be affected by climate change.

Based on the analysis of the migration and climate nexus, the report highlights the following ten policy recommendations and actions:

1. **Develop** conceptual and theoretical frameworks and technical tools, such as models and indicators of the migration and climate nexus; and use these tools to generate policy research, training, and capacity development.
2. **Collect** data, particularly gender disaggregated data; document and share best practices; and conduct statistical analyses on the migration and climate nexus for supporting development plans and policies.
3. **Invest** in research and undertake integrated and multidisciplinary studies on the migration and climate nexus. Such research should highlight how the drivers of existing migration streams might be impacted by, or sensitive to, climate change. Other relevant issues include: the extent and nature of migration in those parts of Africa most susceptible to climate change, human vulnerability, migration as an adaptive mechanism, a risk analysis of displacement, concrete and practical risk-reduction mechanisms involving mobility, potential impacts of displacement, and the implications of displacement for regional peace and security.
4. **Support** collaboration between research institutions; nurture and facilitate collaboration and coordination of research on climate change and migration in Africa; and support South-South partnerships on the migration and climate nexus.
5. **Sensitize** all stakeholders, especially policy makers, to the interplay of migration and climate, and to their impacts on water availability, health, education, food security, and indeed, peace and stability. Sensitization should address international, national, and regional policy agendas, the availability of funds to address the impacts of climate change, the criteria and requirements for qualifying for such funds, as well as methods for accessing, managing, and evaluating them.
6. **Develop** policies, plans, and programs that are climate sensitive, that identify the most vulnerable communities, and that build local resilience and adaptive capacity in order to reduce the need for the poor to migrate away from affected areas; Ensure that the programs do not further undermine the resilience of the poor when faced with climate change, and where policies and programs already exist, review these to address the potential for migration to assist in adaptation to climate change. Lastly, it is important to develop and implement policies to integrate women into the planning, development, and execution of climate adaptation strategies at all levels.
7. **Establish** new policy frameworks to manage climate-induced migration, and muster effective responses. Such a broad framework should combine political, economic, and security dimensions to adequately address the complex challenges of climate-induced migration. This includes promoting new mechanisms and regional solutions that incorporate economic development, diplomacy, aid, and security. It is critical to set a climate migration and international security agenda for the future.

- 8. Adopt** measures and policies to support migrants, to incorporate both migration and climate change in national development plans, and to ensure the protection of both internal and international migrants against exploitation, abuse, or physical violence. Such measures might include the transferability of social benefits across borders. . Finally, migrant support policies should also focus on migrants to urban slum areas. Providing basic services, such as housing, health, water, education and employment, to this rapidly growing population will continue to be one of the major challenges of the twenty-first century.
- 9. Empower** vulnerable populations to enhance their adaptive capacity and access to services. A key policy area for consideration is assisting those individuals, households, and communities who are unable to migrate because of lack of resources and social networks. This should include the removal and/or relaxation of existing policies and regulations that hinder the utilization of migration as an adaptive strategy to climate change. Policies for empowering the vulnerable should also consider property rights and their impacts on agricultural practices. Finally, policies and measures such as weather insurance and crop insurance schemes should be supported to reduce the vulnerability of rural populations to climate change and increase their livelihood options.
- 10. Promote** urban management and address vulnerabilities to climate change that urban populations face. In particular, governments must address the housing deficit through long-term investment in housing. This will address the problem of urban flooding, as well as the threats that climate change and other factors pose to the health and safety of urban residents. Special measures and plans must also be developed to protect urban centers located in coastal zones.

Chapter 1: Introduction

The migration and climate nexus has triggered debate and numerous scholarly contributions. This reflects the growing concern about the impact of climate change on development and human welfare, particularly in developing countries. On the one hand, extreme weather events related to climate change have affected the livelihood and mobility of millions of people. Worldwide, extreme weather events, such as storms, floods, and hurricanes, have doubled from 200 to 400 during the past 20 years. In 2008 alone, these events have led to the displacement of 20 million people worldwide.

On the other hand, gradual environmental changes, such as drought and desertification, which are especially prevalent in Africa, and rising sea levels, are expected to have even more devastating impacts on the livelihood and movement of people, both within countries and across international borders and continents. Estimates suggest that as many as 200 million people could become climate migrants by 2050. Today, there are roughly 214 million migrants globally, meaning if climate migration projections come true, the total level of worldwide migration will double in the next 40 years. According to the International Organization for Migration (IOM 2009) international migrants will number 405 million in 2050.

Available evidence indicates that Africa will be hardest hit by climate change. Historical climate record shows warming of approximately 0.7 degrees centigrade over most of the continent during the 20th century. Over the next century, this warming trend is expected to continue and be accompanied by rising sea levels and increasing frequency of extreme weather events. Additionally, changes in precipitation patterns will cause a decrease in rainfall over large portions of the Sahel, and an increase in rainfall in Eastern and Central Africa. Southern Africa will experience more droughts, while in Western Africa, drought and desertification will intensify. Northern Africa will also suffer from the impacts of climate change. Most ominous are the expected impacts of rising sea levels on the Nile Delta and the coastal zone of the Mediterranean.

Climate change is already impacting migration on the continent, both within countries and across borders. For example, the semi-arid areas of the Sahel, the Kalahari, and the Karoo have historically supported nomadic societies that migrate in responses to annual and seasonal rainfall variations. Nomadic pastoral systems are intrinsically able to adapt to fluctuating and extreme climates, provided they have sufficient scope for movement. However, the prolonged drying trends since the 1970s have demonstrated the vulnerability of such groups to climate change: they cannot simply move their axis of migration when the wetter side is already densely occupied, and permanent water points fail at the drier side. The result has been widespread loss of human life and livestock, and substantial change in the social systems.

This report addresses the theme of *the migration and climate nexus in Africa*. Despite the current global focus on climate change and on migration, the role of climate change in internal and international migration, and the impacts of migration flows on factors that lead directly or indirectly to climate change in Africa have been largely neglected. The literature on migration and development in Africa is overwhelmingly dominated by economic and social factors. Factors related to climate change have been considered of low importance in explaining both migration and population distribution.

The low importance accorded to the migration and climate nexus is due to several reasons. The most significant are (a) the paucity of data and research, (b) the complex multi-directional linkages and interactions between migration and climate processes, and (c) the lack of integration of migration and climate change in planning and policy making. Undoubtedly, the lack of data and knowledge is detrimental to planning and to the formulation and implementation of development policies sensitive to climate changes and to migration. Moreover, there is a paucity of research on the climatic and environmental effects of development activities, and the consequences of these activities on population patterns and population distributions on the continent. This is due to the difficulties related to understanding fully the nature and complexities of climate change, the magnitude of its impact on decisions to stay or migrate, the contribution of migration itself to climate change, and the gender specific dimensions of the nexus.

Understanding the migration and climate nexus in Africa necessitates data collection and undertaking in-depth research. In particular, the impacts of climate change on human vulnerability and on decisions to migrate, and the effects of migration streams on climate change require time series data and documentation of case studies and best practices. There is need to integrate migration and climate in development policy and planning at all levels and sectors of the economy and society, particularly the ones that are highly prone to the impacts of climate changes.

Both migration and climate impact social structures and institutions. In this context, it is important to understand and address the gender dimensions of the migration and climate nexus. Though women in Africa have traditionally played a major role in adaptation to climate change, they are underrepresented in development policies and decisions. Attention should be directed to the policy gaps in order to use women's resources to effectively combat climate change. Further, it is important to implement policies to integrate women into the planning, development, and execution of climate adaptation strategies at all levels.

Overall, countries will need to establish new policy frameworks to manage climate-induced migration. To date, there are no examples of legislation or policies that address migration resulting from gradual climate changes that may destroy habitats or livelihoods in the future. Such a broad framework should combine political, economic, and security assets to adequately address the complex challenges of climate-induced migration. This includes thinking about new mechanisms and regional solutions that incorporate economic development, diplomacy,

aid, and security. The goal is to muster effective responses, as it is critical to set climate migration and international security agendas in the near future.¹

Within this context, the report aims to document and expand knowledge and understanding of the migration and climate nexus in Africa through:

- a). Providing a broad perspective of the extent and nature of contemporary migration related to climate change, and of the potential effect of future climate change on migration in Africa.
- b). Analyzing human vulnerabilities involved in the migration and climate nexus. Specifically, how people in Africa are vulnerable to the impacts of climate change, and how migration is a mechanism for adaptation to these impacts. Additionally, what is the risk of displacement, and in the event of displacement, what concrete and practical risk-reduction mechanisms can be introduced to save lives and livelihoods, particularly among vulnerable groups?
- c). Analyzing the impact of migration and climate on socioeconomic structures. This includes the role of gender in the migration and climate nexus, the size and characteristics of the populations likely to be impacted, the available resources these populations have for coping with change, preexisting patterns of migration, the economic impact of climate change, and how it influences population movements.
- d). Detailing the options and recommendations for policy, multilateral cooperation, infrastructure needs, and financing arrangements. This will require a review of existing policies and programs relating to migration and population displacement. Two interesting questions for consideration are: what is the potential for migration to assist in adaptation to climate change, and what are the policies that can be put in place to facilitate the use of migration or other adaptation mechanisms to climate change?

Following this introduction, Chapter 2 provides a conceptual framework for the migration and climate nexus. The framework serves the dual purpose of articulating the theoretical and practical linkages and interactions of migration and climate, and providing a logical structure for the report by analyzing the main drivers and key issues. Chapter 3 of the report provides the state of knowledge on migration and climate. This is a succinct review of the literature and a brief look at the nature of increasing migration streams and the impacts of climate change. The chapter analyzes the policy evidence and potential hot spots linking migration and climate. Chapter 4 focuses on the role of population factors in the migration and climate nexus. These include size, growth, and distribution, and urbanization, particularly population settlements in urban and rural areas and coastal zones.

¹ Climate change is, in essence, an attack on the shared interests or collective security of the world, and both climate change and climate-induced migration assault human security. It will, therefore, test the ability of countries to preserve natural resources and protect people. Since we are entering unknown territory, we must expect the unexpected and prepare for worst-case scenarios.

Chapter 5 analyses the key issues and challenges related to youth, migration, and climate change. The main issues here include the changing age structure, the vulnerability of youth to climate change, their marginalization in development activities, youth health and employment, and youth and conflict in Africa. Chapter 6 provides brief analyses of women in the migration and climate nexus. The chapter shows how this nexus is imbedded in social processes that will cause its impact to be unequally distributed among affected groups, with women's groups being particularly vulnerable. The report concludes in chapter 7 with key messages and policy recommendations for actions.

Chapter 2: The Migration and Climate Nexus: Theories, Concepts, Main Drivers, and Key Issues

The migration and climate nexus is multidirectional. Climate change may provoke migration, but the act of migration causes climate change as well.

Climate change is the result of both human and natural activities. Migration, on the other hand, is often viewed only as a response to social and economic factors, but the impetus may also be natural, i.e. climate change induced. However, the nexus between the climate and migration is not unidirectional, but multidirectional: climate change causes migration, and migration causes climate change. Moreover, there are a plethora of intervening factors that modulate the migration and climate nexus.

This chapter is an attempt to simplify and illuminate a complex migration and climate nexus. The main purpose here is to try to understand how migration and climate are linked to each other, and to appreciate the importance of their linkages for development policy. The analysis is structured into two sections. The first provides an overview of the theories and concepts of the migration and climate nexus, while the second section analyses the main drivers and key issues for Africa.

2.1 Theories and Concepts

2.1a Challenges in Establishing the Nexus

Even though climate change has an immense potential to impact migration (see literature review in chapter 3), there is little information on how these two processes interact and influence each other. Despite recently emerging interest and discussion on the topic, the link between migration and climate is still ripe for exploration (Stal & Warner 2009). It is a virgin area for further multidisciplinary studies and analyses, and for the generation of new information and policies.

Migration and climate are individually complex and ever-changing phenomena. Each is affected by numerous factors. For instance, time and space largely determine what kind of migration or climate change one is referring to (Kniveton *et al* 2008). With regard to time, climate change and its impacts on the environment vary from the minute it takes for an earthquake to happen to the centuries it takes for continents to drift. For migration, it might be short-term or long-term, and it might be seasonal, circular, or permanent. In terms of space, climate change may affect a whole region or a small coastal town, and migration may be short or long distanced.

The science of climate change is complex on its own. When coupled with studying its impacts on societies, which have different amounts and kinds of resources and varied adaptive capacities to environmental stressors, it becomes even more complex.

The complex interaction of environmental, social, cultural, and economic factors influencing decisions to migrate makes the link between migration and climate a difficult task to establish. Research shows that both the causes and consequences of migration are determined by the social and ecological contexts from which people move and to which they move. If the climate change is a slow onset change, such as drought, it becomes particularly difficult to make a direct link and fully assert that migration occurred due to the climate change. This is because other coinciding changes, such as improving incomes, better situations in urban centers, or declining prices paid to producers, may also play a role in the decision to migrate.

Furthermore, because climate modeling techniques have not yet been developed to properly take account of the impact of individual choice, the variability of future emissions, and the potential of international actions, it has been difficult to predict the impacts of climate change on migration (IOM 2009).

The challenge of the migration and climate nexus is compounded by the paucity of time series data and policy research. Many countries do not collect, publish, or standardize detailed and relevant data on migration streams or climate change and the subsequent impacts on people and development. While documented information about the movement of goods and investment flows are increasing every day, information about migrants and migration remains weak (Tomas & Summers 2009). For example, many developing countries do not account for migration in their censuses (Laczko & Aghazarm 2009). Without adequate data on migration, establishing an empirical link between this important phenomenon and climate change remains a challenge. However, lack of information does not suggest that the migration and climate nexus should be neglected. On the contrary, its importance for development policy calls upon all stakeholders to invest in data collection and analyses.

Another factor contributing to the difficulty of establishing an empirical link between the migration and climate nexus is the fact that different stakeholders produce different kinds of data to match their needs. Stal and Warner (2009) report that humanitarian actors tend to focus on the current situation, and therefore, current data. In contrast, climate scientists often focus on the future impacts of climate change, and collect long-term time series data. Moreover, there is rarely an interdisciplinary approach between scientists studying migration and population change and those studying the environment and climate change. Consequently, there is a need to integrate these disparate research approaches and findings in order to generate new knowledge on the migration and climate nexus.

In addition, the lack of consistency among researchers, policy makers, and international organizations on definitions of terms and concepts such as the environment, adaptation, and disasters, makes the endeavor to establish a scientific and empirical link between migration and cli-

mate even more daunting. IOM is among the few entities that have made an effort to establish a definition for those who move due to environmental changes. The IOM definition of environmental migrants, developed in 2007, refers to:

“...persons or groups of persons who, for compelling reasons of sudden or progressive change in the environment that adversely affects their lives or living conditions, are obliged to leave their habitual homes, or choose to do so, either temporarily or permanently, and who move either temporarily or permanently, and who move either within their country or abroad” (IOM 2009).

Thus, the complexity of the interaction (because several factors could influence the decision to migrate), the unpredictable aspects of climate change (which hinders effective projections), the lack of time series data, the unsatisfactory interdisciplinary approach among those studying migration and climate, and the lack of linguistic standardization hinder comprehensive understanding of the migration and climate nexus.

2.1b Theories on the Migration and Climate Nexus

Despite the aforementioned challenges in establishing a clear link between migration and climate, scientists have been developing relevant theories in this field since the late 1950s. The early groundwork was laid by Peterson’s (1958) general typology. He identified migration in primitive ages as human mobility from ecologically risky areas to safer locations. This theory identifies the environment as a push factor and migration as an innovative response.

The stress–threshold model developed by Wolpert (1986) characterizes the environment as a stressor that may lead to migration as well as a primary factor in deciding the utility of a potential destination. Speare (1974) expanded upon the utility concept and developed a ‘residential mobility decision making model’ that includes environmental hazards.

In general, the approaches used in researching the migration and climate nexus can be grouped into minimalists and maximalists clusters (Johnson 2010). This distinction, initially coined by Suhrke (1994), characterizes the maximalists as those who view environment degradation as a direct cause of large migration streams, both internally and internationally (Suhrke 1994). On the other hand, while the minimalists see the environment as a variable that may contribute to mobility, they refrain from making firm conclusions about directional causality due to analytical difficulties and shortage of data.

Migration scientists generally agree that migration is driven by push and pull factors, as well as intervening forces (Kniveton *et al* 2008). Push factors are linked to the place of origin and may include political instability, inadequate economic opportunities, and a lack of access to resources or employment opportunities. Pull factors, on the other hand, are linked to the place of destination, and include higher wages, better employment opportunities, greater stability, and improved access to resources and services.

The intervening factors facilitate or restrict migration. These may include social networks, ease of transportation, spread of infectious diseases, and most importantly, government policies, including free trade and movement areas, and trade liberalization. The link between migration and climate is commonly presented in this framework of push/pull factors and intervening forces. Environmental stressors are seen as a push factor. A push/pull argument that does not take into account the intervening factors assumes that societies that are affected by climate change are technologically constant and are unable to circumvent the impacts of climate change on the environment (Johnson, 2010).

Climate change may affect migration in four ways:

1. Intensification of natural disasters
2. Adverse impacts of drought and warming on agricultural production
3. Rising sea levels that destroy livelihood in coastal settlements
4. Increased competition and conflict

According to Martin (2009), climate change may induce human mobility in four major ways. The first is through the intensification of natural disasters that destroy livelihoods and assets. The second is the impact of warming and drought on agricultural production and access to clean water. Third, rising sea levels threaten the viability of life in coastal areas. Finally, climate change may exacerbate competition over natural resources, leading to conflict and in turn, migration.

2.1c The Dimensions of Climate Induced Migration

One factor impacting who, why, when, and where people migrate is the nature of climate change. Rapid onset disasters, such as floods, and slow events, such as drought and desertification, have very different implications for migration. Three useful dimensions for analysing migration are: (1) internal-international, (2) voluntary-forced, and (3) temporary-permanent (Lackzo and Arghazarm 2009).

With regards to the internal-international spectrum, existing patterns of migration reveal that the bulk of migrants in the world move within their own countries. Consequently, most climate-induced migration tends to follow patterns such as rural to urban migration. Even in instances where international migration occurs, it is usually to a neighbouring developing country (Lackzo and Aghazarm 2009). The prevalence of short-distance migration may be largely influenced by the high cost and social contacts required for long-distance movements. Moreover, financial resources tend to decrease as the impact of climate change jeopardises livelihoods, thus making long distance migration financially impossible.

A second dimension of migration attempts to assess the degree of choice migrants have in decisions to migrate, i.e. whether migration is forced or voluntary. In general, migrations associated with famine and food crises resulting from droughts and flooding, or with a significant decline in natural capital as a result of land degradation or deforestation, are considered to be more forced than voluntary (Barnett and Webber 2009). On the other hand, migration decisions that are triggered by perceived risks of future environmental changes, rather than immediate

circumstances, may be considered more voluntary. Likewise, capital-intensive, long distance labour migration to developed countries is also considered to be mostly voluntary.

Evaluation of the temporary-permanent dimension of migration often hinges on the nature of the climate change. In the case of rapid onset change, such as earthquakes and floods, Barnett and Webber (2009) argue that temporary migrations are more prominent. They contend that most people displaced by natural disasters often seek to return to the affected lands in order to rebuild and continue their lives in familiar territory. On the other hand, poorer, more disadvantaged groups have a higher tendency to migrate following a disaster because they are less likely to own homes or have jobs that hold them to a particular place. Moreover, there is a higher probability that they live in vulnerable, densely populated areas that have suffered more damage. Naik (2009) offers a different perspective. He suggests that post-disaster migration may not occur at all in places where it might be expected because people overcome the initial fear caused by the event and soon feel psychologically able to remain within high-risk areas.

In the case of slow changes, permanent migration is more frequent. This is especially true in cases where climatic changes has undermined the contribution of the natural environment to capital, and other sources of income and livelihood do not exist (Barnett and Webber 2009). For instance, severe drought in the Sahel had led some pastoralists to permanently migrate to The Sudan (Barnett and Webber 2009).

Although responses may be determined by the nature of the change, i.e. rapid onset or slow events, the characteristics of who is affected also impact whether or not people choose to migrate. Estimates often only capture those at risk, but there is a general consensus that only a percentage of them will actually migrate. Aside from the fact that a community of people affected by environmental change will most probably not have a homogenous reaction to the said event, factors such as income, home and land ownership, age, and gender play determining roles in the decision to migrate.

With regard to income, migration usually requires financial resources to cover transportation and other costs. It has been observed that the rate of migration from one place to another increases in correlation with the income and wage differences between the two places (positive correlation). Net migration declines as the income and wage differences between the places of origin and destination shrinks; this is referred to as the 'migration hump' (Barnett and Webber 2009). The poor, who are the worst affected by environmental conditions, often consider migration as a means to escape economic hardships, but the impact of environmental disruptions on their income is likely to push them further into poverty, which further reduces their ability to migrate. Studies from the Sahel, for example, show that decreases in rainfall and the resulting bad harvest tend to decrease households' abilities to invest in long distance migration (Kniveton *et al* 2009). Similarly, Kniveton *et al* (2009) observed in Burkina Faso that food scarcity during severe drought caused prices to increase, which forced people to spend more on basic needs rather than long distance migration (Kniveton *et al* 2009). Therefore, the existence of a migration hump indicates that the poorest of the poor are unlikely to migrate.

Just as a lack of income impacts migration decisions, indicators of wealth, such as land or home ownership, are critical variables in the decision as well. Findings from both developed and developing countries show that homeowners are less likely to migrate than non-homeowners (Naik 2009). Consequently, overall income growth has been found to contribute significantly to reducing migration as well as the impacts of climate change. This operates through greater willingness to pay for personal security and greater support for public investment in disaster management and risk reduction (Blankespoor 2010, Wheeler 2011).

In addition to income, it is well documented in the literature that migration is age and sex selective (see chapter 6, which addresses the gender dimension of the migration and climate change nexus). Young men have the highest propensity to migrate, while women, children, and the elderly stay behind. Although male migration undoubtedly has its own set of difficulties, this decision often leaves women more vulnerable and exposed to poverty.

One reason migration is sex selective is women's greater vulnerability to environmental change. Vulnerability to environment change is connected to poverty, and women, as a group, are poorer than men (Brown, 2008). Furthermore, the absence of males will, at least temporarily, reduce household income streams, and any forthcoming remittances will not be immediate, further exacerbating women's poverty.

Although the absence of males may empower women as de facto heads of households, male migration may also lead to insufficient labour reserves and additional labour burdens for women (Naik 2009). For example, on the Island of Lake Victoria in Kenya, it was observed that women had difficulty in continuing some of the highly labour intensive agricultural activities usually carried out by men (Bilsborrow 2001).

In addition to problems arising from unmet labour needs, cultural taboos and restrictions often restrict women's ability to migrate. Gender discrimination may also hinder women's participation in agricultural activities and deny them access to machinery that could improve their agricultural productivity. Consequently, male migration has the unintended consequence of increasing women's vulnerability and poverty.

2.1d The Impact of Migration on Climate

Although the discourse and research regarding the migration and climate nexus is dominated by the impacts of the latter on the former, the impact of migration on the environment is also acknowledged. One reoccurring hypothesis is that migrants have more adverse impacts on the environment in destination countries than non-migrants (Bilsborrow 2001). This arises from the assumption that migrants, especially the temporary, are less concerned about the effects of their activities on the environment since they don't have a sense of belonging and stewardship to the place. Additionally, migrants may bring practices of resource use which may be inappropriate for their new homes. Thus, migrants who have moved as a result of environmental degradation create degradation in destination regions. The result is a vicious cycle of the migration

and climate nexus. Despite the internal logic of this argument, there is not yet sufficient data to confirm this assertion.

Whereas migration may adversely affect destinations, research suggests it may positively impact places of origin. Bilal (2001) shows that in some cases, depending on land use by the remaining population, countries and areas of origin might experience reforestation and re-growth of vegetation following out-migration due to decreased pressure on land. Moreover, in some instances, households with migrant members cultivate significantly less farm land than households without migrants, because the remittances they receive make the hard labor of cultivation less necessary. This, in turn, may lead to forest and vegetation recovery. Furthermore, remittances from migrant members of households have proved to play a crucial role in financing innovation of farming methods (Tacoli 2009). Lastly, in rural areas, the interplay of gender roles and male out-migration may inadvertently positively impact the environment as reduced labor means women are less able to maintain or expand the environmental modifications that result from intense agriculture practices .

2.1e Human Rights in the Migration and Climate Nexus

The on-going and projected impacts of climate change have led some academics to highlight the human rights concerns posed by the phenomenon (Zetter 2009). Despite the increasing attention to the issue of climate change, no legal provisions have been made in either the UN Framework Convention on Climate Change (UNFCCC), or the Kyoto Protocol to protect and assist those who will be directly affected by the impacts of climate change (IASC 2008). They remain unacknowledged by any binding international treaty, nor is there an international body specifically assigned to monitor and provide for them. This lack of provision is often attributed to the lack of an accepted definition for environmental refugees.

One serious implication of this unclassified status is that, with the exception of relocations resulting from extreme weather events, climate migrants are not guaranteed access to financial grants, foods, tools, shelter, schools, and clinics when displaced (Brown 2008). In other words, the failure to classify climate change-induced migrants may impinge upon affected people's ability to completely enjoy internationally protected human rights as stipulated in the 1948 Universal Declaration of Human Rights.

Although migration is recognized as a coping strategy in response to the changing environment, there are still some people who do not or cannot migrate due to financial constraints, old age, and/or lack of knowledge on where to go. Living in high-risk areas where livelihoods are severely threatened or where natural disasters have occurred causes exposure to increased health problems and declining life expectancy (Barnett and Webber 2009). The right to life is no longer guaranteed in instances where climate change reduces natural capital and income to the extent that people are subjected to starvation and other life threatening conditions that could increase morbidity and mortality.

Even in cases where people migrate, the act of being forcefully displaced or removed from a familiar environment is likely to lead to emotional trauma, loss of property, lack of access to assistance, lack of protection for women and children, exposure to trafficking and other forms of exploitation and even discrimination, all of which deny the enjoyment of the full range of internationally protected human rights (Zetter 2009). Climate change and its effects may also be said to infringe upon affected populations' rights to development, health, food, and water as well. Clearly, this is an issue that the international community should address sooner rather than later.

2.2 Main Drivers and Key Issues in Africa

The foregoing analysis has explained the complexities and challenges involved in the theories and conceptualization of the migration and climate nexus. Below, the main drivers and key issues of the migration and climate nexus in Africa are briefly analyzed in light of the following themes:

- a. Vulnerability
- b. Population growth, and distribution
- c. Conflict and poverty
- d. Gender as a cross-cutting theme
- e. External Factors

The multidirectional causality of migration and climate nexus is modulated by a plethora of intervening factors such as vulnerability, population growth and distribution, conflict and poverty, gender, and external factors.

2.2a Vulnerability

Vulnerability is important for conceptualizing and understanding the drivers and key issues in the migration and climate nexus in Africa. It has been highlighted in Climate Change 2001, the Third Assessment Report of the IPCC (IPCC 2001). The report defined vulnerability in terms of climate damage or harm to the environment. It established how human activities such as burning fossil fuels and changes in land use are modifying the global climate, with projected temperature increases over the next 100 years that could affect human welfare and environment. Also, the report referred to increasing human vulnerability as a result of climate change and environmental degradation.

More recent research has defined vulnerability as the “potential of experiencing harm or loss from some event or condition, and this potential is related to factors that affect the likelihood of the event or condition to occur and the ability to cope with the event if and when it occurs” (McLeman and Smit 2006). Based on this definition, McLeman and Smit recognize vulnerability as a dynamic process that can be expressed as the probability of human systems being exposed to hazardous conditions such as climatic events (drought, desertification, rising sea level, etc.), and the adaptive capacity of the human systems to cope with such changes when they occur.

Vulnerability changes positively with exposure and negatively with adaptive capacity. In other words, climatic events expose people to harmful conditions that might negatively impact their lives, depending of course, on the nature and severity of these events. People may or may not decide to migrate, depending on the level of their vulnerability. However, if the adaptive capacity of human settlements is high, and is supported by some adaptive policy measures such as social security and insurance, vulnerability to climatic changes will be reduced.

The international policy agenda on social and human development and on sustainable development have frequently referred to vulnerability, marginalization and exclusion of population groups in the development process, and to the harm that poor people can do to the environment. For example, The 1995 World Summit on Social Development called for the integration and achievement of inclusive development. Social and human development is about enlarging people's choices and rights to development through actions that would enable and empower them to participate and, at the same time, fully enjoy the fruits and benefits of development.

In Africa, people are socially and economically vulnerable, and at the same time, they are highly exposed to the impacts of climate change. Their capacity to adapt and mitigate the negative impacts of climate change is, therefore, weak. Another important dynamic contributing to the high levels of vulnerability on the continent is the fact that both the economies of African countries and the majority of African citizens are largely dependent on natural resources for their livelihood and survival. This high dependency dramatically increases the vulnerability of the people and economies of the continent to climatic change.² The vulnerability of people is further aggravated by the fact that production and consumption patterns themselves are contributing to the creation of climate process drivers such as emissions and concentrations of greenhouse gases and aerosols.

A full picture of vulnerability draws on the multiple dimensions of social and human deprivation, including social exclusion, gender, migration, employment, health and education. Also, it draws on the coping strategies adopted by those directly affected. It brings together concepts such as adaptation, mitigation, copying mechanisms, social cohesion, social harmony, and social integration, to link and synergize the policies and actions of the migration and climate nexus.

2.2b Population Growth and Distribution

Africa's population increased from 230 million in 1950 to over a billion in 2010. It is expected to reach 2 billion by 2050. These increasing numbers indicate that more people will be subject to the impacts of climate change, and more of them may be expected to migrate in response. Moreover, across the continent, increasing population has been a major cause of environmental degradation, as manifested in increased deforestation, soil erosion, and depletion of natural

² The high dependence of the African economies on natural resources and the volatility of economic growth to natural conditions and weather hazards is highlighted in a series of Economic Reports on Africa jointly published by ECA and AU.

resources. In Malawi, for instance, fuel-wood provides 93 percent of the energy source for the population. This puts enormous pressure on the forest cover in the country. A growing population will only increase this pressure. This trend of rapid population increase leading to increased demand is present across the continent and strains all forms of natural resources.

Another facet of the growing population across the continent is its composition. Population numbers are rapidly expanding in all age groups in most of the countries³ due to past high fertility levels, but most of the population is below the age of 35, with most falling into the 15 to 24 youth cohort. The rapid increase in the total working age population is expected to lead to increasing use of energy, and consequently, higher emissions of greenhouse gases. This cohort is also largely excluded and marginalized in development activities and is characterized by high levels of unemployment and a high propensity to migrate internally and internationally.

Besides population size, growth, and composition, the final aspect of the migration and climate change nexus in Africa is population distribution. Where do people live in Africa and how does climate change affect their settlements, both in urban and rural areas? How does it affect their decisions to stay or to migrate? The impact of high population growth on climate change and migration will be more significant when the increased pressure on resources and levels of carbon dioxide emissions are analyzed in terms of the growth distribution.

2.2c Conflict and Poverty

The high prevalence of conflict and poverty is another dimension of the migration and climate nexus in Africa. In addition to being the two most important challenges to development, conflict and poverty are among the most important drivers of population displacement in the continent. Africa already hosts the highest number of displaced and stateless people in the world. It is inevitable that climate changes will become a third critical driver of population displacement. Climate migration is often a result of natural disasters, but resource scarcity, food security, and water shortages will also be important drivers of climate-induced migration in Africa in the 21st century. Though refugees from natural disasters usually return home eventually, future climate migrants could be permanently forced to leave. Moreover, both climate change and increased migration are likely to exacerbate both poverty and conflict.

³ Excluded from this general pattern are countries that have experienced the demographic transition, such as Tunisia and Mauritius, and countries whose age structure are heavily impacted by high mortality due to AIDs and other factors.

2.2d Gender as a Cross-cutting Theme

Gender issues and dimensions are often neglected in both climate negotiations and the migration and development debate. However, this has recently begun to change. There is growing awareness that women need to be protected, engaged, and empowered for migration and development issues to be adequately addressed, and for climate solutions to truly succeed. Specifically, it is important to consider how women can help harness the potential benefits of migration for development, and how they can contribute to adaptation and mitigation strategies to combat climate change.

Understanding the gender dimension of climate change and human movements requires consideration of two important developments in Africa: a) the feminization of poverty, and b) the increasing number of women in the migration streams. With regard to poverty, about half the population of Africa lives in extreme poverty and one third in hunger (UNECA 2009). Poverty is higher among women than among men in Africa, and more prevalent among women in Africa than other regions in the world. Recent evidence also shows that poverty is more widespread among female-headed households in Africa. This is partly due to women's comparatively limited access to the resources of production, including land, technology, and credit (UNECA 2009).⁴ Finally, existing social mores make women more vulnerable to the impacts of climate change than men, and as a result, they are much more devastated by poverty and natural disasters than men.

In terms of migration, there is evidence of increasing number of women in the migration streams within Africa and abroad (UNECA 2006). In Western Africa, for instance, the number of migrant women increased from 2.2 million in 1990 to 3.7 million in 2005, growing to 3.9 million in 2010. More and more women in Africa are leaving their own countries or localities to earn a living elsewhere. This trend is related to poverty, to the failures of the traditional food production economy, and to the increasing difficulties men face trying to support their households from wage earnings. One positive of migration is that migrant women are claiming greater freedom to move independently and meet their own needs.

2.2e External factors

The main drivers and key issues of the migration and climate nexus in Africa must be understood in conjunction with the external factors and within a global framework. Economic, social, and political factors in both African countries and beyond the continent contribute to climate change and push and/or pull migrants.

The global context of the migration and climate nexus is evidenced by the recent European Union report on *Climate change and international security* (EU 2008). Based on its analysis of

⁴ For more details on this issue please refer to ECA, 2009, *African women's report 2009: measuring gender inequality in Africa - experiences and lessons from the African gender and development index*.

mass migration and political destabilization resulting from climate change, it concludes that these “put the multilateral system at risk.” While this is a dark assessment, it appropriately calls attention to the issue. In response to growing migration pressures in Northern Africa, the European Union and especially the Spanish government have tightened border controls. The Spanish government has sent Interior Ministry officials to African countries, such as Senegal, Guinea-Conakry, Mali, Mauritania, and Cape Verde, to discourage potential migrants from leaving. Both the E.U.’s analysis and Spain’s actions reflect the understanding that increased climate-induced migration amplifies existing security and humanitarian threats, and increases pressure on weak states in Africa.

Consequently, though the focus of this report is the migration and climate nexus in Africa, it has repercussions beyond the continent.

Chapter 3: The Migration and Climate Nexus in Africa

Existing knowledge on the migration and climate nexus indicates major changes in global climate are projected to become more noticeable in coming decades and may have serious consequences for human populations. One area of concern is increasing temperatures on land and sea. Air temperature is estimated to increase by 2°C above pre-industrial levels by 2050. Once the increase in global average temperature exceeds 3°C, food production is likely to be adversely affected. Besides air temperature, sea-surface temperatures are expected to rise as well. Warming sea temperature is a threat to coral ecosystems and may, in turn, impact the abundance of pelagic, and aquaculture fisheries (Barnett and Webber 2009).

Changes in precipitation are expected to alter rainfall events, causing more intense rainfall in some places and less frequent rain and drought in others. This will exacerbate current patterns of flooding and drying. Moreover, variations in rainfall and the expected decline in mean precipitation in certain regions will put water supply at risk. It is also expected that climate change will cause sea levels to rise. According to a World Bank study, sea levels rising a single metre would displace 56 million people in 84 developing countries (Naik 2009). Barnett and Webber (2009) forecast rising sea levels will make coastal populations more vulnerable to intense flooding and subsequent land loss due to erosion.

Regional climate changes are also expected. Phenomena such as the El Nino Southern Oscillation (ENSO) and the Asian monsoon will intensify extreme weather events such as hurricanes and cyclones as well as regional precipitation levels. The effect of ENSO is evident in Southern Africa, which has had record heavy rains often accompanied by severe floods such as those in Mozambique in 1999/2000. Although all regions are expected to experience some of these adverse effects of climate change, less developed regions will be more vulnerable. The Stern Review (2006) has established that developing countries suffer the worst impacts from severe weather events resulting from environmental changes; of the 262 million people affected by climate disasters annually from 2000 to 2004, over 98 percent of them were in the developing world (Naik 2009).

One important determinant of vulnerability to climate change is the state of human development in affected areas. People in countries ranked high in the human development index (with high income, good health and high level of education) are most likely to cope with impacts of climate change. The reverse is true for people who lack such capabilities. Between 1994 and 2003, natural disasters in countries of high human development killed an average of 44 people per event, while disasters in countries of low human development killed an average of 300

people (Naik 2009). The great majority of African countries rank low on the human development index and consequently, their populations are extremely vulnerable to climate changes.

In sum, Africa is a continent highly vulnerable to climatic changes. Most African countries are not on track to achieve any of the Millennium Development Goals, a clear indication of the state of human and social development on the continent. About 41 percent of all Africans reportedly still live on less than one dollar per day, and malnutrition affects over 200 million (Fischer and Vollmer 2009). Climate change will, therefore, impact the masses of socially and economically vulnerable people in Africa, precisely those who do not have the means and resources to adapt or mitigate its impacts.

3.1 Documenting the Complex Impacts of Climate Change in Africa

3.1a Slow and Rapid Impacts

Climate change may affect the environment rapidly, as in the case of natural disasters, or the impact may be much slower and more gradual, as in the case of desertification. In response to rapid-onset changes, migration is a typical survival strategy. According to a joint report by OCHA, IDMC, and the Norwegian Refugee Council (Laczko and Aghazarm, 2009), in 2008, at least 36 million people worldwide were displaced by sudden natural disasters. In sub-Saharan Africa specifically, studies reveal that the effect of natural disasters on emigration is statistically significant: one additional natural disaster per year could lead to an increase in net out-migration of 0.6 per 1000 (Fisher and Vollmer 2009). Sudden climate change might also lead to immediate displacement of people. For instance, thousands were displaced following the floods and hurricanes in Mozambique in 2001, 2007, and 2008 (Warner *et al* 2009).

Even though they garner less media attention, slower more gradual aspects of climate change, such as droughts and desertification, affect and displace far more people than sudden environmental events (UNFPA, 2009). According to the 2009 international emergencies disaster data base, 718 million people were affected worldwide by storms between 1979 and 2008, while 1.6 billion people were reported to have been affected by droughts (Laczko & Aghazarm 2009). UNDP estimates that more than 100 million people in Southern Africa are severely affected by desertification and drought (Fischer & Vollmer 2009). Similarly, worsening drought and water scarcity have threatened livelihoods and impelled migration across Northern Africa, especially in Sahel (Fischer & Vollmer 2009, Warner *et al* 2009)

3.1b Climate-induced Migration

Estimates of how many will migrate worldwide as a result of climate change range from 200 million (Myers 2001) to 1 billion (an estimate by Christian Aid). Migration is but one possible

response to effects of climate change, so not everyone exposed to the risks will choose or be able to migrate. In fact, the number of people who cannot migrate in response to climate change may exceed the number of those who do (Barnett and Webber 2009). Thus, these estimates actually reflect the number of people residing in risk areas, but they do not properly reflect those who will actually migrate.

Several other factors, including the fact that migration requires financial resources and social support, which may decline as effects of climate change heightens, affect the decision to migrate (Tacoli 2009). Moreover, other adaptation mechanisms, such as income diversification schemes like non-farm work, remittances, changes in planting practices, inter-household transfers and loans, food rationing, the selling of assets, reliance of relief aid, and use of animal holdings, are responses to slow or rapid onset climate change (Naik 2009). For these reasons, current and future estimates of climate-induced migration should be dealt with caution.

While the general argument and much of the evidence shows that out-migration is a coping strategy to climatic events or processes, some situations and analysis show the opposite. For example, following a rapid onset disaster, the affected areas may experience increased immigration. Displaced people may return with relatives to assist in the recovery, or there may be an influx of agency personnel engaged in recovery or new migrants seeking employment in the reconstruction process (Barnett and Webber 2009). Similarly, some argue that a less severe total temperature rise of 2 to 3 degrees over the 21st century, rather than a rise of 4 to 5 degrees, will actually make some places better able to sustain larger populations. For example, a 2005 study predicts that a warmer north Atlantic and hotter Sahara will cause more rain for the Sahel, which will improve agricultural capabilities (Brown 2008).

3.1c Climate change and environmental drivers of migration in Africa

Although it is widely acknowledged that African countries played little part in the green house emissions that will likely be a major catalyst of climate change, the continent will, nevertheless, suffer acutely from the consequences. In order to understand the complex impact of climate change in Africa, it is important to recognize the factors that make the continent particularly vulnerable. The natural environment is a main source of livelihood and employment for the majority of people in Africa, especially in the rural areas. About 70 percent of the population is estimated to be dependent on rain-fed agriculture or agriculture-related activities for their income and survival. Consequently, economic survival is dependent on factors that will ensure agricultural productivity, such as water supply, quality and quantity of land, and good health to enable labour productivity. All these factors will be directly impacted by climate change (see table 3.1).

Table 3.1 Complex Impacts of Climate Change on Environmental Drivers of Migration in Africa

Environmental Sector	Current Threats	IMPACTS OF CLIMATE CHANGE THAT MAY PROVOKE HUMAN MIGRATION
LAND AND ECOSYSTEMS	<p>Frequent periods of droughts and desertification threaten the livelihood of people who live in arid and semi arid zones, particularly in the Sahel countries.</p> <p>High population pressure and unsustainable systems of land use endanger tropical forests and rangeland areas. Possible consequences include the loss of biodiversity, deterioration in land cover, and depletion of water availability. Some of the countries in this zone are land locked and have the highest population density in Africa</p> <p>Rapid urbanization is increasing the concentration of people in poor urban slums</p>	<p>All areas presently under threat from land degradation and desertification are the most vulnerable to higher temperatures. Higher temperatures will cause significant changes to forest and rangeland cover, as well as the distribution, composition and migration patterns of animals.</p> <p>The rangelands in areas that are expected to receive an increase in average rainfall could become more productive. However, it is also likely that untimely rainfall may destroy productivity and cause food shortage and famines</p> <p>.</p>
WATER RESOURCES	<p>Water resources are strained by increasing population pressures, leading to increased use in urban centers and for industrial and agriculture production. Per capita water availability is declining in all countries as a result of both declining water availability and increased in population size.</p>	<p>Climate change has serious implications for water resources in Africa. By 2025, many countries will shift from water surplus to water scarcity (<1000 m3 / person/year), water stress (1000-2700 m3/person/year), and water vulnerability (1700-25003/person/year).</p> <p>Reduced precipitation and increased rainfall variability is projected for the Sahel countries and most of Southern Africa. This will reduce rates of recharge of underground aquifers and dams, resulting in less water availability.</p> <p>The impact of climate change on water resources will affect food production and population health as well as migration patterns across the continent.</p>

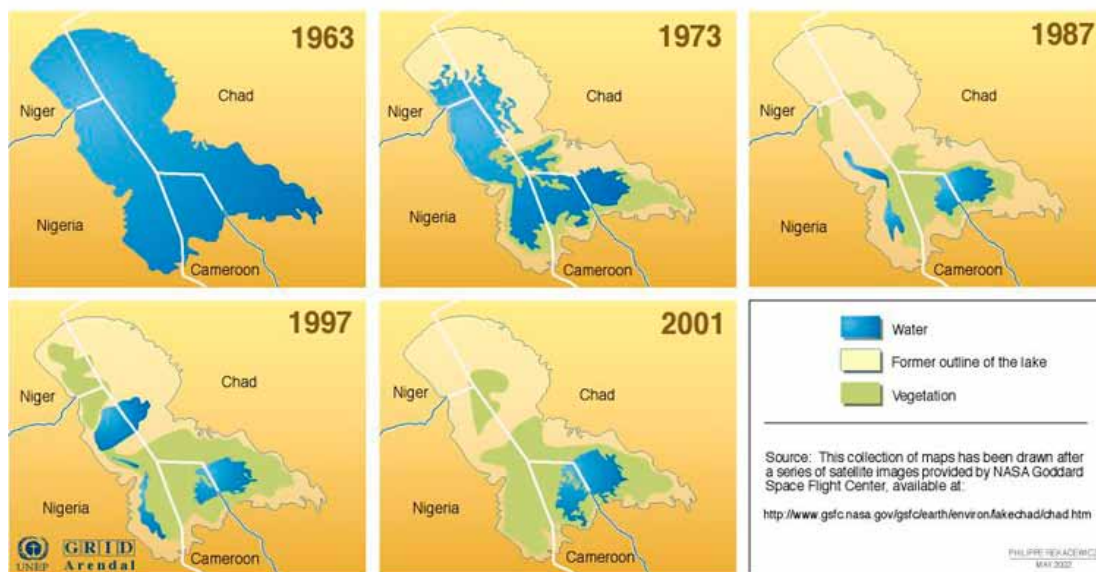
Environmental Sector	Current Threats	IMPACTS OF CLIMATE CHANGE THAT MAY PROVOKE HUMAN MIGRATION
COASTAL AND MARINE ENVIRONMENTS	<p>Several coastal areas are under threat from increasing population pressure, conflicting land use, and inshore pollution (from domestic, industrial, and agricultural effluent).</p> <p>Human activities in coastal zone contribute to erosion</p> <p>Extreme storm events, such as storm surges, exacerbate erosion and flooding of coastal areas.</p>	<p>Rising sea levels will increase rates of erosion and inundation, threatening coastal zones that have low lying coasts and leading to the loss of agricultural lands.</p> <p>Rising sea levels and changing water temperatures are expected to damage coral beds along the east coast of Africa, further increasing the potential for erosion, inundation, and human displacement.</p>
PRODUCTION (AGRICULTURE AND FOOD SECURITY)	<p>Most African countries are highly dependent on agriculture for employment, GDP, and livelihoods.</p> <p>In most parts of the continent, agricultural output depends strongly on the quality of the rainy season.</p> <p>Land degradation reduces the production potential of agricultural land.</p> <p>The dependence on highly variable annual rains for crop production and rangeland recovery makes the livelihoods of commercial and rural subsistence farmers extremely uncertain.</p>	<p>Although altered rainfall and temperature regimes in some areas could improve productivity of certain crops, geographical shifts in the areas suitable for agriculture are likely to disrupt rural communities – adding to food security stress, social instability, and increased rates of urbanization.</p> <p>If conditions become hotter and drier in the dry-land areas of Africa, changes in vegetation cover will increase vulnerability to crop failure and to reduced productivity from livestock due to increased pests and diseases, rising temperatures, and variability in rainfall. This will modify inter-regional food dependence networks and result in changes to national and international markets.</p>

Water is one of the resources most severely threatened by climate change. The Intergovernmental Panel on Climate Change (IPCC) has projected that between 75 and 250 million people in Africa will face increased water stress. Approximately 400 million people in 10 countries are expected to experience chronic water shortages, and 440 million people in 20 countries are expected to experience a 25 percent shortfall in food supplies (Fischer and Vollmer 2009). Countries with relatively high populations, such as Nigeria and Egypt, are at a higher risk. Onuoha (2010) predicts that Nigeria will probably run short of water in the next 25 years. Egypt, meanwhile, which is primarily dependent on the Nile to meet its human, industrial, agricultural

needs, is struggling to maintain its historical share of the Nile's water. Faced with a growing population, its per capita water supply is simultaneously declining rapidly.

One reason for the emerging water crisis across the continent is that African lakes have been major victims of the unfavourable effects of climate change. Onuoha (2010) reports that 600 lakes in Africa are declining rapidly (Onuoha 2010). Lake Chad, for instance, has lost over 50 per cent of its water between 1973 and 2002 (Onuoha 2010). This loss is attributed to the interplay of population pressure, resource misuse, resource overuse, climate change, and natural variability. Most importantly, 20 million people in five countries live in the Lake Chad Basin⁵ and are dependent on the lake's water. This dramatic drop threatens food security, will likely aggravate poverty in a region that is already chronically vulnerable to food insecurity, and increase migration streams.

The Disappearance of Lake Chad in Africa



Water scarcity and increased pressure on existing water resources will clearly impact agriculture across the continent. However, an even more serious threat may be climate change's contribution to the scope and magnitude of drought and desertification. Drought already threatens agricultural productivity in Africa, particularly in the Sahel and in East African countries. The drought in these countries is currently moving through its fifth year and exposing more than 23 million East Africans to possible starvation and destitution (Leighton 2009). Severe droughts have been frequently recorded in Southern Africa, with the 1991/2 occurrence causing a 54

⁵ (Lake Chad is a vital source of water for Cameroon, Chad, Niger, and Nigeria, and The Central African Republic. An estimated 20 million people (consisting of 11.7 million people in Nigeria, 5 million in Chad, 2.5 million in Cameroon, 193,000 in Niger and 634,000 in the Central African Republic) live in the Lake Chad basin and depend on the lake for sanitation, drinking water, agriculture, fishing, and religion-cultural activities (Onuoha 2010).

percent decrease in cereal harvest and exposing more than 17 million people to the risk of starvation (Grote and Warner 2009). In 2004/05, the Southern Africa and Sahel drought spread to the Eastern coast, affecting food supply in Tanzania and even extending up north to Eritrea and Ethiopia (Grote and Warner 2009).

Although drought already threatens food security, the future projections are even more alarming. For example, the UNDP estimates that 90 million hectares of dry-lands in sub-Saharan Africa could experience drought (Leighton 2009). In 2050, Northern Africa, with an estimated population of 310 million people, is projected to experience crop failures, desertification, and water resource stress. Southern and Western Africa, with a combined estimated population of 682 million people, are expected to experience maize crop failure and increased famine (Barnett and Webber 2009). By 2080, several countries, particularly in equatorial Africa, may lose as much as 60 percent of their capacity⁶ for agricultural production.

Across the continent, increasing deforestation accelerates and exacerbates the already serious problem of desertification. Africa has the highest rate of deforestation in the world, with an annual net loss estimated at 5.3 million hectares (Grote and Warner 2009). In a span of ten years, 1990 through 2000, Africa lost an estimated 52 million hectares of forest; Sudan, Zambia, and the Democratic Republic of Congo accounted for almost 44 percent of the total estimate (Grote and Warner 2009). Desertification is an on-going process and a major concern, especially for residents of the Sahel region, where Burkina Faso, Chad, Kenya, and Niger have been particularly affected. The 135 million people currently affected by severe desertification could increase to 180 million in the future. Increasing desertification will interrupt and permanently change how and where food is planted as well as force populations to move.

Although coastal populations also face serious challenges due to the lack of sufficient quantities of fresh water, rising sea levels pose an additional threat. Rising sea levels may lead to increased erosion and flooding, loss of property and agricultural lands, and ultimately population displacement and food insecurity. In the Niger Delta, for example, a one meter rise in sea levels could cause a loss of 15,000 square kilometers of land by the year 2100 (Uyigue 2007). Another area particularly vulnerable to rising sea levels is the Nile Delta in Egypt. It is also one of the most densely populated areas of the world. A one meter rise in sea level there is projected to displace at least 6 million people and flood 4,500 km square of farmland (Brown 2008).

⁶ Losses may reach 56 percent in Sudan, 52 percent in Senegal, 39 percent in Morocco, 36 percent in Algeria and Mali, 31 percent in Ethiopia, 19 percent in Nigeria, and 47 percent in other countries in the Southern Africa region (Leighton 2009)

Nile Delta Potential impact of sea level rise



Sources: Otto Simonett, UNEP/GRID Geneva; Prof. G. Sestini, Florence; Remote Sensing Center, Cairo; DIEHCKE Weltwirtschaftsalis.



Despite the rising threat of food insecurity as a result of climate change, the corollary health risks, including infectious diseases such as malaria and water borne diseases, such as diarrhea and cholera, cannot be overlooked. Changes in temperature and precipitation are expected to affect vector and water-borne pathogens; for example, the population of disease-carrying mosquitoes is expected to increase in wet areas and even arid areas, when affected by flooding (Desanker 2002). For a region where 445 million are already exposed to malaria annually, and where 1.3 million deaths are estimated to result from malaria infections, the increase in the spread of malaria will be deadly (Barnett and Webber 2009). Associated health risks in conjunction with are likely to contribute to mortality on the continent.

While the rural poor have been identified as the most vulnerable to the effects of climate change due to their heavy dependence on natural capital, they are not the only ones at risk. The urban poor will likely experience health problems as well as rising prices for basic goods such as food and water. There are estimates that climate change may cause a global average annual reduction in aggregate consumption of between 5 percent and 20 percent per head. Whether urban or rural, the impacts and associated costs of climate change will fall first on the poorest countries and the poorest people, the majority of whom will be in Africa (Barnett and Webber 2009).

3.2 The Migration and Climate Nexus in Africa

In Africa, people have been moving internally, regionally, and internationally for centuries. Both environmental and economic realities have become push and pull factors in decisions to migrate. Historical and socio-cultural ties, especially ethno-religious affinity, have also played a role in regional and international migration flows within Africa. More recently, greater regional cooperation in sub-regions of Africa, such as the Economic Community of West African States (ECOWAS), has expanded opportunities for temporary and permanent migration.

In the Sahel region, migration has long been a normal part of the life course. Temporary migration of part or of the whole household has been both a household strategy for economic improvement through economic diversification as well as a means of spreading risk and reducing pressure on resources (Jonsson 2010). For instance, in western Sudan, an adaptive response to drought is to send an older male family member to Khartoum to find paid employment to sustain the family until the drought is over (Brown 2008).

However, faced with growing population pressures combined with environmental push factors such as prolonged droughts, increased desertification, and land degradation, climate change may be changing traditional mobility routes and behaviors. Namely migration numbers are increasing and fewer migrants are returning home. For example, between 1968 and 1973, drought provoked an estimated one million people temporarily migrated from Mali to neighboring countries in the Sahel (Leighton 2009). A study examining the north–south migration in Ghana shows that the majority of the interviewed migrants reported to have experienced a degree of environmental push and mentioned environmental factors among the major reasons for migrating (Van der Gees and Fermin 2009). Similarly, in Nigeria, the desertification of 3,500 square kilometers of land annually is forcing farmers and herdsman to migrate to crowded cities or move into ever shrinking areas of habitable or cultivatable land (Brown, 2008). Of the 25 million ‘environmental refugees’ identified worldwide in 1995, about 5 million were in the Sahel.

In some cases, the impact of climate change has led to people invading protected areas in search of clean water and pasture for their animals. This undermines initiatives to protect and enhance the wildlife resources of countries, which are not only major tourist attractions, but also essential parts of the healthy running of the ecosystem. In 2004, more than 800 families were evicted from the Serengeti National Park in Tanzania after they moved there to escape drought. Similarly, migrants settled in the Usangu Game Reserve of Southern Tanzania and had to be removed (Mwiturbani 2010).

3.3 Conflict in the Context of Migration and Climate Change

It has been argued that climate change will cause economic hardships and social disruptions, and that it will intensify competition over limited resources such as land, water, and pasture. According to proponents of the neo-Malthusian doctrine, which holds that population growth and resource scarcity result in violent competition, this may have implications for political stability in Africa. Population increase on the African continent, combined with the impending scarcity of land and water as a result of climate change, will increase the value of these resources and intensify competition for them for basic survival and economic livelihood.

The record of internally and internationally displaced people and refugees across the world demonstrates that violent conflict is a clear driver of migration. This relationship between conflict and migration is particularly evident in Africa. Burundi, Somalia, Mozambique, The Sudan, and Zimbabwe are examples of African countries with histories of violent conflict and corresponding emigration. Forty percent of all wars in the last decade were fought in Africa, and consequently, it is the region with the highest population of forcefully displaced people. One out of three refugees worldwide is either in or from sub-Saharan Africa (Naudé, 2009).

Though conflict is a driver of migration, not all experts are convinced that migration, climate-induced or otherwise, is a driver of conflict. Raleigh et. al. (2008) and Gleditsch et. al. (2007) argue that there is minimal evidence to prove that climate-induced migration will incite or increase violent conflicts. They argue that although the poor and the marginalized will be most vulnerable to displacement, they will have little capacity to wage conflict. Barnett and Webber (2009) contend that the poor will have little incentive to fight as their ability to build new lives and/or to provide for themselves temporarily depends very much on the support and cooperation of their local hosts (Barnett and Webber, 2009).

The act of migrating is, therefore, not considered an automatic cause of conflict. Rather, the way the receiving state reacts to migrants is seen to be the major determinant. For example, conflict may arise in cases where leaders blame migrants for pre-existing problems in the host country or where migrants increase pre-existing tensions over resources. These factors are considered to be politically determined and could be averted through social measures.

However, existing evidence from the African continent shows that the interaction of environmental change and economic opportunities, or the lack thereof, often leads to conflict at multiple levels. At the international level, the case of Lake Chad is exemplary. As was mentioned previously, the Lake Chad basin is home to 20 million people in Cameroon, Chad, Niger, Nigeria, and the Central African Republic who depend on its waters. As it shrinks, the lake is moving towards the Chadian and Cameroonian territories, yet over half of the population dependent on the lake are in Nigeria (11.7 million). Reports indicate that fishermen, particularly Nigerians and Nigeriens, have crossed political borders following the receding lake waters.

The dramatic loss of water over the last 30 years (50% reduction in size) has been accompanied by reduction in fish stocks, increased siltation, loss of vegetation, and depletion of grazing land. According to Onuoha (2010), the changes in Lake Chad will lead to conflict by intensifying both the competition for dwindling resources and the frequency of contact between the major livelihood systems in the catchments area. In fact, this has already happened. Anaga Tiega, Director of the Lake Chad Basin Commission, states: "We are already experiencing some conflict between fishermen and pastoralists, and between fishermen and farmers, and vice versa" (Onuoha 2010). Grote and Warner (2009) predict conflicts will continue due to the lack of integrated water and environmental policies.

Intensified migration out of the Lake Chad basin is also likely to continue, and may provoke further conflict as people relocate due to scarcity of resources or in search of alternative livelihoods. Many farmers and fishermen have already moved to cities in search of alternative means of income. However, this is likely to have negative consequences as urban areas are ill prepared to provide the housing, infrastructure, jobs, and services to absorb the new populace (Martin 2009). Conflict is especially likely when international migrants strain already limited resources.

Conflict arising from water scarcity is also likely at the village level. It has been reported that villages have already adopted protective policies to guard their water supply. This type of water access restriction is reported to have caused inter-village fighting, especially where members of the two villages are from different ethnic groups (Mwiturbani 2009)

At the household level, water-use conflicts are also likely, especially where there are gender divisions of labor. For example, Mwiturbani asserts that in the main river of the Mara River sub-Basin, a sub basin of Lake Victoria, men are responsible for taking care of livestock and farming while women are responsible for household chores and farming. In some instances, the women walk up to 10 kilometers daily to collect water for domestic chores. Given the patriarchal system that gives men decision making rights in the family, some of the men decide to utilize the same water for livestock or for personal use. Conflict may ensue given the time and energy necessary to acquire water in the first place. These conflicts may adversely change social values and cause a breakdown of unity

Empirical evidence suggests that lower economic growth rates resulting from the impact of environmental change on economic opportunities may be another cause of conflict. Naudé (2009) reports that "a five percentage point drop in annual economic growth increases the likelihood of conflict by 10 percentage points" (2009). Conflict is both a cause and a result of economic decline and environmental change. Collier asserts that conflict reduces growth rates by about 2.2 percent and that the impact of conflict limits ways countries can manage or protect the environment (Naudé 2009). Similarly, Naudé (2009) expatiates on the close connection between conflict, the environment, and the economy in sub-Saharan Africa. Naudé further suggests that the higher the number of natural disasters in a country, the higher the probability of civil war. One additional disaster per annum in sub-Saharan Africa is argued to raise the probability of a country falling into civil conflict by 1.75 percent, which would eventually lead

to forced migration (Naudé 2009). As long as conflict and environmental degradation reduce economic opportunities, migration will occur (Naudé 2009).

3.4 The Missing Link - Emphasizing the Positive Aspects of Migration

Because policies attempt to influence the volume and direction of migration rather than accommodate flows and support migrants, some scholars have concluded that migration is typically not regarded as a positive aspect of global development (Tacoli 2009). This should not be the case. Evidence shows that migration can have a positive impact on the adaptive capacity of vulnerable communities.

As stated earlier, migration of a part or of an entire household is a coping strategy that has traditionally been employed during periods of drought and in response to other environmental and social factors. As the deleterious impact of climate change becomes more pronounced on income sources and food supply, either by affecting land assets or by contributing to agricultural unemployment, many rural agricultural families are compelled to send one or more family members out of the affected areas as a way of diversifying income streams. While some view environmental migration as a failure to adapt to the changing environment, Lackzo and Aghazarm (2009) emphasize that migration in itself is a type of adaptation rather than a failure to adapt.

Some studies suggest that out-migration of members of an affected household actually enhances the capacity of those left behind to adapt to climate change and its effects on livelihoods (Barnett and Webber 2009). A major way this occurs is through remittances. The volume of remittances worldwide is reported to be twice the volume of Official Development Assistance (ODA), and families that have labor migrants who remit incomes are said to do better during the crises than those that do not (Barnett and Webber 2009).

In addition to reducing the number dependent on a household's income and resources and creating new sources of income, migration has many other potential benefits. Migration broadens the social networks of households and communities, which alleviates the risk associated with short-term displacement in the face of crises. Moreover, because education increases the success rate of migrants in destination community, Barnett and Webber (2009) assert that migration may encourage education and increase educational attainment of sending populations. Beyond the individual and household level, education benefits the community as a whole as returning migrants can bring back new ideas and skills. Also, networks of migrants may contribute resources and invest in their community of origin by, for example, building public schools and health clinics (Barnett and Webber 2009). Finally, the receiving communities also benefit from migrants because migrants fill labor shortages, pay taxes, and contribute to the growth of the host community's economy.

3.5 Impacts of Development Activities on Migration and Climate

Evidence from African countries shows that development activities impact migration and the environment. In particular, large-scale irrigation projects and the construction of dams have led to environmental changes, and caused massive resettlement and migration. The most frequently cited example is the colonial era irrigation scheme in Gezira, The Sudan. Besides transforming land use from rain-fed agriculture and grazing to cash crop production, the irrigation scheme led to labor migration from as far as Nigeria, Mali, and Senegal. The El Masnour dam and reservoir in Morocco has had unforeseen impacts on the environment in the Middle Draa basin, including flow reductions, falling ground water tables, drying up of basins, increased salinity, and irregular water supply (Fermin 2009). Because of the environmental degradation resulting from the dam and prolonged periods of droughts, rural residents have migrated out of the basin over the last decade. Similarly, Lake Chad is testament to the potentially damaging impacts of development activities on the environment. Between 1973 and 2002, Lake Chad lost over 50 % of its water. One major contributing factor was a poorly planned irrigation project, which accounted for about 30% of the water lost (Onuoha 2010).

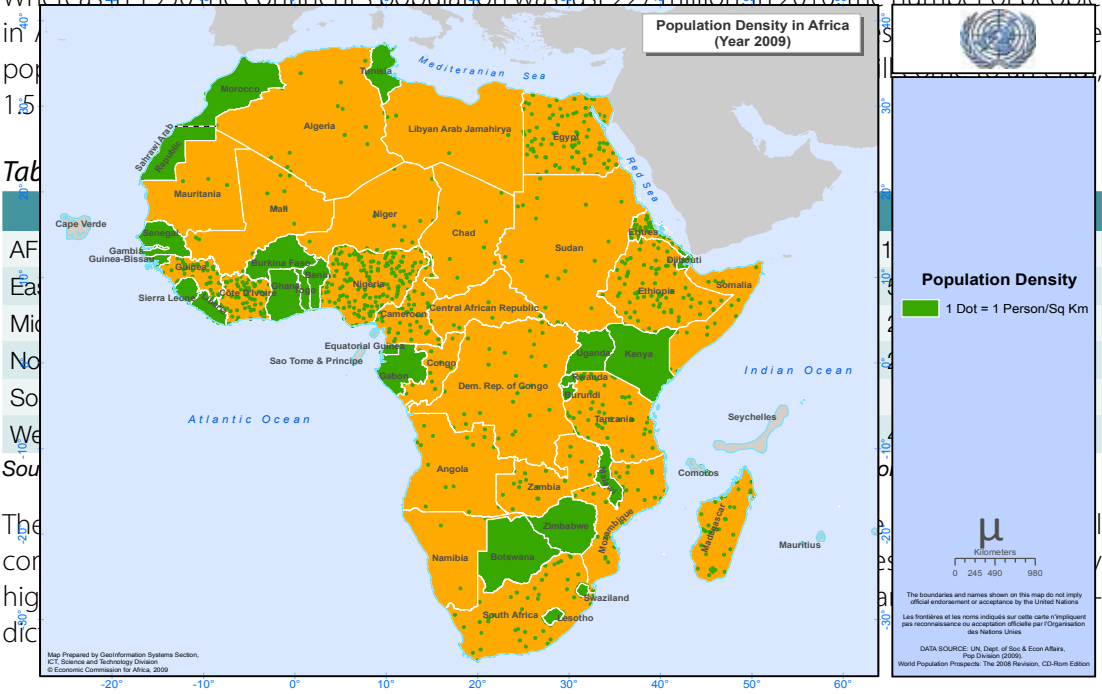
Although these examples should not discredit the great potential of development projects, they should illustrate that poorly planned development activities can have an adverse effect on the environment, exacerbate the effects of climate change, and induce migration.

Chapter 4: Population Growth and Distribution

Population size and growth, and the spatial distribution of people in Africa, particularly in urban and rural settlements, are important factors in the migration and climate nexus. High population growth is often considered a major cause of environmental degradation, manifested in increased deforestation, soil erosion and siltation, and the depletion of natural resources. Key aspects of population distribution as they pertain to the migration and climate nexus include where people live, how climate change affects their settlements, and how it affects their decisions to stay or to migrate. In particular, population distribution into rural and urban settlements is often linked to increased pressures on water and land resources, and to variable contributions by rural and urban areas to carbon dioxide emissions. This chapter provides evidence-based policy analyses of these factors and highlights their importance in both migration and climate change policy making.

4.1 Population Size and Growth

Table 4.1 provides a cross-sectional view of population size and growth in 2010 for the continent as a whole, and for its 5 sub-regions as defined by the United Nations Population Division. Whereas in 1950 the continent's population was just 227 million in 2010 the number of people



There are several challenges presented by climate change that are unique to urban populations. The population density chart in Africa in 2009 shows the patterns of population distribution in the continent. It indicates that the great majority of people in the continent live in ecologically, climatically and environmentally favorable zones - on the coasts, around lakes, on river banks, and in highlands and dry lands. However, these areas are also the most vulnerable to the variable impacts of both extreme weather events and long term environmental degradation.

Most significantly, the chart shows that the most densely settled areas of the continent are located on the coast and in adjacent coastal zones, which are highly sensitive to the effects of rising sea levels. Coastal cities across the continent are often on low-lying land, vulnerable to flooding and salinity of fresh water supplies during severe storms and as sea levels rise. The coast of West Africa, home to approximately 80 percent of people in this sub-region, is particularly vulnerable. For instance, it is predicted that the average sea level rise in Cotonou, Benin will be 20cm by 2050 and 49cm by 2100 (IHDP Urbanization and Global Environmental Change Project 2008). Populations residing in areas such as river mouths, estuaries and lagoons will face many of the same impacts of climate change (IHDP Urbanization and Global Environmental Change Project 2008). Consequently, the great majority of people in Africa are highly vulnerable to climatic and environmental changes. When these changes occur, people are likely to respond through both internal and international migration.

The impact of population factors on the migration and climate nexus can also be contextualized in relation to the means of survival and living standards. Most Africans are dependent on mineral and natural resources for their livelihood and survival. These resources are important factors in population distribution. This dependence on raw materials exacerbates the vulnerability of both the populations and the economies of Africa to environmental degradation and changes in weather conditions and ecosystems.⁷

The patterns of population distribution and vulnerability are also shaped by development activities in agriculture, industry, and the mining and services sectors - because many of the population settlements in Africa are centered in areas where production and employment activities are available. Besides attracting people to move, these settlements, both in rural and urban areas, contribute to the creation of climate process drivers such as emissions and concentrations of greenhouse gases and aerosols.

4.2 Migration and Climate Change in Rural Areas

Another important factor in the migration and climate nexus is that the majority of Africa's population is rural. Despite falling 25 percent since 1950, it is still slightly more than 60 percent today. Future prospects indicate the rapid decline of the percentage of the total population residing in rural areas will continue, reaching 38.4 percent by 2050 (lower panel of table 4.2).

7 The high dependence of the African economies on natural resources and the volatility of economic growth to natural conditions and weather hazards is highlighted in a series of Economic Reports on Africa jointly published by ECA and AU.

However, residence in rural areas is currently highly variable by sub-regions. The great majority of the people in Eastern Africa reside in rural areas, in contrast to less than 50 percent in Northern and Southern Africa. Nevertheless, the rural populations will continue to increase in absolute terms in all sub-regions except Southern Africa (upper panel of table 4.2). In other words, in spite of a declining share of the total population, rural areas will continue to experience increasing population densities. This poses challenges to sustainable economic and social development, and increases vulnerability to climate change.

One reason is that rural population settlements are highly dependent on agriculture for income, employment, and food. Changes in weather patterns, such as precipitation levels, are of particular importance because African agriculture relies heavily on rainfall for the provision of water for crops. This dependence is especially true for sub-Saharan agriculture. Agricultural production is not only vital for rural populations, but it is also integral to most African economies. (Barrios *et al.* 2006). Consequently, rainfall variations will likely have a significant impact on economic activity across the continent.

Table 4.2 Estimates and Projections of the Rural Population (in thousands)

	1950	1970	1990	2010	2015	2030	2050
Africa	194551	280269	433504	620053	666513	762895	767551
Eastern Africa	61413	96395	158299	249992	277792	345298	373936
Middle Africa	22459	30783	49072	73318	78367	88875	86992
Northern Africa	39852	55407	82003	104009	107877	109475	93225
Southern Africa	9719	14335	21479	23947	23218	20295	15471
Western Africa	61107	83348	122651	168787	179258	198951	197926
Percent of Total Population							
Africa	85,60	76,41	67,87	60,02	57,80	50,05	38,41
Eastern Africa	94,70	89,58	82,04	76,41	74,58	66,65	52,56
Middle Africa	86,00	75,18	67,39	56,88	53,62	44,08	31,87
Northern Africa	75,22	63,78	55,50	48,85	46,78	39,47	29,04
Southern Africa	62,35	56,32	51,16	41,31	38,92	31,69	22,96
Western Africa	90,21	78,69	66,95	55,15	52,08	42,96	31,64

Source: United Nations, Department of Economic and Social Affairs, Population Division (2010). *World Urbanization Prospects : The 2009 Revision. CD-ROM Edition - Data in digital form (POP/ DB/WUP/Rev.2009)*.

The destabilizing impact of climate change on agricultural production, particularly declines in food crop production, could spur greater migration and displacement among rural populations. Climate related migration, however, tends to be mostly internal and mainly from rural to urban areas. For example, during the drought in Mali from 1983 to 1985, Findley (1994) reports that long-distance migration decreased, whereas short-distance migration to larger population agglomerations increased. Perhaps unsurprisingly, these internal migrations are also characterized by an increase in mobility from the agricultural to the non-agricultural sector. Despite these trends, rural inhabitants who are affected by changing weather patterns do not migrate to urban areas exclusively. In some cases, when rainfall decreases available rural livelihoods and assets, migration tends to be restricted to other rural areas because migration to urban centers and across international borders entails higher costs.

Nevertheless, climate change does spur international migration as well. Marchiori *et al* (2010) analyzed 50 years of data from 43 sub-Saharan African countries and found that as more workers become available in urban areas due to internal migrations, unemployment rises, and urban wages tend to decrease. This provides a push factor for the urban workers to move across borders in search of better wages. In the Sahel, this step-by-step migration from rural areas to urban areas and then to foreign destinations has been observed in Mali, Burkina Faso, Cote d'Ivoire and Gabon (Findley 2004).

4.3 Rapid Urbanization-Important Nexus Driver

Though predominantly rural, Africa is the most rapidly urbanizing continent. Current levels of urbanization do not match the levels of other regions in the world, but the rate of increase

in the percentage of the population residing in urban areas has averaged 10 times the rate of OECD countries, and has been nearly twice that of other developing regions (Barrios *et al.* 2006). Between 1950 and 2000, Africa's urban population grew by an average annual rate of 4.4 percent, compared to 3.6 percent for Asia, 3.5 percent for Latin America and the Caribbean, 2.13 percent for Oceania and 1.7 percent for Northern America. The urban population in Africa is estimated at 413 million in 2010, and is projected to reach about 761 million in 2030, and 1.23 billion in 2050. However, urbanization in Africa is a heterogeneous process. It varies by sub-region and from country to country (Table 4.3).

Table 4.3 Estimates and Projections of the Urban Population (in Thousands)

	1950	1970	1990	2010	2015	2030	2050
Africa	32719	86523	205225	412990	486525	761293	1230915
Eastern Africa	3434	11211	34660	77194	94663	172766	337493
Middle Africa	3657	10161	23741	55592	67781	112727	185977
Northern Africa	13130	31461	65763	108912	122718	167876	227852
Southern Africa	5869	11118	20502	34021	36439	43741	51917
Western Africa	6629	22572	60559	137271	164924	264182	427675
Percent of Total Population							
Africa	14,40	23,59	32,13	39,98	42,20	49,95	61,59
Eastern Africa	5,30	10,42	17,96	23,59	25,42	33,35	47,44
Middle Africa	14,00	24,82	32,61	43,12	46,38	55,92	68,13
Northern Africa	24,78	36,22	44,50	51,15	53,22	60,53	70,96
Southern Africa	37,65	43,68	48,84	58,69	61,08	68,31	77,04
Western Africa	9,79	21,31	33,05	44,85	47,92	57,04	68,36

Source: United Nations, Department of Economic and Social Affairs, Population Division (2010). *World Urbanization Prospects : The 2009 Revision. CD-ROM Edition - Data in digital form (POP/DB/WUP/Rev.2009)*

A primary characteristic of current urbanization trends in Africa is the high degree of urban primacy and a sparse city network. In other words, the urban population is concentrated in only a few cities and urban agglomerations. Urban primacy can be determined by measuring the ratio between the population size of the largest city compared to the population size of the second and third biggest cities in the country. High urban primacy is usually taken as a sign of poor regional integration within a country. Because the majority of the national resources are concentrated in the main or only a few cities, growth in smaller urban areas and in the rural areas is limited. Consequently, many African countries have not reaped the economic growth that has accompanied urbanization in other developing regions (Annez *et al.* 2010).

The rapid rate of urbanization in Africa will have several important consequences and implications for settlements on the continent. First of all, population growth in Africa will be progressively absorbed in urban settlements through rural to urban migration. Currently densely populated urban areas will become even denser in the future, and rural settlements will be

transformed into urban places. Rapid urbanization will change lifestyles, living conditions, and both develop markets for and increase the consumption of goods, services, and labor.

Rapid urbanization will also directly affect climate change in Africa. As populations grow, their impacts will obviously be intensified. This can already be seen in the much higher levels of air pollution in large African cities such as Lagos and Cairo. Moreover, the geography of cities themselves will significantly contribute to the causes of climate change. For example, the urban “heat island effect”, which is the result of altered wind patterns and pavement, buildings, and other structures heating quicker than natural vegetation, will contribute to higher temperatures.

Rapid urbanization will also exacerbate accelerate human vulnerability. Vulnerability of the urban populations in Africa is already high due to density, poor planning, poverty, and low socio-economic status. The rapid growth of the urban population in Africa has led to the proliferation of unplanned and informal settlements, thus contributing to the formation of slums and the perpetuation of urban poverty. In cities such Addis Ababa, Lagos, and Cairo, for example, 70 percent of the population live in slums. Rapid population growth in urban areas has outpaced the ability of local and national governments to adequately provide services to urban residents in all sectors, including education, health, water, sanitation, and housing. This combination of poverty, density, and lack of infrastructure in African urban areas exposes a significant share of the urban population to the deleterious effects of climate change.

Long-run climate change scenarios tend to suggest that extreme climate variations and, more specifically, water shortages, are more likely to cause abrupt changes in human settlements and urbanization patterns in sub-Saharan Africa than elsewhere in the world (Watson *et al.* in Barrios *et al.* 2006). A study of 76 developing countries, 36 of which were sub-Saharan African countries, shows that a one percent fall in normalized precipitation induces urbanization to rise by 0.45 percent in sub-Saharan Africa (Barrios *et al.*, 2010). Accordingly, Barrios *et al.* (2006) argue that the main driver of urbanization in sub-Saharan Africa has been climate change. This has been seen across the continent. For instance, Uganda’s National Adaptation Programme of Action (NAPA) considers drought and soil erosion to be among the drivers of rural-urban migration (Martin 2009). Similarly, in West Africa, big cities such as Dakar, Bamako, Ouagadougou, Niamey, and Kano experienced rapid growth between 1960 and 2000 as a result of both violence in neighboring countries as well as rapid intra-country and rural–urban migration due to rainfall decreases and land degradation (Grote & Warner 2009).

4.4 Small Island States and Land Locked Countries

When discussing the implications of the spatial distribution of the population within the migration and climate nexus, small island states and land locked countries merit particular attention. The African region is home to several small island states—Cape Verde, Comoros, Mauritius, São

Tome and Principe, and the Seychelles. The level of urbanization varies across these countries⁸: from 61 percent in Cape Verde to 28 percent in Comoros. Although the range of urbanization levels signify that problems concomitant with urbanization will vary, every one of these countries is seriously vulnerable to the threat posed by rising sea levels. Rising sea levels threaten to force large numbers of the population to migrate to other countries. In fact, small island nations with low elevations in the Pacific Ocean have already begun to witness out-migration due to high rates of coastal erosion and rising sea levels (Fritz, 2010). Indeed, with significant increases in sea levels, this can be expected for African countries as well.

There are 15 landlocked countries in Africa. They are all geographically located in sub-Saharan Africa and occupy a total land area of about 8 million square kilometers, or 26 percent of the total land area of the continent. The total population of these countries is estimated around 246 million persons in 2010.⁹ An important characteristic of the landlocked countries is that some of them densely populated, while some other ones are sparsely populated. Population density (persons per square kilometer) is highest in Rwanda (390.2) and lowest in Botswana (3.4). Ethiopia and Uganda, the most populated landlocked countries in Africa, have population densities of 77.0 and 140.2 respectively. These high densities imply high exposure to climate change and high propensity to migrate.

Migration from land-locked countries to urban centers in coastal countries is high. For example, it is estimated that more than 10 percent of the labor force in Mali migrates annually to neighboring coastal countries. In Côte d'Ivoire, 13 percent of the population are foreign-born, many drawn from neighboring landlocked countries (Annez 2010). Similarly, Niger, Mali and Burkina Faso are important sources of migrant laborers to the coastal countries in Western Africa (Senegal, Cote d'Ivoire, Ghana, Nigeria, etc.), whereas migrants from Lesotho, Swaziland, Botswana, Zambia, and Malawi migrate to the Republic of South Africa. Naudé's (2009) assessment of migration and displacement in Africa shows that when a country's population size is accounted for, the largest net-out migration per 1,000 of population is seen in small island states and small landlocked countries that are both environmentally and economically vulnerable.

The migration from land-locked countries to the coastal zones has had serious ramifications for health. It has contributed to the spread of HIV/AIDs and diseases such as malaria, hookworm, schistosomiasis, river blindness, and yellow fever that have been contracted in coastal zones and then returned with migrants to their home countries. They have been difficult to control in tropical regions far from the coastlines because of the lack of seasons makes the reproduction of mosquitoes and other disease transmitters rather constant throughout the year.

8 42 percent in Mauritius, 62 percent in São Tome and Principe, and 55 percent in the Seychelles

9 With a total population of 85 million Ethiopia has the largest land locked population in the continent, followed by Uganda (33.7 million) and Burkina Faso (16.2 million). The least populated countries are Swaziland (1.2 million), Botswana (1.9 million) and Lesotho (2.1 million)

Chapter 5: Youth, Migration and Climate Change

Research on migration and climate change has often focused on the role of population size, growth, and distribution. Changes in the population's age structure, which usually results from transitions in the dynamics of population growth in terms of fertility and mortality, has received much less attention. The purpose of this chapter is to fill this research gap and illustrate how changing age structure is related to the migration and climate nexus.

5.1 Youthful Age Structure

Africa is a youthful continent. Due to past fertility levels, population numbers are rapidly expanding in all age groups in most of the countries. This general pattern includes countries that have experienced a demographic transition, a phenomenon where the numbers of youth and working age population have expanded, while children have declined relative to other age groups. Besides declining fertility, the age structure changes have been heavily impacted by high mortality due to AIDs and other factors.

An important implication of the youthful age structure is the rapid growth of youth and working age populations. Youth and working age populations in Africa have more than doubled in 30 years - from 251.2 million (aged 15-64) in 1980 to 582 million in 2010. Projections indicate that these are likely to increase even more rapidly in the future, reaching 937 million in 2030 and slightly exceeding 1.3 billion in 2050. This rapid expansion of the youth and working age population is expected to increase migration and the intensity of the impact of human activities, particularly on natural resources, energy use, and greenhouse gas emissions.

Another pertinent aspect of the young age structure is related to issues of vulnerability. Rapidly increasing youth and working age populations create denser human settlements and increased exposure to the impacts of climate change. Climate change also contributes to the high incidence of poverty and unemployment among youth in Africa as well. Finally, this cohort is, largely excluded and marginalized in development policies and strategies.

Focusing on the migration side of the nexus, youthful age structure in Africa is an important determinant of mobility. Indeed, for various reasons young people in Africa dominate the migration streams, both internally and internationally. Many migrate because of poverty and in search of education and employment opportunities.

The impact of climate change on agriculture and food production is an extremely important factor contributing to youth migration in Africa (See Box 5.1). As agricultural productivity falls

and employment opportunities in the agriculture sector dwindle, youth migrate from rural to urban areas. The rural areas they leave behind hold little promise for the future and only limited access to education, health, sanitation, and employment.

Although many leave their homes and families in search of jobs and better lives elsewhere, most lack the required soft and hard skills that will enable them to obtain gainful employment. Those migrating from rural to urban areas are often relegated to small jobs like shoe cleaning, car washing, and serving as domestic household staff. Those choosing to migrate internationally, however, often face even greater hardships. Due to distances and the prevalent means of migration, many die, while others become homeless, disabled, or permanently injured. Those who do survive, often find themselves confronted with other challenges like violence, exploitation, sexual abuse, abject poverty, crime, and prostitution.

Box 5.1 Sangaré, a poor young farmer

The story of Sangaré, a poor young farmer, from a village in southern Mali who migrated to the city of Bamako in order to escape poverty, is an illustration of what many African rural youths experience due to declining agricultural productivity and lack of income caused by the impact of climate change on the natural environment. Sangaré migrated because “the fields don’t produce anymore” and after the rainy season all that is left is to “rub shoulders with poverty everyday”.

Source: Charlotte Min-Harris, 2009 “Youth, Migration and Poverty in Sub-Saharan Africa: Empowering the Rural Youth”

5.2 Youth Health and Employment

Many of the potential impacts of climate change will directly or indirectly affect public health and necessitate interventions. Nevertheless, one consequence of rapid population growth has been a substantial increase in the demand for social services, especially health. Consequently, there will be an increase in climate related health issues such as higher levels of air and water pollution, a greater prevalence of vector and water-borne diseases, and insufficient nutrition. Therefore countries started to integrate climate change in health strategies. However, there will be fewer resources available to address the growing health problems. In addition to issues related to physical health, mental health issues are increasingly being diagnosed in “environmental refugees” who have experienced stressful conditions. This can only be expected to increase as well.

The heavy reliance on the use of charcoal for energy/fuel for subsistence and income generation has also been associated with climate and health consequences. Ulrike (2007) reports that respiratory diseases linked to air pollution caused by cooking fires accounts for about two million death a year worldwide, mostly among women and children. Consequently, efforts made in reducing air pollutants would have direct health benefits for young people. Urgent and profound changes in power generation and energy use in all sectors are, therefore, necessary to ensure that properly designed and implemented actions, such as use of solar ovens, are put in place. This would result in major public health co-benefits because in addition to being emission free, young women would be saved from the risky tasks of gathering firewood.

Many studies have been conducted on household energy and health interventions. In fact, the World Health Organization (WHO) has published a catalogue of methods intended to help governmental agencies, non-governmental organizations, and universities involved in household energy and health interventions to develop evaluation strategies appropriate to their goals and organizational capacities. The question is now whether countries are moving in this direction.

Climate change affects the pattern of employment in various ways. This is particularly true in Africa because most communities depend on agriculture, fishery, and forestry for their livelihoods. These employment sectors are the most important, but also the most affected by extreme weather events. Moreover, long term events, such as desertification and drought, negatively affect agricultural productivity, rural employment, and economic development. They also push affected youth to search for work and better standards of living away from their native surroundings.

In regions where livestock and cattle are the major source of livelihood for rural youth, drought or flood exacerbate poverty by diminishing pasture land and water supply, affecting not only the productivity of livestock, but also the rate of mortality. For example, in Somalia between 2001 and 2005, goat mortality reached 60 percent and 80 percent for pack camels (USAID 2005). As livestock conditions deteriorate due to the increase of vector-borne diseases, limited or diminishing pastureland and water supply, pastoralist households must diversify their income streams. Typically, this results in migration. In the Sahel region the migration of young men and women in search of wage labour has been used as a temporary coping strategy for many households to adapt to climate change. The pattern of migration in this region is either short-cycle, where young males go to nearby cities for paid jobs and the females go as domestic workers, or long-cycle, which is usually of longer distance to foreign lands such as Gabon, Senegal or even France, depending on factors such as money for transportation, networks and contacts at the destination, and the prospects of success.

5.3 Youth, Conflict, and Climate Change

In countries emerging from conflict, such as Sierra Leone, young people, especially males, were the main fighters in the war. Economic disruption as a result of war, the lack of parental support due to separation from families, the responsibility of caring for younger siblings, scarcity of resources such as land for agricultural productivity, and the lack of skills as a result of limited schooling and training are all factors impelling many of the youth to migrate to urban societies where the informal sector is most likely to absorb them. Studies show that in some post-conflict areas, child-headed households have land holdings of less than a tenth of a hectare, which is insufficient for subsistence farming. They also have few or no livestock, so are, consequently, vulnerable to food insecurity (Stavrou *et al* 2005)

The ongoing depletion of natural resources as a result of climate change has led to a considerable increase in the competition for these essential natural resources. Young people have been affected as both the victims and participants in conflicts over increasingly scarce resources.

In addition to interpersonal conflict over land in rural areas, the diminishing pasture for livestock and the scarcity of water are increasing the mobility pattern of pastoralists, many of whom are youth. This brings them into intense competition and sometimes conflict with farmers and other sedentary groups who also need the disappearing lands and declining water sources for their economic livelihoods. In many parts of central and north-eastern Nigeria, increasing desertification combined with population pressures have forced grazers to migrate southwards in search of grazing land. In 2001, this led to conflict between Tivs and the pastoral Hausa Fulani people.

In Ethiopia, Kenya, Sudan, and Uganda, where the median age is low (18 years in both Kenya and Sudan, and 15 years in Uganda and Ethiopia) and 71 to 85 percent of the population is involved in agriculture, cross border conflicts between populations are on the increase. Long standing and ethnic tensions have flared because drought and desertification have reduced the land available to pastoralists and caused some to access water from sources deemed to be within the territorial control of another ethnic group. Such conflicts have erupted between ethnic groups across international borders in Eastern Africa.

North Africa is already suffering from water scarcity, which increased drought and heat stresses will further exacerbate. In a sub-region already charged with political tensions, the possibility of conflict will grow as agricultural productivity declines, leading to greater food insecurity, dependency on food imports, rising food prices, and discontent among the largely unemployed youth. For example, following an increase in food prices in January 2011, youths in Algeria, Morocco, and Tunisia rioted in protest. Following the global rise in food prices in 2008, food riots occurred in at least 14 African countries. The majority of the victims and protesters were young people (David and Berazneva, 2011).

Chapter 6: Women, Migration, and Climate Change

Few, if any, societies in the developed and developing world can be considered fully equal; women and men continue to have socially conditioned differences in roles, work patterns, responsibilities, and decision-making power. In light of these differences, the connections between women and migration, the environment, disasters, conflict, and health has been studied in depth. However, the literature has yet to explicitly address the nexus between women, migration, and the climate, which is the purpose of this chapter.

Women have been largely invisible in the migration and climate discourse. This may be because climate change is largely understood as a global phenomenon that will impact human lives irrespective of social and cultural relations or institutions. However, even though climate change is an ecological phenomenon, its impacts are imbedded in social processes and variably distributed among affected social groups. Migration is an adaptation strategy to climate change, but one that impacts, and is impacted by, gender. Therefore it is important to consider this dynamic in the context of climate-induced mobility to allow for broader and comprehensive policy measures. While this chapter highlights women's vulnerability, it is not intended to present women as victims or the "weaker" sex. Rather, it aims to specifically address the often overlooked, but nevertheless, distinct, vulnerability of women in the migration and climate nexus.

6.1 Women's Vulnerability in the Migration and Climate Nexus

6.1a Poverty

Poverty is an important factor linking women's migration and climate change. The adverse effects of climate change will be felt most acutely by the poor in developing countries. Faced with either the present reality or the looming threat of environmental change, the poor have little capacity to adapt, few opportunities to prepare, and limited abilities to participate in negotiations to reduce risk. Poverty, however, is not limited to economic income. It is a multidimensional concept that includes the inability to live a healthy life, to access education, to enjoy a decent standard of living, and to participate in the social, economic, and cultural aspects of life in a given community. On all these counts, women in Africa are at disadvantage.

Global statistics indicate that 70 percent of the 1.3 billion people living in conditions of poverty are women (UNDP 2008). Of the 960 million illiterate people in the world, two-thirds are women, while 41 of the 75 million children that do not attend school are girls (UNDP 2008). In

instances where men and women have the same employment, women are reported to receive 70 percent of the wages paid to men, both in developed and less developed countries. In several African countries, cultural practices, policies, and institutions restrict women's ownership and access to assets such as land and livestock as well as their mobility.

Although often unrecognised, women are key players in agricultural productivity in the world and in Africa especially. As slow-onset climatic changes, such as drought, adversely effect agricultural production, particularly amongst small-scale rural farmers, women will bear the brunt of this impact. An estimated 59 percent of women are responsible for the world's food production, but in some parts of Africa, the rate ranges between 50 percent to 80 percent (Denton 2000). In the Sahel, for example, 68 percent of the population active in agriculture are women. Table 6.1 below illustrates the primary role of women in farming in some African countries.

Table 6.1 Role of Women in Agriculture in Africa

Country	Role of Women in Agriculture
Benin	60- 80% of the women carry out agricultural work and supply 44% of the work necessary for household subsistence.
Congo	Women account for 73% of those economically active in agriculture and produce more than 80% of the food crops.
Morocco	An estimated 57% of females participate in agricultural activities with 68% being involved in animal production, while 46% engage in vegetable production.
Sudan	Women make up 80% of the farmers.
Tanzania	98% of the rural women are defined as economically active.
Zimbabwe	Women make up 61% of farmers in communal areas and comprise at least 70% of the labour force in these areas.

Source: FAO, A Synthesis Report on the Africa Region, Women, Agriculture and Rural Development

Despite being the major producers of food, women tend to own less than 10 percent of agricultural land. When women do own land, it is often overused and less fertile since it is usually acquired through patriarchal inheritance (UNDP 2008). Given this fact, an increase in desertification, drought, or other slow-onset changes in the climate could impinge on subsistence production, causing a loss of revenue for women and further diminishing their already comparatively low income. Moreover, as land availability dwindles due to climate changes, the problem of women's limited access to agricultural assets will be further compounded.

6.1b Impacts of Migration on Women

As agricultural resources diminish and agricultural production becomes less predictable and constrained, migration, either from rural to urban areas or to an international destination, has been identified as one of the main alternative livelihood options employed by men to adapt to the loss of agricultural income and assets. Typically, when this sort of migration occurs, women are left behind because it is less acceptable for women to travel on their own in some parts of Africa. For example, Warner et al (2009) show that in Niger, men usually migrate, whereas in most cases, children, the elderly, and women are left behind. One positive aspect of this

trend is that increased male migration often results in increased female participation in decision making in the communities. This can be seen in Ribeiro and Chaúque's (2010) case study of two communities in Mozambique. In Mapai-Ngale, where male migration rates are high, the ratio for female to male participation was 8:6. In Magondzwene, where the rates are lower, the rate is only 2:8.

However, the case study from Mapai-Ngale also shows that even in cases where men migrate, they contribute minimally to family economic needs. This is not necessarily out of irresponsibility, but sometimes due to the unreliable economic opportunities in their host communities. Consequently, while women's role in decision making increases, their workload also increases. Sometimes this added burden forces women to seek alternative sources of income¹⁰ to support their families, which may themselves have unforeseen consequences.

Furthermore, women's assuming temporarily the role of head of household does not guarantee they will have the same access to the financial, technological, or social resources as the men. Many cultures require the woman to submit to the decisions of either the eldest son in the household or the closest male relative. Lastly, even when the women are de facto household heads, decision making at the community level is still typically male-dominated.

Men's out-migration also has health impacts that indirectly affect women. Men migrating to areas that have existing high prevalence of diseases such as HIV/AIDS, tuberculosis, and malaria, become vulnerable to infections, increasing their chances of death and/or later infecting the women. A study of urban populations in Cameroon found that within the span of a year, migrating men had a higher incidence of HIV than men who remained at home (Omelanduik 2006). Similarly, in parts of Zambia, men's migration have led to higher rates of HIV infection upon their return. Even in cases where men contract HIV but do not infect women, there are still significant risks to women. Considering that poor economic conditions were a major 'push' factor for migration in the first place, it is unlikely that there will be sufficient funds for medication to prevent the virus from growing into full blown AIDS. This increases the likelihood of women becoming widows, and children becoming orphans; thus, reducing household income and exacerbating poverty.

Even though migration policies and regulations are yet to fully adjust to the increased mobility of women, there is a budding feminization of migration in African countries. In addition to the growing 'environmental push', factors such as the expansion of global markets, the informal economy, and other related socioeconomic transformations have increased women's mobility. Shifting demands in the global labour market are beginning to accommodate the flow of women migrants as the traditional roles typically assigned to women, such as cleaning and care giving, are globally in high demand. According to UNFPA, 47 percent of the 17 million immi-

10 Ribeiro and Chaúque report that in the community of Mapai-Ngale, where 60% of households are headed by women, low crop production and the need for additional income led women to begin brewing and selling alcoholic drinks. However, problems associated with excessive consumption of alcohol, such as drunkenness, violence, promiscuity, and disease, have followed. Thus, the increasing incidence of violence against women is intricately linked to the migration and climate nexus

grants in Africa were women, with the highest increases in the Eastern Africa and Western Africa (UNFPA 2006). While African women tend to migrate short distances and within the continent, some women are shown to journey as far as North America and Europe. For example, women constitute an estimated 85 percent of the total migrants from Cape Verde to Italy (UNFPA 2006).

Unlike male migrants, female migrants on average tend to be young, single, and either separated or divorced. In contrast to married women, who may receive remittances from their husbands who have migrated, single women, single mothers, and women who are divorced, separated, or widowed usually have insufficient safety nets within their communities. Consequently, they are more likely to migrate in search of alternative sources of income (Piper 2005). Though migration may reduce women's vulnerability in their communities of origin, compared to men, they face much greater exposure and vulnerability to specific migration hazards such as rape, trafficking, and prostitution.

Another negative aspect of women's migration is the lack of social protection once they have migrated. Migrant women dominate unskilled labour migration streams and work typically unprotected sector of their host economy, such as house maids. They tolerate harsh working conditions and take high risks because though significantly less than locals, their earnings may be four to five times higher than what they would have earned had they not migrated. However, not all migrant women successfully endure the trade-off between their income and rights (Omelaniuk (2006).

6.1c The Search for Water and Fuel

In many cases, climate change has made acquiring water and fuel, two of the basic necessities of life, more difficult. Disproportionately, the responsibility for acquiring them falls on women and young girls. Not surprisingly, as these resources diminish, there are serious consequences for women. Forty-one million girls worldwide do not attend school because, along with their mothers, they are usually responsible for collecting water and firewood. For example, in the main river of the Mara River sub-basin, women are reported to walk up to ten kilometres daily to collect water (CITATION). According to a UNDP report (2008), women in sub-Saharan Africa spend 40 billion hours a year collecting water, equivalent to a year's worth of labour by the entire workforce of France. This incredible expenditure of time and effort, however, is not a shared task. Ghanaian women, for example, spend more than twice as much time as men gathering water and firewood (UNFPA and WEDO 2009). A study of a Zimbabwean family showed that women contribute 9.3 hours of the total household time dedicated to water collection, in contrast to 1 hour for men (Nampinga 2008).

Given women's roles in sourcing water for the household, changes in precipitation will certainly affect women, particularly girls. In dry areas, women will spend longer hours, covering longer distances, to fetch water. This time investment reduces the time available for other household activities, income earning, and participation in community life. Moreover, it results in less time

spent with children, which in the long run, may have adverse impacts on societal values. Lastly, the amount of physical activity engaged in for water sourcing aggravates the injustice women face on a daily basis. While the women go further and further to collect water, it is the men who often have the decision making power over how the water should be used.

Deforestation is another critical threat to African women. Though used for nutritional, health, commercial, and cultural activities, the forest may be most important as a source of household energy. Similar to the task of gathering water, deforestation leads to more and more valuable time spent gathering biomass for household energy needs. Clearly, as the time invested in gathering wood increases, the time invested in other activities, such as domestic, income generating, the community, and maternal, decreases. Finally, the reliance on biomasses for cooking has had serious health implications for African women.

For young girls, the time investment necessary for the twin tasks of gathering water and wood has serious consequence. Many girls may drop out of school, simply in order to fetch water and fuel for the family. Walking long distances to gather water and fuel also exposes them to harassment and assault, particularly in conflict affected or conflict prone areas.

6.1d Impacts of Rapid Onset Disasters on Women

There is a widespread consensus that climate change increases the occurrence of rapid onset disasters such as landslides and earthquakes. When such disasters occur, how men and women are impacted varies relative to the degree of gender equality in their societies. A study by Neumayer and Plümper (2007) analysing disasters in 141 countries found that in societies where women and men enjoy the same rights, disasters cause almost an equal number of deaths in both sexes. However, societies characterised by high inequality they also have high differences in sex specific death rates. In such societies, multiple factors, such as poverty and low income, make women more vulnerable when rapid onset disasters occur.

The educational disadvantage of women is another critical factor when rapid disasters occur. Many women are unable to read or comprehend warning signs, so early warning systems are ineffective. Women also have little decision making power in disaster prevention and preparedness programs, and they are generally excluded from disaster recovery operations and planning on a national level as well. Lastly, they usually have limited time to access vital information on mitigation and adaptation strategies.

Nutrition also plays an important role in determining an individual's likelihood of survival in a disaster. In sub-Saharan African, women consume fewer calories than men due to cultural provisions that allow men to receive more food. In Rwanda, a UNDP (2008) study showed that within the same income group, women in male-headed households consumed 377 less calories per adult than female-headed households. Consequently, in the event of a disaster, women are already nutritionally disadvantaged, and this inequality in nutritional distribution

can be expected to continue after the disaster as well, leading to higher morbidity amongst surviving women.

Lastly, cultural norms and preferences play a pivotal role during a disaster, and they may also contribute to the higher casualty rate among women. Norms as seemingly innocuous as dress codes may, in fact, be significant if they restrict women's mobility and their ability to move quickly during hazards. More significantly, preferential treatment both during rescue efforts and after is often given to boys.

Consequently, in the event of a disaster, educational and nutritional disadvantages as well as cultural biases are all factors that make women more vulnerable. These factors may explain why 85 percent of those who die in climate-induced disasters are women, and why women are 14 times more likely to die during a disaster than men (Nampinga, 2008; Araujo and Aguilar, 2007).

Following a disaster, gender continues to be a prominent factor. Besides the perpetuation of the aforementioned culturally defined nutritional inequalities, the gender norms defining the division of labour and household responsibilities are preserved. Women must often take on increased household workloads as well as the responsibility for caring for the injured.

Violence against women is another effect of disasters. The emotional trauma and stress resulting from threatened livelihoods, abrupt changes in regular routines and lifestyle, future uncertainties, and the loss of loved ones, income, and property may all contribute to increased anger and frustration. This, in turn, may increase the likelihood of domestic and sexual violence. Violence against women is particularly prevalent in cases where displaced families are living in emergency or transitional housing. These are often overcrowded, lack adequate privacy, and are not designed to support the needs of women.

Many times, disaster relief also inadvertently discriminates against women. Due to the bureaucratic nature of some government agencies, relief organizations, and insurance companies, women who do not fit into the rigid classification of "family" or "household" are at a disadvantage to receive aid (Hunter and David 2009). Official relief programs that draw upon models of male-headed households, are, at times, bureaucratically ill equipped to address the needs of single women or women heading their own household.

For young girls, there are a host of other problems. In post-disaster scenarios, there is an increase in the number of girls getting married at an early age, dropping out of school, facing sexual harassment, and getting trafficked for prostitution.

In sum, climate change poses an undeniable threat to women. They face specific disadvantages not only in the face of disaster, but also in coping with the repercussions afterwards. Women's vulnerability to the effects of climate change is exacerbated by their socially ascribed roles and responsibilities as well as by their status as the poorest members of the society. These factors compromise the time available for engaging in capacity building endeavours such as

education. It also further reduces their likelihood of having an economically and socially secure future and perpetually confines them to a cycle of poverty and dependency.

6.2 Women as Catalyst of Change

The vulnerability of women in Africa to the adverse impacts of migration and climate change does not imply that they are passive. On the contrary, women have the capacity and ability to use their special traits and their roles within their societies to have a positive impact on both migration and climate change. Women's roles as educators, care givers, and social organizers is complemented by their close relationship with the environment, namely as those primarily responsible for crop cultivation and water collection. This role within society makes women intimately aware of the nature of their environment and the adverse impacts of climate change and environmental degradation. However, it also makes them repositories of indigenous knowledge on sustainable practices and coping strategies, and puts them in the unique position to exacerbate or ameliorate climate change.

Women in Africa have been and can be catalysts for meaningful and positive climate change (Box 6.1 and Box 6.2). The women of Keur Moussa in Senegal, for example, employ adaptive strategies to stymie climate change and help their communities. Soil erosion is the cause of both water shortages and the flooding of farming land, conditions that have forced both men and women to migrate to cities. As a result, organizations of women in Keur Moussa built crescent shaped canals that helped to conserve soil and water and to combat flooding. The canals have also allowed the women to reclaim crop-land and improve agricultural outputs (UNDP, 2008).

Being highly reliant on natural resources, women are often innovative environmental managers and follow sophisticated risk minimization strategies. Making ends meet and surviving with few resources and an unfavorable power relation requires cleverness and resourcefulness. When these unique abilities are nurtured, they can bring about large benefits for entire communities and regions. For example, experience has shown that communities in which women are involved in the devising of early warning systems and reconstruction process adapt better when natural disasters occur (UNFPA and WEDO, 2009). Consequently, there is a need to further investigate women's coping and mitigation strategies and innovations. They should be applied on a larger scale and

Box 6.1 : Women as important agents of change – the women of Niger Delta

In 1999, women of the Niger Delta organized demonstrations both in Nigeria and abroad to bring attention to the massive flaring of natural gas by Shell, a transnational oil company in the region. The company was emitting more green house gases that the whole of the sub-Saharan region. The protests resulted in the closing of the company's headquarters in London as well as a temporary closure of the wells. The company reverted to military action as the protests continued, resulting in the death of 200 people and sexual violence against several women. The continued persistence by the Niger Delta's Women's Organization brought about the cancellation the company's license by a Nigerian court as well as a stop to the flaring of natural gas.

Source : UNDP (2008)

included as part of the solutions to the challenges and threats that climate change poses. Sharing and supporting women's knowledge and strategies will highlight women's potential to contribute meaningfully to climate change mitigation and adaptation strategies. Failing to do so will deprive society, governments, and policy makers of the knowledge and skill set unique to women.

Women are especially important following natural disasters. Hunter & David (2009) assert that in such instances, it is often the extended networks of women that provide various resources to assist in evacuation. Moreover, kinship and social networks often provide the temporary shelters for those that have fled. As destructive and devastating as natural disasters are, coping with them also necessitate new roles and new modes of interaction - opportunities where gender inequalities in society might be addressed. Sadly, however, in the rush to restore normal life, these opportunities are often missed.

In addition to positive impacts women can make in addressing climate change, it is important to recognize their positive impacts on migration. It is now widely acknowledged that remittances sent home by migrants contribute significantly to the socio-economic development of home countries. Migration analysis shows that in many cases, women migrants send more remittances than men (Piper, 2005). For example, Dodson's (1998) assessment of cross border migration to South Africa shows that though the amounts may be smaller due to women's lower earning potential, they occur more frequently. Furthermore, as recipients rather than remitters, women ensure that remittances are properly spent to meet the basic needs of the family. As a result of training and empowerment programs to improve financial literacy, women are now keeping more of the remittances. By effectively utilizing them to fund schooling, reduce child labor, and improve health, migration can help transition communities or families from low to middle socio economic class by funding schooling, reducing child labor and improving health (Omelaniuk, 2006).

Box 6.2: The Sinsibere Project – Folcenter Nyetaa Mali

This project which is being undertaken in partnership with Dodo Finland and the Ministry of Foreign Affairs of Finland. It has proven the effectiveness and efficiency of partnering with women and empowering them for productive environment management. Mali, a Sahelian country where two-thirds of land is a desert, meets 90 percent of its energy needs through burning woods and charcoal. The project works with women to help them create alternative income sources to reduce their dependence on wood. These sources include vegetable gardens and making of shea butter. This is complemented by micro loan infrastructure, environmental literacy, financial education, and training in the making of energy efficient stoves. The project highlights the potential of utilizing the position of women as key environmental managers in strengthening environmental management and disaster risk reduction. Additionally, an important lesson is that combining environment protection with alternative income generation is critical to success because the poor people are undoubtedly hesitant to be involved in environmental protection if it threatens their livelihoods. Evaluation of the project showed that after six years of operation 80 percent of the participating women reported that they no longer cut wood for commercial purposes or have significantly reduced their wood consumption. As women are also the main educators of children such environmental education will be passed on to the next generation.

Source : UN – ISDR (2008)

Lastly, a World Bank study (2007) shows that migration of women may lead to health gains, one of which is lower fertility rates in source countries. The study shows that fertility rates in Morocco have decreased as emigration to Western countries increased and women have become more aware of family planning options (World Bank, 2007).

6.3 Policy Issues

In Africa, males dominate long-range or long-term migration, but both the percentage of women migrating to neighboring countries for trade and the rate of women participating in inter-regional migration is growing rapidly (Piper, 2005). According to Hunter and David (2209), in 2005, females had grown to 49.6% of international migrants.

Much of the research on migration does not account for the unique migratory experiences of women or their socioeconomic contributions (UNFPA, 2006). One reason is the lack of gender disaggregated data. Especially in Africa, sex disaggregated data is less available for internal migration than for international migration (Jolly, 2005). This is particularly relevant because there are relatively more women in short distance and internal migration than in international migration. Thus, a bias in research, data collection, and policy analysis towards international migration may exacerbate the neglect of women in the migration discourse.

Climate change also suffers from a similar lack of research and sex disaggregated data. The exclusion of women is evident in the majority of climate change debates, analysis, and frameworks. Instead, their primary focus is on the economic or physical effects of climate change, so they address only technical issues. In many instances, climate change is treated as a technical and scientific issue that does not have social dimensions, which is very far from the reality. The most important global frameworks on climate change, such the Kyoto Protocol, do not include gender issues. Moreover, they fail to recognize the imperativeness of women's participation in climate change activities. There is urgent need to include women and their organizations in climate negotiations and actions at all levels.

However, recently the situation has started to change. Women's issues and roles have begun to be given attention in conferences and meetings on climate change. Some of these include the Manila Declaration of 2008, the 2009 Nairobi Action Platform: African Parliamentarians on Disaster Risk Reduction and Climate Change, and the 2009 Beijing Agenda for Global Action on Gender Sensitive Disaster Reduction Risk (Hunter & David 2009). Additionally, the 2008 Convention of Biological Diversity, which has been ratified by 190 States, explicitly addresses the participation of women. Since COP-11, the conference of parties has included women's caucuses that have negotiated for the mainstreaming of gender into all areas of the convention (UNDP, 2008).

At a national level, Senegal provides a best practice in terms of effective mainstreaming women in climate change mitigation and adaptation strategies. The National Committee on Climate Change employs women in leadership positions and takes action to mainstream their issues

into national climate change policies. This women-led team advocates and promotes the empowerment, inclusion, and capacity building of women in the country. For example, understanding the importance of indigenous knowledge, Senegalese women participated in public consultations in every region so as to provide input on adaptation solutions. These insights will later be incorporated into the National Adaptation Programme of Action (UNFPA and WEDO, 2009).

The National Adaptation Programmes of Action (NAPAs) are one of the more important mechanisms in developing countries for addressing climate change. Some of the countries have integrated women issues in their NAPAs (Box 6.3). However, most of the countries emphasize the vulnerability of women to the effects of climate change, but they fail to recognize women's immense knowledge and potential to contribute to adaptive mechanisms (UNDP, 2008). A review of 30 NAPAs conducted by the Gender Advisory Team of OCHA in 2009 showed that despite mentioning gender equality and women's empowerment principles, none demonstrated a clear commitment to these principles. Furthermore, the review found that only half of the NAPAs recognized gender differentiated impacts of climate change (UNFPA & WEDO, 2009).

Similarly, although several funds have been instituted in order to facilitate and fund different adaptation and mitigation strategies, especially in developing countries, assessment shows that in most cases, the interests of men dominates such funds and make them less accessible or applicable to women. Budgets should address both of the practical and strategic needs of women. These include participation in decision making and land ownership. Moreover, since the process of applying for such funds is lengthy, complicated, and requires technical knowledge, there is a risk that women and other vulnerable groups might not be able to access them.

It should be understood that the unsatisfactory participation and exclusion of women and gender issues from migration and climate change decision making processes overlooks the concerns and contributions of half of the world's population. Therefore, the willful neglect of gender is, in essence, a human rights issue.

Box 6.3: Integrating Gender in National Adaptation Programme of Action

Malawi : The Malawi NAPA stipulates that interventions that target women in vulnerable situations are proposed. Some of these are access to microfinance to diversify income; ensuring easier access to water and energy sources for example by drilling boreholes and planting wood lots. Additionally, gender focus is among the eight criteria for selecting projects under the NAPA funding

Niger: Under the NAPA framework and funding women are main beneficiaries of the livestock and farming projects.

Mauritania: The Mauritan NAPA explicitly recognize women as repositories of crucial indigenous knowledge and considers them key stakeholders.

Tanzania: The Tanzanian NAPA asserts that women groups should be strengthened in adaptation mechanisms to facilitate community participation.

UNDP (2008) & UNFPA & WEDO (2009)

Unfortunately, discussions and debates about migration and climate change in the public, in policy making arenas, and in academic circles often do not give women issues the attention they deserve. Despite a large body of evidence suggesting that gender sensitivity is crucial for effective mitigation and adaptation mechanisms, women are absent from most decision making processes. This is true not only at national and international levels, but also at household and community levels.

Chapter 7: Key Messages and Policy Recommendations for Action

This report has clearly shown that there is still limited ability to fully explain the causal relationship between migration and climate or to predict with any degree of certainty the magnitude of consequences of climate change on migration, and *visa versa*, in decades to come. Although there have been mapping exercises to assess the likely impacts of climate change on migration, such mapping does not allow for any concomitant understanding of the degree of responsiveness of migration and climate change to each other. It is difficult to determine how much climate change will emerge as a significant or predominant factor in influencing migration, distinct from other economic, political, social, and/or other unidentified factors.

Migration in Africa has taken place for centuries without much reference to climate change. Many economic, social, political and environmental factors cause migration, and it is very difficult to isolate the impact of climate change as a specific variable. For example, various reports of the International Panel on Climate Change (IPCC) stress that there is no simple linkage between global temperature increases and the number of people affected and forced to move by climate change. Instead, the IPCC reports suggest that impact of climate change on humans will be strongly influenced by other factors, such as poverty, and that income, population, and technological change determine the degree of impact and the decision to migrate.

Largely due to the lack of research, data, and consensus on climate-induced migration, many policy makers, planners, and researchers in Africa have not focused attention on this topic. The recent surge in new research, reports, and academic papers has not provided policy makers with the comprehensive information necessary to really understand the nature, trends, magnitude, and impact of the migration and climate nexus in the Africa region. Nevertheless, the present report argues that climate change will cause migration both in the short run and the long run, and that the topic necessitates serious consideration at regional, national and international levels.

Despite limited data and evidence of climate-induced migration, it is widely recognized that the challenges posed by climate change are many, and that these challenges are likely to be acutely felt by the world's poorest populations. These challenges may push the affected African countries into deeper poverty and make achieving the Millennium Development Goals (MDG) by 2015 impossible.

7.1 Key Messages

The key messages of this report are the following:

1. The link between migration and climate is multidirectional. Climate change is the result of both human and natural activities. Migration, on the other hand, is often viewed only as a response to social and economic factors, but the impetus may also be natural, i.e. climate change induced. However, the migration and climate nexus is not unidirectional. Rather, climate change may provoke migration, but the act of migration causes climate change as well. This multidirectional causality is modulated by a plethora of intervening factors such as vulnerability, population growth and distribution, conflict and poverty, gender, and factors of the external environment.
2. There is insufficient attention and priority accorded to the migration and climate nexus as well as a lack of understanding of the complex linkages and interactions involved in migration and climate processes. The lack of adequate data and techniques for measuring the actual link between migration and climate change inhibits effective policy making as well as international, regional, and national responses to the challenges at hand. In addition, the literature shows that research on migration has been primarily focused on international rather than internal migration trends, which causes women and gender issues to be overlooked. Finally, there has been insufficient research on how various patterns of migration contribute to climate change and environmental degradation.
3. Although there are difficulties in understanding the differences in how men and women are impacted by climate change, and how gender influences the decision of whether or not to migrate, the report has tried to illuminate some of the gender issues of climate change and migration in Africa. One key finding is that poverty, gender roles, and social/cultural biases make women more vulnerable to both climate change and migration. Additionally, though African women have traditionally played a major role in adaptation to climate change and environmental degradation, neither women nor their issues are adequately represented in policy making and development.
4. The lack of standardization among researchers, policy makers, and international organizations in the definition of terms and concepts such as the environment, adaptation, and disasters, has complicated efforts to establish a scientific and empirical link between migration and climate change. The matter is compounded further by the fact that different stakeholders working on the topic produce different kinds of data to match their needs. While humanitarian scientists are more interested in data on current situations, climatologists are more focused on the future impacts of climate change, projections, and long-term time series data. Additionally, there is no interdisciplinary approach between scientists who focus on migration and population change and those who study the environment and climate change. In most cases, the social impacts are neglected.
5. There is need for the development of capacities to integrate or mainstream the migration and climate nexus into development strategies and plans at all levels. The migration

and climate nexus has not been integrated into national development plans such as the Poverty Reduction Strategy Papers, or the progress assessment(s) of the MDGs. Also, it is absent in regional policy frameworks such as the African Migration Framework of the African Union, and the migration frameworks and policies of the Regional Economic Communities (RECs). This absence must be addressed.

6. Neither policy makers nor the public is sufficiently sensitized to the seriousness of climate change. Policy makers need to understand how climate change will impact development and how it will impact migration. Similarly, the public needs to be more aware of how, both in the short-term and the long-term, climate change will affect their livelihood and survival. Sensitization and awareness must be integral components of migration and climate change activities.
7. Migration has, in general, contributed positively to poverty alleviation and is a critical source for development financing, building of human capital, and an important channel for the transfer of knowledge and technology.
8. Migration is wrongly perceived as strictly a problem. As a result, the majority of governmental policies aim to influence the volume and direction of migrants rather than to accommodate flows and provide support. Migration should not necessarily be seen as a failure to adapt to the direct and indirect effects of climate change, but rather as a key component of adaptation that has important positive effects for the development in both origin and destination countries.
9. Migration is not adequately addressed in global climate change policy instruments and agendas. Both the UN Framework Convention on Climate Change (UNFCCC) and the Kyoto protocol do not include any provisions regarding assistance or protection of people who will be directly affected by climate change. Likewise, the global policies and agenda on international migration and development largely exclude consideration of climate change. Both the High Level Dialogue on international migration and development and the report of the Global Commission on International Migration are silent about climate change. The failure to include climate-induced migration in the international migration laws and policies constitutes a significant gap in international policies and law.
10. The increase in frequency and intensity of climate change raises concerns about its effects on vulnerable populations. Available evidence indicates that Africa will be hardest hit by global warming over the next century. Projected temperature increases will likely be accompanied by changes in precipitation patterns, rising sea levels, and increased frequency of extreme weather events. It is, therefore, expected that as climate change increases, the volume and frequency of migration will increase as well.
11. Increasing levels of rural to urban migration, provoked in part, by environmental stress, has led to very high growth rates among coastal populations and urban slums. This trend is expected to continue, exacerbating problems related to rapid urbanization and undermining progress toward the MDGs. Rural-urban migration taxes urban infrastructure, resulting in an inability to adequately address health and education needs of migrants and/or the existing population. This would directly impacts the MDG goals concerning

universal primary education, child and maternal mortality, and combating deadly diseases.

12. The circular migration that has been important throughout the ecologically fragile areas of East Africa and the Sahel for centuries will be severely affected by climate change. As climate changes become more intense, the prediction is that water supplies will be interrupted and land productivity damaged. Short-term and temporary measures will no longer be sufficient, and traditional livelihoods will have to undergo more radical transformations, including long-term and permanent migration to urban areas and other regions

7.2 Recommendations for Action

Drawing from these key messages, the following policy recommendations and actions are pertinent:

1. **Develop** conceptual and theoretical frameworks and technical tools. Such tools will help in the development of models and indicators, and in the generation of scientific findings and new knowledge on the migration and climate nexus. Also, they will help in training and capacity development, and in the development of institutions and human resources urgently needed to fill shortages in this area in Africa.
2. **Collect** data and information on the migration and climate nexus. Concerted effort should be taken to collect, standardize, and publish time series data and qualitative information on the migration and climate nexus. Governments and development partners should invest in data and statistical analyses to generate new knowledge and gender disaggregated data on the migration and climate nexus for supporting development plans and policies.
3. **Invest** in research and support collaboration between research institutions. The migration and climate nexus is ripe for intellectual and research contributions. Given the absence of local and regional data, a first important task is producing targeted, well-funded, and coordinated research. It is recommended that local research and case studies be developed. This research should highlight how the drivers of existing migration streams might be impacted by, or sensitive to, climate change, rather than produce crude global estimates based on delineation of affected areas. Such research should focus on the number of potential climate-induced migrants, provide a broad perspective on the extent and nature of contemporary climate-induced migration, and assess the potential effect of climate change on migration. Other relevant issues include: the extent and nature of human movements in those parts of Africa most susceptible to climate change, human vulnerability, migration as an adaptive mechanism, a risk analysis of displacement, concrete and practical risk-reduction mechanisms involving mobility, potential impacts of displacement, and the implications of displacement for regional peace and security. Another policy response should be for governments and regional institutions to nurture and facilitate collaboration and coordination of research on climate change and migration in Africa. Apart from the fact that very little research is being undertaken on this

topic, there is little evidence of research institutions in Africa working together, pooling resources, and sharing information and experiences they have on the topic.

- 4. Sensitize** all stakeholders. Once enough evidence is collected on the migration and climate change nexus, the next policy response is to embark on wide-scale sensitization of all stakeholders, especially policy makers. It is important to understand how the interplay of climate and migration will affect each other, and how they will affect water availability, health, education, food security, and indeed, peace and stability. Besides enhancing their understanding of the potential impacts of climate change, sensitization will heighten policy makers' awareness of the need to integrate climate change in sectoral strategies and systems, such as the health sector. Also it is important to sensitize the policy makers and planners to the availability of international funds dedicated to assist poor countries to adapt to climate change, the criteria for qualifying for such funds, and the methods for accessing, managing, and evaluating them.
- 5. Develop** climate sensitive policies, plans, and programs that identify the most vulnerable communities and that build local resilience and adaptive capacity so that the poor have options other than migrating from affected areas. Where policies and programs exist, there should be a review of such existing policies to address the potential for migration to facilitate adaptation to climate change. Lastly, it is important to develop and implement policies that integrate women into the planning, development, and execution of climate adaptation strategies at all levels.
- 6. Establish** new policy frameworks in order to manage climate-induced migration. Currently, there are no examples of legislation, regulations, or policies that address migration resulting from gradual climate changes that may destroy habitats or livelihoods in the future. Such a broad framework should combine political, economic, and security dimensions to adequately address the complex challenges of climate-induced migration. This includes promoting new mechanisms and regional solutions that incorporate economic development, diplomacy, aid, and security. The goal of the new policy frameworks is to muster effective responses and set a migration and international security agenda for the future.
- 7. Adopt** measures and policies to support migrants. National development plans should aim to incorporate both migration and climate change in order to ensure the social and physical protection of more vulnerable or poorer migrants. This might include measures to improve the transferability of social benefits across borders, but the most crucial issue is developing policies that will protect both internal and international migrants against exploitation, abuse, or physical violence. As climate change alters nomadic pastoralists' traditional migration routes, pushing them across sensitive borders, new policies must also address this reality and defuse the mounting tensions related to these migrations. Policy interventions must include all stakeholders, including the likely victims of climate change. For example, when planned resettlement becomes necessary, as it did in northern Ethiopia in the 1980s, the agreement of all stakeholders and long-term institutional support are crucial to the success of such an intervention.

- 8. Empower** vulnerable people to enhance their adaptive capacity and access to services. A key policy area for consideration is assisting those individuals, households, and communities who are unable to migrate because of lack of resources and social networks. This should include the removal and/or relaxation of existing policies and regulations that hinder the utilization of migration as an adaptive strategy to climate change. Policies for empowering vulnerable people should also consider property rights and their impacts on agricultural practices. Finally, policies and measures such as weather insurance and crop insurance schemes should be supported to reduce the vulnerability of rural populations to climate change and increase their livelihood options. This will promote stability of rural societies and diminish their incentives to migrate to urban areas. Governments should periodically review their rural development strategies to take into account the migration and climate nexus and drivers.
- 9. Promote** urban management and address vulnerabilities to climate change that urban populations face. Providing basic services, such as housing, health, water, education and employment, to rapidly growing urban slum population will be one of the major challenges of the twenty-first century. In particular, governments must address the housing deficit through long-term investment in housing. Special measures and plans must also be developed to protect urban centers located in coastal zones, which will have their own unique set of problems due to the threat of rising sea levels.

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