Environmental governance and climate change in Africa

Legal perspectives

Rose Mwebaza and Louis J Kotzé

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Preface

Africa is one of the most vulnerable continents to climate change and climate variability, a situation aggravated by the interaction of 'multiple stresses', occurring at various levels, and low adaptive capacity … Africa's major economic sectors are vulnerable to current climate sensitivity, with huge economic impacts, and this vulnerability is exacerbated by existing developmental challenges such as endemic poverty, complex governance and institutional dimensions; limited access to capital, including markets, infrastructure and technology; ecosystem degradation; and complex disasters and conflicts. These in turn have contributed to Africa's weak adaptive capacity, increasing the continent's vulnerability to projected climate change.[1]

With these somber words, the Intergovernmental Panel on Climate Change (IPCC) confirmed in 2007 that Africa is one of the continents on earth that is most susceptible to the potentially devastating effects of climate change. In the African context, the ecological impacts resulting from climate change are compounded by, what the IPCC terms, 'multiple stresses'. These stresses manifest themselves in various forms, including, *inter alia*: immense socioeconomic challenges such as poverty; lack of basic amenities which negatively affect material conditions for human welfare; lack of good governance practices; political instability and armed conflicts; displacement of people as a result of human-induced and natural disasters; the prevalence and increase of diseases, particularly HIV/AIDS; wide-spread human rights abuses; developing economies attempting to claim their rightful place in the world economic order; and lack of financial resources. The *Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (2007) details and further elaborates on all these challenges and paints a particularly gloomy picture for the continent's future and the enormous challenges that lie ahead in progressively and effectively addressing the challenges.

It is therefore not surprising that climate change constitutes one of the most topical themes increasingly permeating the current development debate, especially insofar as climate change will require a paradigm shift regarding approaches to sustainable development and the attainment of the Millennium Development Goals in Africa. Sustainable development is a complex phenomenon. It therefore seems pertinent to engage in vigorous discourse to devise strategies to ameliorate the severe impact of climate change on developing countries and, more specifically, the vulnerable countries situated on the African continent. Effectively tackling climate change requires a multi-disciplinary approach. Law, and more specifically, environmental law, plays an important role in this respect, especially insofar as legal mechanisms are able to shape the behaviour of people with respect to their interaction with the environment. The manner in which law could be used to address the deleterious effects of climate change accordingly provides numerous opportunities to reinvigorate the debate surrounding climate change and its effects on developing countries, particularly, those situated on the African continent. In response to the latter, the Environment Security Programme (ESP) of the Institute for Security Studies (ISS), Nairobi, and the Centre for Advanced Environmental Studies in Environmental Law and Policy (CASELAP) at the University of Nairobi, organised a scientific conference which specifically sought to investigate the challenges of climate change in Africa and to formulate possible legal responses to address some of these challenges. This scientific conference that was held from 23–25 March 2009 at the Silver Springs Hotel in Nairobi, Kenya, coincided with the Third Symposium of the Association of Environmental Law Lecturers from African Universities (ASSELAU). This book contains a selection of papers presented at the scientific conference.

The book is divided into five parts. **Part 1** contains papers that seek to present a general overview of climate change issues in some African countries. In **Chapter 1**, Mwebaza investigates the impact of climate change on East Africa. The author notes that East Africa is set to be one of the areas to be worst hit by climate Change in Africa. The worst impacts of climate change in this area are projected to be at principally two levels; the human impact and the environmental or biodiversity impact. The major human impacts of climate change have been observed in the areas of human health, food security and access to water for domestic and industrial use. Environmental and biodiversity impacts, on the other hand, have mainly been felt through a rise in sea level

along the East African Coast, and loss of biodiversity resulting form extreme weather patterns and changes. The author proposes that, given the observed and projected impacts of climate change in East Africa, governments in the region need to make more concerted efforts to deal with the impacts of climate change. These efforts should include development of appropriate legal and policy regimes at national and regional level and the mainstreaming of climate change issues in all sectors, especially those projected to suffer the greatest impacts of climate change.

In **Chapter 2**, Busingye provides an enlightening perspective on the relationship between gender roles, land degradation and climate change in Uganda. The author contends that this relationship is one of cause-and-effect and that a proper understanding of this relationship would enable the creation of mechanisms to address challenges posed by climate change. Busingye suggests this relational model shows that gender roles, which are a function of social-cultural, economic and political underpinnings of society, are at the confluence between two other concepts, namely, land degradation and climate change. The author points out in this respect that land degradation is aggravated by unsustainable human activities including over-cultivation, overgrazing and failure to agree on which activity is suitable for which environment by the two genders in a household, namely women and men. Women in particular are disempowered by society's social-cultural constructs and as such cannot meaningfully contribute to decisions relating to the sustainable utilisation of family land. Against this broader context, the author suggests that a proper understanding of the linkage between gender roles, land degradation and climate change is useful in addressing social-cultural issues since these are all factors, which may influence the challenges posed by climate change.

Part 2 of the monograph focuses on approaches to mitigate the harmful effects of climate change in certain African countries. In **Chapter 3**, Mwiturubani reflects on the role of informal institutions in enhancing coping mechanisms to deal with the impacts of climate change in the Lake Victoria Basin (LVB). The author states that an IPCC analysis of the impacts of climate change suggests that in sub-Saharan Africa, where the majority of the population depends on rain-fed agriculture, economic activities are likely to be more vulnerable to climate change. This is so because the coping mechanisms of the indigenous communities in the rural areas are limited due to a lack of appropriate technology. A survey of households and interviews involving key informants

in the LVB, however, illustrates that local people in the LVB, through their informal institutions, have been developing different (informal) strategies to deal with the impacts of climate change. Mwiturubani suggests that these strategies are in most instances adaptable to changing ecological conditions and are effective and useful in responding to natural resource constraints caused by climate change. Some of the strategies include: creating and implementing specific rules on access to and utilisation of some specific natural resources such as those in the water catchment areas; creating and implementing rules on the type of crops to be grown; creating and implementing restrictions on the type of harvests to be sold; and disseminating knowledge of weather forecasts informed by indigenous-based tools and indicators to understand the onset and end of rainfall. The author concludes by proposing several recommendations to the governments in the region to formulate policies and enact laws with a view to supporting informal institutions and indigenous-based technologies for sustainable development.

Part 3 of the monograph is dedicated to papers focusing on climate change adaptation. In **Chapter 4**, Habtezion provides a general overview of adaptation policies in Africa, and specifically Eritrea, and also reflects on the challenges and opportunities in the application of tools and methods related to climate change. The author argues that scientific advances in seasonal and multi-decadal predictions in climate variability and change have laid bare the enormity of challenges in adaptation, and have also highlighted some impediments in pushing the United Nations Framework Convention on Climate Change (UNFCCC) process forward. The author points out that currently, a range of tools and methods exist, or are being developed, to facilitate access, understanding and application of climate data, which could be employed by least developed countries (LDCs) in the design of appropriate adaptation policies, strategic pathways and enabling legislation. These tools and methods are essential for making science-based policy decisions on adaptation. The author, however, finds that the complexity and cost associated with such data, tools and methods do not always coincide with the state of human resources and technological capacity of African LDCs and, as such, their effect on the design of adaptation processes is bound to be limited. Habtezion contends that increased efforts need to be made through the UNFCCC process, as well as through possible regional initiatives, to enhance the capacity of African LDCs in the application of available tools and methods related to climate change, also with a view to ensuring that these

tools and methods are considered to be an integral part of ongoing discourse on climate change financing, and the transfer and deployment of technology. The author concludes that parallel to such efforts, regulatory measures are needed to ensure harmonisation of environmental/natural resource-related laws and policies and coordination among relevant institutions, with the view to facilitating adaptation mainstreaming into development planning. In **Chapter 5**, Ladan investigates the myriad legislative and regulatory challenges faced in promoting efficient and renewable energy with respect to climate change mitigation in Nigeria. The author contends that while much has been written about the science, technology and policies for promoting energy efficiency and renewable energy, little has been written on the legislative and regulatory options that are necessary to implement these technologies and policies. He proposes that by promoting clean and efficient energy use at the legislative and regulatory levels, governments will be able to ensure that all stakeholders have the opportunity and incentives to adopt new practices that will help to mitigate climate change and reduce pollution while keeping on the path of economic and social development. Ladan supports his arguments by: emphasising the importance of efficient and renewable energy to produce electricity for the mitigation of climate change; providing an overview of the policy, legislative and regulatory measures available to promote energy efficiency and renewable energy; and highlighting the challenges and strategies to overcome the barriers to the effective use and regulation of renewable energy in Nigeria. In **Chapter 6**, Laltaika specifically focuses on the use of biofuels in the Tanzanian context and, for this purpose, discusses various legal challenges and recommendations for change in this respect. By surveying evidence of climate change, rising prices of fossil fuels and the ever-increasing demand for energy, the author underscores the importance of investing in alternative fuels in Tanzania and also discusses the effects of agrofuels on biodiversity conservation, food security and land tenure. Laltaika argues that precautionary measures should be adopted and implemented to ensure that this propelling industry does not cause more harm than good to the environment.

Part 4 of the monograph focuses on the Clean Development Mechanism (CDM) in the African context. It contains three chapters dealing specifically with this issue. **Chapter 7** provides an African perspective on reforming the CDM. Lau, Rumble and Niland eloquently argue that the idea behind the CDM is that developing nations will benefit from sustainable development in the

form of 'climate-friendly' projects that reduce emissions of greenhouse gases (GHGs) while developed nations receive Certified Emissions Reduction (CERs) credits that may be used for compliance purposes. However, since its inception, a number of problems have arisen with this mechanism. The authors proceed to analyse the problems inherent in the formulation and implementation of the current CDM from an African perspective, and in doing so, consider an array of possible solutions to these shortcomings with a view to informing the possible reform of the CDM in the Copenhagen Protocol, which will replace the Kyoto Protocol at the end of the first commitment period in 2012. The authors also include in their discussion an analysis of options for scaling up the CDM to promote more active participation of African nations in the post-2012 climate regime. In **Chapter 8**, Tamasang investigates the CDM and its potential for climate change mitigation in Africa by specifically focusing on forestry projects in Cameroon. For this purpose, the author turns his attention to the issue of conditionality by drawing from the provisions of the Kyoto Protocol and certain decisions of the Conference of the Parties to the Protocol. The issue of conditionality is also examined within the context of African forest projects in general and Cameroon forest projects in particular. The author concludes that there are a number of legal concerns under the Kyoto Protocol which require review if the objectives of the CDM are to be achieved. He further proposes that a more viable option for an effective climate change governance mechanism would consist of efforts to complement project development with litigation. In **Chapter 9**, Kasimbazi provides a critical review of regulatory mechanisms for implementing renewable energy CDM projects in Uganda. In doing so, the author assesses the various challenges and opportunities associated with the current Ugandan regulatory framework and he argues that the success of CDM projects in the renewable energy sub-sector largely depends on the existence of an adequate regulatory framework. An examination of Uganda's policy and legal framework reveals that, generally considered, it is adequate to implement renewable energy CDM projects. The author, however, finds that there are other non-legal limitations that curb the effective operation of the regulatory framework and that, if these limitations are not addressed, the regulatory framework and several CDM projects are likely to fail. Kasimbazi concludes by providing several recommendations directed to the appropriate authorities, which may assist in overcoming current deficiencies in this respect.

Part 5 of the monograph is devoted to the issue of human rights approaches to climate change mitigation and adaptation. In **Chapter 10**, Mwebaza points out that while there is a vibrant global discourse on climate change and the serious threats it poses to both the environment and humanity, there is little in this discourse focusing on how climate change will adversely affect fundamental human rights of present and future generations. She finds that there is even less discourse on how the fundamental rights of the most vulnerable people of Africa will be affected by climate change, and that little or no attention is afforded to the need to integrate human rights into the climate change mitigation and adaptation policies and strategies being implemented in various African countries. Mwebaza concludes that, for African countries to effectively respond to the challenges of climate change and its impact on the fundamental rights of people, these countries must integrate basic human rights standards and norms as contained in the international human rights framework into their mitigation and adaptation policies and strategies. She further contends that until and unless fundamental human rights are integrated into Africa's efforts to mitigate and/or adapt to climate change, any efforts undertaken to respond to the impacts of climate change will only result in minor successes. Twinomugisha discusses the implications of climate change for the right to health in Uganda in **Chapter 11**. The author points out that climate change may adversely affect access to adequate housing, clean and safe water, sanitation, and adequate nutrition, all of which have implications for the right to health. Yet, as Twinomugisha indicates, Uganda is obliged by its constitution and various human rights instruments to progressively realise the right to health of its people. Pursuant to its constitutional and international obligations, Uganda has, in partnership with the international community, undertaken measures to enhance public health. However, the gains made in the area of public health may be undermined by the negative impacts of climate change. The author succinctly argues in this respect that the fulfillment of human rights, such as the right to health, can significantly contribute to efforts aimed at addressing the consequences of climate change. He concludes that for Uganda to fulfill its obligation to realise the right to health, it must devise and implement legislative and policy strategies to prevent the deleterious consequences of climate change on human health.

This book does not attempt to provide profound solutions to all the challenges posed by climate change in Africa. Rather, it aims to contribute to the ongoing discussion by investigating certain aspects of climate change and the

manner in which these manifest themselves in a selection of African countries. It also acknowledges the dearth of literature dealing specifically with climate change and its effects on the African continent. It is therefore hoped that the collection of insights presented in this book would contribute to and further encourage debate surrounding what is perhaps currently one of the most pressing issues in modern day society.

Rose Mwebaza and Louis J Kotzé
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Part 1

Climate Change in Africa

General Perspectives

1 The impact of climate change in eastern Africa

Rose Mwebaza

ABSTRACT

East Africa is projected to suffer some of the worst impacts of climate change in Africa. These impacts are projected to be in primarily two areas: the human impacts and the environmental or biodiversity impacts. The major human impacts of climate change have been observed in the areas of human health, food security and access to water for domestic and industrial use. Environmental and biodiversity impacts, on the other hand, have mainly been felt through the sea level rise along the East African Coast, and loss of biodiversity resulting from extreme weather patterns and changes.

However, in spite of the projected impacts of climate change in the region, there is nothing or little that has been done by the countries to prepare to respond adequately to the impacts of climate change. This chapter will examine in detail the projected impacts of climate change in East Africa. In particular, the chapter will examine the impact of climate change on human health, food security and access to water. The chapter will also recommend the need for policy action at both local and national level as means of responding to the impacts of climate change.

INTRODUCTION

Climate change has been described as the leading challenge of our time. The UN Secretary-General Mr Ban Ki-moon describes it as 'the most global of problems' facing our times. While speaking at the meeting of the industrialised nations of the Group of Eight (G8) gathered at Heiligendamm, Germany, Mr Ban Ki-moon stated that forces must be mustered to fight global warming under a multilateral process within the UN framework. He said that climate change and how we address it will define us, our era and ultimately the global legacy we leave for future generations.[1]

He noted that while wealthy nations possess the resources and know-how to adapt to the effects of climate change, African countries face a bigger challenge in dealing with the effects of climate change. He noted further that an African farmer losing crops or herds to drought and dust storms is infinitely more vulnerable. Large-scale adaptation and its funding to the order of billions of dollars a year to manage climate-change impacts, particularly in the developing world, will be needed. He spoke of a Namibian representative who, at the UN Security Council Meeting in April 2007, stated that climate change is not an academic exercise but a matter of life and death, especially as the Kalahari Desert is expanding, destroying farm land and rendering whole regions in his country uninhabitable.[2] A French representative at the same meeting described climate change as the number one threat to mankind.[3]

Mr Ban Ki-moon is not alone in his call for global action on climate change. Honourable Helen Clark, former prime minister of New Zealand, notes that the issues raised by climate change have given a tangible core and renewed sense of urgency to the goal of sustainable development.[4]

But climate change is not just about the environment. As Sir Emry Jones Parry notes, climate change is transforming the way we think about security. While this will not be the first time people will have fought over land, water and other resources, the scale of the conflicts resulting from climate change means that they are likely to dwarf the conflicts of the past.[5] A report published on the 16 April 2007 by the Military Advisory Board of the United States notes that projected climate change poses a serious threat to America's national security because it will be a multiplier of instability in some of the most volatile regions in the world. However, it is not just America that will suffer these projected changes. Africa is projected to suffer the brunt of climate change because of its limited capacity to adapt. From flooding to disease and famine, migration in areas of high tension to drought and crop failure, from increased competition for food, water and energy in a continent in which resources are already stretched to the limit to economic disruption on an unprecedented scale, Africa is likely to suffer the full force of the projected impacts of climate change and the domino effect of this is bound to be felt by the rest of the world.

In recognition of the growing importance of the discourse on climate change, the UN Security Council, in an unprecedented move, recognised climate change as a core security issue on the 17 April 2007. Nevertheless, as Sir Emry Jones Parry notes, climate change and security should not be looked at within the traditional narrow confines of national security. Climate change and human security is about collective security in a fragile and increasingly interdependent world and, tragically, it will be the most vulnerable and least able to cope, most of whom are on the African continent, who will be hit first.[6]

At the world gathering on climate change in Bali, there was unanimous consensus among the conference of parties delegates that there was need to urgently enhance implementation of the UN Framework Convention on Climate Change in order to achieve its ultimate objective in full accordance with its principles and commitments.[7]

It is in the context of the recognised importance of climate change at a global level that this paper seeks to present the impact of climate change in East Africa. In order to understand the context within which climate change is happening in East Africa, the paper will commence with an expository background of East Africa. It will review the major geophysical features, its biodiversity and the population that will be affected by the impacts of climate change. It will then proceed to examine the emerging evidence on climate change before proceeding to present the impact of climate change in East Africa. The paper will end with a conclusion based on the emerging evidence on climate change and its impact in East Africa.

BACKGROUND ON EAST AFRICA

East Africa is traditionally comprised of three countries: Uganda, Kenya and Tanzania. However, the political definition of East Africa now includes Rwanda and Burundi. Geographically, the East African region is described to include the coastal countries of Mozambique, Somalia, the island of Madagascar, the

three archipelagoes of Comoros, Mauritius and Seychelles, and the French Territories of La Reunion.[8]

In order to give scope to the presentation, the paper will focus on the impact of climate change on the four East African countries of Uganda, Kenya, Tanzania and Rwanda.

The four countries have a combined population of over 107 million people. The population has doubled in the last 25 years and is expected to grow by 63 per cent in the next 25 years to reach 175 million. The population is predominantly young, with over 40 per cent under the age of 15.[9]

The four countries cover a total land area of 167.45 million hectares, which is 7 per cent of sub-Saharan Africa's land area. Rwanda has the highest share of its land under permanent cultivation, which increased from 48 per cent to 56 per cent between 1992 and 2002. Tanzania has the lowest share of land under cultivation, accounting for just 5 to 6 per cent of its total land area. Uganda's total land under cultivation amounts to 35 to 37 per cent, while Kenya's land area under permanent cultivation is a mere 8 to 9 per cent.[10]

The amount of land allocated to pasture is highest in Tanzania at 40 per cent, followed by Kenya at 37 per cent and Uganda at 26 per cent. Rwanda has seen its share of land allocated to pastoralism reduced from 26 to 19 per cent between 1992 and 2002.[11]

The amount of forested land has declined in the four countries in the last ten years, with Rwanda witnessing a decline from 17 to 12 per cent. Tanzania's decline was from 42 to 41 per cent; Kenya's forest cover has shrunk by 2 per cent, while Uganda's forests have shrunk by 4 per cent. In total, the region lost 2 923 000 hectares of forested land in a period of ten years (1990–2000). This is an area greater than Rwanda's total land area of 2 467 000 hectares.[12]

The region has 192 cubic kilometers of renewable water resources each year. Tanzania enjoys 47 per cent of this resource, Uganda 34 per cent, Kenya 12 per cent and Rwanda 3 per cent. Tanzania accounts for the highest water withdrawal at 49 per cent, followed by Kenya at 40 per cent, with Uganda and Rwanda withdrawing 8 per cent and 3 per cent respectively. Water withdrawal in the region is primarily for agriculture, with Tanzania's agricultural usage amounting to 93 per cent, Kenya 64 per cent, and Uganda and Rwanda 39 per cent. Water usage for industrial production is minimal, accounting for just 1 per cent in Tanzania, 6 per cent in Kenya, 15 per cent in Uganda and 14 per cent in Rwanda.[13]

An important aspect of water usage in the region is Lake Victoria, the second largest fresh water body in the world, which is shared by the three countries of East Africa. The lake is also important geopolitically for its downstream users in Sudan and Egypt. However, since 2003, the lake has experienced a drop in its water level. Recent studies on the lake reveal that 45 per cent of the drop in the water level of the lake is attributable to drought and 55 per cent to the over-release of water from the Owen Falls Dam.[14] The East African of March 13 to19 2006 also reports that the drop in the level of lake Victoria can be attributed to global warming associated with the emission of greenhouse gases (GHG) by Western countries and the drying up of its two major contributory rivers, Kagera and Nzoia, which contribute over 47 per cent of all the water to Lake Victoria.

In terms of biodiversity, the region has a total area of 19,2 million hectares of protected areas. This accounts for 11 per cent of the total land area of the region and accounts for 2,4 per cent of all protected areas in the world. Tanzania has protected 15,6 per cent of its land area, Uganda 8,9 per cent, Kenya 6,1 per cent and Rwanda 7,9 per cent. The four countries have between themselves protected 19 marine areas, 11 biosphere reserves and ten internationally important wetlands. The four countries are home to 1 348 species of mammals of which 109 are threatened or endangered. There are also 3 839 species of birds, comprising a significant 38 per cent of the global total. The region is also host to 23 702 species of plants, comprising of 9 per cent of the global total. [15]

EMERGING EVIDENCE ON CLIMATE CHANGE

There is now indisputable evidence that climate change is happening in Africa, as it is in the rest world, and that it is not only bringing with it changes to biodiversity but also social and economic impacts.

Climate change is defined by the Intergovernmental Panel on Climate Change (IPCC) as a change in the state of the climate that can be identified by changes in the mean and/ or the variability of its properties and that persist for an extended period, typically decades or longer. It also refers to any change in climate over time, whether due to natural variability or as a result of human activity. This definition of climate change is different from the one used by the United Nations Framework Convention on Climate Change (UNFCCC), which only refers to climate change as attributable directly or indirectly to human activity that alters the composition of the global atmosphere which is in addition to human activity

that alters the composition of the global atmosphere and that is in addition to natural climate variability observed over compared over time periods.[16]

Scientists now tell us with certainty that the global surface temperature is rising and this is largely due to human activities. Human activities are changing the composition of the earth's atmosphere. Increasing levels of GHGs like carbon dioxide in the atmosphere are largely a result of the burning of fossil fuels. Once emitted, these gases remain in the atmosphere for periods ranging from decades to centuries. The burning of fossil fuels also results in the emission of aerosols that absorb and emit heat, and reflect light. The addition of these gases and aerosols has changed the atmosphere, leading to changes in temperature, precipitation, storms and sea level.

The IPCC projects that if GHG emissions continue to rise at their current rates, the mean global temperatures will rise by a substantial 1,4 to 5,8 degrees Celsius by the end of the 21st century.[17] Observed evidence by the panel of scientists further indicates that 11 of the 12 years between the period 1995 to 2006 rank among the 12 warmest years in the instrumental record of the global surface temperatures since 1850. The temperature increase is widespread and is greatest at the higher northern latitudes. Land regions have warmed faster than oceans.[18]

The panel also projects that global warming this century is likely to trigger serious consequences that include rise in sea levels. Global average sea level rose at an average rate of 1,8 mm per year in the period 1961 to 2003 and at a staggering average rate of about 3,1 to 3,8 mm per year in the period 1993 to 2003.[19]

Observed decreases in snow and ice are consistent with global warming. There is evidence to show that the annual average arctic sea ice has shrunk by 2,7 to 2,3 per cent per decade. There is also observational evidence of increased tropical cyclone activity in some regions.[20]

It is therefore very clear that there currently exists objectively verifiable evidence to demonstrate that climate change is happening and that, unless something is done, it is only likely to get worse in the near future. Any intention of containing climate change will therefore depend to a large extent on the extent to which GHGs and aerosols are controlled and regulated and the extent to which features of the climate respond to GHG and aerosol concentrations.

It is important to note that, in addition to human activity, natural influences also play a big part in climate change and so influences, such as those from volcanic activity and changes in the sun's intensity, will, to a great extent, affect climate change. Volcanism affects climate by causing cooling for a period of a few

years. The sun, as the ultimate source of all the heat in the climate system, also affects climate change. The sun is getting brighter with higher energy output as it continues its slow evolution. Orbital variations which are considered by some scientists to be extensions of solar variability also cause changes in the distribution and abundance of sunlight reaching the earth's surface, thus affecting climate. In addition to the effect of the sun, plate tectonics also contributes to climate change as plate tectonics reposition continents, shape oceans, build and tear down mountains, and generally define the stage upon which climate exists.[21]

Climate change is not a new phenomenon. The earth's climate has changed throughout history, from the glacial periods or ice ages, where ice covered significant portions of the earth, to interglacial periods where ice retreated to the poles or melted entirely. These changes were triggered by a combination of forces such as changes in the earth's orbit, changes in the sun's intensity, volcanic activity and changes in ocean currents.

However, since the Industrial Revolution, human activities, especially the burning of fossil fuels and biomass, have added to the amount of heat-trapping GHGs in the atmosphere. The IPCC reported in 2005 that the atmospheric concentration of carbon monoxide has risen to 379 ppm^3 compared to the pre-industrial levels of 280 pmm^3. [22]

Manufacturing is said to contribute significantly to climate change and cement manufacturing alone is said to be the third-largest cause of manmade carbon dioxide emissions. Cement production is responsible for approximately 2,5 per cent of total worldwide emissions from industrial sources.[23]

Other human activities that have contributed to climate change include changes in land use and cover which have affected temperatures by changing the amount of solar radiation the land reflects and absorbs. Activities such as deforestation, reforestation, desertification and urbanisation influence climate change by affecting temperature, wind and precipitation in the places where they occur. Changes in land use also affect the amount of carbon dioxide taken up or sequestered or released by the land surface. A famous hypothesis by William Ruddiman suggests that the rise of agriculture and the accompanying deforestation led to the increase in carbon dioxide and methane 5 000–8 000 years ago.[24]

A 2006 UN report, titled Livestock's Long Shadow, asserts that livestock is responsible for 18 per cent of the world's GHG emissions as measured in carbon dioxide measurements. It was further reported that, in addition to carbon monoxide, livestock produces 65 per cent of human-induced nitrous oxide, which

has 296 times more the global-warming potential of carbon monoxide, and 37 per cent of human-induced methane, which has 23 times the global-warming potential of carbon monoxide.

Other evidence of climate change reported by Butterfly Conservation in the UK states that climate change has changed the migratory patterns of species. They report that relatively common species with a southerly distribution have moved north, while scarce upland species have become rarer and even been lost. Organisations such as Wildlife Trust, World Wide Fund for Nature, and Birdlife International are actively monitoring the effects of climate change on biodiversity.

It is therefore clear that climate change is a reflection of the variations in the earth's atmosphere, processes in other parts of the earth such as oceans, and the effects of human activity.

THE IMPACT OF CLIMATE CHANGE IN EASTERN AFRICA

Introduction

East Africa is considered to be one of the areas on the African continent most vulnerable to climate change and its impacts. The impact of climate change in East Africa has been observed at principally two basic levels: the human impact and the environmental or biodiversity impact. The major human impacts of climate change have been mainly observed in the areas of human health, food security and access to water for domestic and industrial use. Environmental and biodiversity impacts on the other hand have mainly been felt through rising sea levels along the East African Coast and loss of biodiversity resulting from extreme weather patterns and changes.

It is important to note at the onset that these impacts of climate change are likely to be aggravated by the interaction of other stressors prevalent within the region, such as extreme poverty, limited access to capital, ecosystem degradation, complex disasters and conflicts.

Human impacts of climate change

Food security[25]

Food security in most of East Africa is not guaranteed through the market but through seasonal rain-fed subsistence farming. Eighty per cent of the population in the region depends on agriculture for a livelihood. Food security in the region is therefore intricately tied to climate variability and the predictability of planting and harvesting seasons.

However, since 1996 there has been a marked variation in the amount of rain falling in the region as a result of climate change. This has in turn affected agricultural production, which has in turn affected food security. Funk et al report that between 1996 and 2003 there was a dramatic decline of rainfall in the region of between 50–150 mm per season.[26] In addition to the decline in rainfall, there is also a growing variation and deviation from normal growing seasons which affects food production and thus food security. The major cause of these variations and deviations is the *El Niño*, which produces abnormally high amounts of rain in parts of East Africa, leading to flooding.

This decrease and variation in rainfall in the region as a result of climate change will have a direct impact on crop yields, meat production, fisheries and sources of wild food for forest-dwelling hunter-gatherer communities. It will also have the direct impact of increasing encroachment of marginal lands and protected areas as people look for fertile land for agricultural production to ensure continued food security. Other direct impacts will include an impact on people's incomes as a result of less income from agricultural production resulting from climate change. All this will have severe consequences on the livelihoods of the community in East Africa and its forms of social protection, which will be disrupted by the direct and indirect impacts of climate change on agricultural production and food security.

Furthermore, climate change will affect soil fertility and its ability to retain the necessary minerals for food production that ensure a balanced diet. The direct consequence of this will be a reduction in the nutrient content of food in the region, including protein and gluten contents of grains, and toxin levels from pests and diseases. The resultant effect of this on human health will include weakened human body systems and increasing vulnerability to diseases.

It is important to note, however, that the impact of climate change on food security in the region will be aggravated by the interplay of other factors, such as economic and social factors that determine the vulnerability of households and communities in the region, as well as their capacity to adapt.[27] The impact of climate change on food security also needs to be considered within the wider discourse on human security, especially the realm of interstate conflict, intrastate conflicts and the political economy of the East African countries.

Climate change will not only affect food production but also fisheries. Climate change in the region has already been blamed for the drop in the levels of Lake Victoria, which has affected fish volumes in the hitherto well-stocked lake. Rising temperatures in the region have been blamed for the abnormal stratification of Lake Tanganyika, which has affected its fishery capacity.

It is therefore no wonder that East Africa is currently considered to be one of the regions on the African continent prone to food shortages. This is in line with the UN Food and Agriculture Organisation (FAO 2004) report, which indicates that the number of African food crises per year has tripled in the time between the 1980s and 2000s.

Access to water

One of the worst predicted impacts of climate change in East Africa is on access to water for both domestic and industrial use. Currently, two-thirds of all people in rural Africa and a quarter of urban dwellers lack access to clean safe drinking water. This situation is likely to be aggravated by the negative effects of climate change on precipitation in the region. The IPCC notes that climate change and variability have the potential to impose additional pressure on water availability, water accessibility and water demand in Africa.[28]

The shortage of water in the region will mostly be a result of the variability in the frequency, intensity and predictability of rainfall in the region. The IPCC[29] predicts that warmer temperature in the region will lead to a 5–20 per cent increase in rainfall between December and February and a 5–10 per cent decrease in rainfall between June and August.[30] However, it notes that these changes are likely to be sporadic and unpredictable and will not be uniform throughout the year in the region. This unreliability in the variability of rainfall will affect water management and thus affect water supply for domestic consumption and industrial use.

Climate change in the region has also affected water availability as a result of warming sea surface temperatures in the Indian Ocean off the East African coast, which has been blamed for the recent reduction in rainfall and droughts in the equatorial and subtropical East African region.[31] In Tanzania, for example, high temperatures and less rainfall has been predicted to affect the annual flow to the Pangani and Ruvu rivers by 6–9 per cent and 10 per cent respectively.[32] Glaciers also feed the Pangani basin from Mount Kilimanjaro, which are predicted to disappear completely by 2015–2020. The Pangani basin is one of

Tanzania's most agriculturally productive areas and the inhabitants of its basin depend on the melt water from Mount Kilimanjaro and the fog water from the rainforest for drinking, irrigation and hydropower.[33] The Pangani basin is also an important hydropower production region. Because of this, climate change threatens the productivity and sustainability of this region's resources, which hosts an estimated 3,7 million people.[34]

Climate change has also had a severe impact on the fluctuations in lake levels in East Africa. Fluctuations in Lake Victoria have been attributed to climate change. In 1997/98, floods and rainfall triggered by *El Niño* in East Africa resulted in a surface rise of 1,7 metres and disrupted agricultural production and pastoral systems in the region. The flooding resulting from the phenomenon also led to the death of over 1 000 people and disrupted communication and service provision in Uganda.[35] In the same year, while waters were rising in Lake Victoria, *El Niño* triggered a severe drought in another location in Kenya, significantly reducing the availability of hydroelectric power in the region.[36]

Conway notes, however, that the impact of climate change on access to water must be considered with caution. For example, he observes that there is no indication of how the Nile flow, which originates in Uganda will be affected by climate change because of the uncertainty about rainfall patterns in the basin and the influence of complicated water management and water governance structures.[37]

Human health

Climate change in East Africa, like elsewhere, is predicted to lead to adverse human health consequences. Rising temperatures and intense rainfall in the region have been held responsible for malaria epidemics in the highlands of Kenya, Uganda, Tanzania and Rwanda. Temperatures affect the development rates of vectors and parasites, while rainfall affects the availability of mosquito breeding sites. Changes in climate, such as the persistent warm and rainy days for more of the year, have led to an increase in malaria in many areas in the region. In addition, temperatures are warming in the formerly cooler, higher elevation areas of East Africa, leading to a spread in malaria in areas and populations that had previously not been exposed to malaria.[38]

Patz et al reported in 2005 that the outbreaks of Rift Valley fever epidemics in the region are also correlated to climate variability. Between 1950 and 1998, three quarters of the Rift Valley fever outbreaks occurred during the *El Niño* seasons.[39]

Environmental and biodiversity impacts of climate change

The increasing rise in temperatures coupled with a reduction in precipitation in East Africa is leading to changes in land use, which in turn are leading to the destruction of habitats and disrupting the connectedness of ecosystems, which could lead to many localised extinction of species.

According to Lovett, climate change is expected to lead to significant alterations to Africa's biodiversity as species struggle to adapt to changing conditions.[40] It is predicted that, due to its sensitive native fauna, East Africa is particularly vulnerable to exotic and invasive species colonisation. Several ecosystems, particularly grass and shrub savannahs, in East Africa are shown to be highly sensitive to short-term availability of water due to climate variability. Shrub and grassland vegetation types have root systems that are shallow and dense; they draw their moisture from water that is available from upper soil layers and growth in these species depends highly upon the timing, intensity and duration of rainfall.[41]

Migratory species in East Africa are also vulnerable to changes in climate change. Climate change has the potential to alter migratory routes of species which may also increase conflicts with humans, particularly in areas with scarce rainfall. Land use resulting from climate change will also affect migratory routes. For example, it has been demonstrated that park boundary fences have disrupted migratory journeys of wildebeest.[42] Also, a change in the intensity and duration of rainy versus dry seasons has affected the breeding habits and rates of African elephants.[43]

Climate change is predicted to have considerable and severe impacts on the coastal areas of East Africa. The IPCC[44] projects that a rise in sea level along the coastal areas and the resulting coastal erosion could lead to destruction of coral reefs which absorb the energy of ocean swells. The coastal mangroves are also at threat from coastal erosion resulting from extreme weather changes. Additionally, sea level rise is also affecting the availability of fresh water by causing salt water to intrude aquifers and deltas. This is particularly most apparent in Tanzania.

CONCLUSION

The impact of climate change in East Africa is set to be bigger and more severe than already predicted because of the multiplier effects of other already existing stressors. The influence of other stressors is also likely to worsen the impact of climate change in East Africa and will lead to even worse consequences because of the lack of adequate resources and technical know-how in the region to adapt to climate change.[45] The current food shortages experienced by Kenya, East Africa's largest economy, is testament to the unprecedented impacts of climate change on region. On the 16 January 2009, the government of Kenya launched its largest-ever international appeal for food aid to save millions of starving Kenyans. Over ten million people are projected to be in danger of starvation in Kenya. The government needs 37 billion Kenyan shillings or US$468 million for emergency food, support to schools and for agricultural and livestock interventions. [46]

Kenya is suffering the vagaries of climate change. Weather patterns have become erratic, moving from the extremes of drought to flooding.[47]

The food crisis in Kenya as well as in the other East African countries is a reflection of how little or no attention has been given to climate policy as a mechanism for responding to the challenges posed by climate change. It is clear that none of the countries in the East African region have well-designed and developed adaptation policies to help them adequately respond to the impacts of climate change. The East African countries basically need two types of climate adaptation measures: those aimed at increasing the agricultural resilience to climate variability and drought, and those aimed at enhancing access to and viability of drought-coping strategies.[48]

The East African countries also need to develop the capacity to make local level links to national level policies and action plans to adequately respond to the impacts of climate change. Focusing on the linkages between local-level action and national-level policies and action plans would ensure resource efficiency in preparing required national level action plans and policies and implementing them. As noted by the African Ministerial Conference on the Environment, the creation of synergies in national implementation will help minimise conflict in goals, programmes and activities, avoid duplication of efforts and economise on scarce resources in the fight against climate change.[49]

The need for climate policy and adaptation measures cannot be emphasised enough and it is going to be incumbent upon all countries in the region to address these two important policy challenges in order to effectively respond to the impacts of climate change in the region.

NOTES

1 Speech of the United Nations Secretary-General Ban Ki-moon at the opening of the G8 meeting in Heiligendamm, Germany, 6 June 2007, http://www.un.org/Pubs/chronicle/2007/issue2/0207p04.htm (accessed 10 March 2008).

2 Ibid.

3 Quoted from Sir Emry Jones Parry, Permanent representative of the United Kingdom to the United Nations, http://www.un.org/Pubs/chronicle/2007/issue2/0207p20.htm (accessed 10 March 2008).

4 See http://www.un.org/Pubs/chronicle/2007

5 Congolese representative at the UN Security Council, April 2007.

6 Sir Emry Jones Parry, Permanent representative of the United Kingdom to the United Nations, http://www.un.org/Pubs/chronicle/2007/issue2/0207p20.htm (accessed 10 March 2008).

7 See Bali Action Plan: Advanced unedited version.

8 See http:/www.unep.ch/regionalseas/main/eaf/eafenv.html (accessed 13 February 2008).

9 Society for International Development, Trends, tensions and contradictions: the leadership challenge, in *The State of East Africa Report 2006*, Rome: 2006, 17.

10 Ibid, 18

11 Ibid, 19.

12 Ibid.

13 Ibid, 25.

14 WWF, Climate change impacts on East Africa: a review of the scientific literature, November 2006.

15 Ibid, 29.

16 IPCC, *Climate change 2007: synthesis report*, contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, Core writing team: R K Pachauri and A Reisinger (eds), Geneva: IPCC, 2007, 1.

17 Ibid.

18 Ibid.

19 Ibid.

20 Ibid.

21 See Causes of climate change, http://en.wikipedia.org/wiki/climate_change

22 Ibid.

23 Ibid.

24 See generally W F Ruddiman, *Plows, plagues and petroleum: how humans took control of climate*, New Jersey: Princeton University Press, 2005.

25 Food security in this paper is considered less in terms of sufficient global and national agricultural food production and more in terms of livelihoods that are sufficient to provide enough food for individuals and households. Accordingly, for the purposes of this paper, food security is considered within the three principle components identified by Swaminathan (2000) and Hugon and Nanterre (2003). These are: the availability of food through the market and through own production, the adequate purchasing and or relational power to acquire or access food and the acquisition of sufficient nutrients from the available food, which is influenced by the ability to digest and absorb nutrients necessary for human health, access to safe drinking water, environmental hygiene and the nutritional content of the food itself. See IPCC, *Climate change 2007*, 454.

26 WWF, Climate change impacts on East Africa, 4.

27 Adaptive capacity is a key component of studying the impact of climate change on food security. In this regard, a number of studies have been undertaken to probe the enormous challenges of developing adaptive capacity at multiple scales. From these studies, a complex array of factors have been identified, including behavioral economics, national aspirations, sociopolitical goals, governance, civil and political rights, literacy, economic wellbeing and stability, demographic structure, global interconnectivity, institutional stability and natural resource dependence. All these are emerging as powerful determinants of vulnerability and the capacity to adapt to climate change. Such determinants permeate through food systems to impact food security at household and community levels. Attainment of the Millennium Development Goals, particularly the first goal of eradicating extreme poverty and hunger in the face of climate change, will therefore require interventions that specifically consider food security as an integral element of human vulnerability within the context of complex social, economic, political and biosophical systems, that is, are able to offer usable findings to decision makers at all levels. See IPCC, *Climate change 2007*, 456.

28 See IPCC, *Climate change 2007*, 444. It notes, however, that even without climate change, present population trends and patterns of water use indicate that more African countries will exceed the limits of their economically usable land-based water resources before 2025. In some assessments, the population at risk of increased water stress in Africa is projected at 75–250 million and 350–600 million people by the 2020s and 2050s respectively. Also, while the number of people experiencing water stress is likely to increase by 2055 in northern and southern Africa, in contrast, more people in eastern and western Africa will be likely to experience a reduction rather than an increase in water resources.

29 IPCC, *Climate change 2007*, 444.

30 Ibid.

31 One of the possible impacts of climate change in the region is the rise in sea level, which is projected to affect agricultural production on the East African coast. Kenya alone predicts that a metre rise in the coastal sea level as a result of climate change will lead to a loss of over 500 million dollars in terms of revenue loss from mangoes, cashew nuts and coconuts alone. Damage to the coastal zone of East Africa will not only affect cash crop production but will also grossly affect tourism in the region. While there is a dearth of specific information of the exact impact, the World Tourism Organisation predicts that changes in coastal zones resulting

from climate change could place tourism at risk. This is a very serious potential impact since Africa accounts for three per cent of global tourism trade.

32 See Victor Orindi and Laurel A Murray, *Adapting to climate change in east Africa: a strategic approach*, Gatekeeper series, London: IIED, 2005, 117.

33 WWF, Climate change impacts on East Africa, 4–6.

34 Ibid.

35 See Orindi and Murray, *Adapting to climate change in east Africa*, 117.

36 WWF, Climate change impacts on East Africa, 6.

37 See D Conway, from headwater tributaries to international river: observing and adapting to climate variability and change in the Nile Basin, in *Global Environmental Change*, Amsterdam: Elsevier, 2005, 15, 99–114. He observes that there is need for more detailed research on water hydrology, drainage and climate change.

38 See G Zhou, A Minakawa, K Githeko and Y Yan, Association between climate variability and malaria epidemics in the East African highlands, *Proceedings of the National Academy of Sciences of the United States of America*, 2004, 2375–2380.

39 See J D Patz, D Campbell-Lendrum, T Halloway and J A Foley, Impact of regional climate change on human health, *Nature* 438 (2005), 310–317.

40 See J C Lovett, G F Mudgely, P B Banard, Climate change and ecology in Africa, *African Journal of Ecology* 43 (2005), 279–281.

41 See V Vanacker et al, Impact of short-term rainfall fluctuation on inter-annual land cover change in sub-Saharan Africa, *Science* 298 (2005), 589–593.

42 See I J White, et al, Blue Wildebeest population trends in Kruger National Park and the effect of fencing, *South African Journal of Wildlife Research* 18 (1988), 78–87.

43 See J H Poole, Announcing intent: the aggressive state of musth in African elephants, *Animal Behavior*, 37 (1989), 140–152.

44 IPCC (2001). Op.cit.

45 There is a growing body of knowledge documenting adaption to climate change in Africa. This includes diversification of livelihoods, institutional architecture including rules and norms of governance, adjustment in farming operations, income-generation projects and the sale of labour, and the move to off- or nonfarm livelihoods. See IPCC, *Climate change 2007*, 452.

46 *Nairobi Chronicles*, 16 January 2009, www.breakingnewskenya.com(accessed 24 August 2009).

47 Ibid.

48 Siri Erikson, Policy linkages between climate change and adaptation, www.arizona.edu.oals (accessed 24 August 2009).

49 Ibid.

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2 Gender roles, land degradation and climate change

A Ugandan case study

Godard Busingye

ABSTRACT

This chapter discusses the relationship between gender roles, land degradation and climate change in the context of Ugandan society. This relationship is one of cause-effect nature. An understanding of this relationship would enable the creation of mechanisms to address challenges posed by climate change. The chapter provides a conceptual framework upon which such mechanisms could be established. An analysis of this relational model shows that gender roles, which are a function of social-cultural, economic and political underpinnings of society, are at the confluence between two other concepts, i.e. land degradation and climate change. The chapter discusses in detail how the social-cultural issue of gender roles influences land degradation, which is considered a precursor to climate change. Land degradation is escalated by unsustainable human activities including over-cultivation, overgrazing and failure to agree on which activity is suitable for which environment by the two genders in a household, namely women and men. Women in particular are disempowered by society's social-cultural constructs and as such cannot meaningfully contribute to decisions relating to the utilisation of family land.

Once climate change occurs, it is difficult to reverse and it impacts negatively on society. For example, in cases of floods, people are displaced from their homes and cannot continue with their day-to-day activities, and in cases of drought, human activity is also reduced to a bare minimum. In all these and similar instances, adaptation measures are required to enable communities to cope with the effects of climate change. When the nexus between gender roles, land degradation and climate change is complete, the element of gender roles still remains obscure or is never made prominent. Moreover, a proper understanding of the linkage between gender roles, land degradation and climate change is useful in addressing social-cultural factors related to the foregoing since these are all factors which may influence the challenges posed by climate change in Uganda.

INTRODUCTION

Gender roles, land degradation and climate change stand in a cause-effect relationship with one other. The objective of this chapter is to draw the linkage between gender roles, land degradation and climate change. The central question this chapter accordingly seeks to answer is: how can an understanding of the linkage between gender roles, land degradation and climate change be useful in addressing the social-cultural causes and their impact on climate change in Uganda?

In order to clearly illustrate this relationship, this chapter has been divided into five main sections which deal with: conceptual and contextual background information; land degradation in Uganda; linking climate change and land degradation; and gender roles, land degradation and climate change. The cause-effect relationship between these variables is discussed mainly from a sociocultural perspective. The chapter concludes with brief recommendations in this respect.

CONCEPTUAL FRAMEWORK

The following sections briefly investigate some of the principal theoretical concepts lying at the core of this chapter. They also briefly refer to general geographical, socioeconomic and cultural aspects of Uganda.

Climate change

Conceptually, and for the purpose of this chapter, climate change refers to climatic modification which is attributed directly or indirectly to human activity. Climate change affects the composition of global atmosphere in addition to natural climate variability observed over comparable time periods.[1] Climate change causes alteration changes in the timing, regional patterns and intensity of precipitation events, in particular, in the number of days when heavy precipitation occurs.[2] When discussing the variability of climate change, it is important, in the context of this chapter, to consider the social-cultural dimension of society in Uganda that informs and conditions the decision-making capacity of individuals (based on one's gender and gender roles in society) to avert activities likely to bring about land degradation.

Land degradation

Land degradation refers to the reduction or loss, in arid, semi-arid, and dry sub-humid areas, of the biological or economic productivity and complexity of rained cropland, or irrigated cropland.[3] It might be a direct consequence of human activities and habitation patterns, such as soil erosion caused by wind and/or water; deterioration of the physical, chemical and biological or economic properties of soil, and the long-term loss of natural vegetation.[4] It is possible that there are a number of social forces, such as gender relations and roles, at play in the entire process of land degradation that, even though their impact may not be evident from the outset, may still influence climate change to a great extent. At the confluence of land degradation and climate change lie 'invisible' gender roles that contribute to the escalation of land degradation and climate change, or in other words, gender roles may influence activities that contribute to land degradation which, in turn, may result in unfavourable effects which culminate in climate change.

Gender

Gender is a matter of culture;[5] an activity of managing situated conduct in light of normative conceptions of attitudes and activities appropriate for one's sexual category.[6] Simply put, it is the social classification into masculine and feminine.[7]

There seems to be a misconception between gender as a social-cultural or even economic and political concept and sex, a biologically or genetically determined aspect of the human being. This misconception surrounding the concept of gender does not arise in respect to sex. Sex is determined by making reference to the visible difference in genetalia between women and men and the related difference in procreative function.[8] Under this 'sexualised' determination of gender, women are human beings of the female sex, that is, the sex that gives birth.[9]

It is probable that the least understood and unique behaviours attached to particular sexes could be a basis for determining roles for different genders in society,[10] though this issue is not specifically investigated in this chapter. Gender roles, which are informed by sociocultural, economic and political undertones, fit squarely within the patriarchal ideology that is essentially the rule of the fathers, where patriarchy is a social system in which the father is the head of the family and men have authority over women and children.[11] These roles may vary from place to place and from country to country.

In the case of Uganda, the colonial legacy superimposed western patriarchal ideology over the indigenous one. The indigenous African patriarchy accommodated some level of gender balance, but was later modified by the western form of patriarchy which was a combination of capitalism and western culture at the time of colonisation. Unlike the traditional African patriarchy which accommodated the different views of all genders, the current patriarchy model in Uganda is less accommodative in this respect. At the advent of colonialism, women were relegated to a redefined, subordinated domesticity. The status of men, in contrast, was elevated and reified.[12] This situation, however, is not unique to Uganda. In respect to land inheritance, for instance, patriarchal relations in KwaZulu-Natal, South Africa, resulted in restrictions bearing more harshly on women, thereby allowing only men to inherit.[13] In respect to gender relations, therefore, the gender power is weighted against women, and women bear the brunt of men's negative response to change.[14]

Geographical information about Uganda

Most parts of Uganda enjoy a moderately hot and wet climate. The annual rainfall ranges from approximately 500 mm in the drier parts of the country to well over 2 000 mm in the wetter areas of the country. Annual temperatures

range from 16 degrees Celsius to around 27 degrees Celsius. In drier months of the year, however, temperatures can reach 36 degrees Celsius. The country is endowed with many fresh water bodies covering an area of about 39 460 km^2 of the country's total area of 235 800 km^2. Natural vegetation cover constitutes approximately 20,3 per cent of the country's total land area.[15] Currently, however, the country is experiencing serious effects of land degradation.[16] In some cases, these have resulted into unprecedented heavy rains that cause floods in most parts of the country, while severe droughts have been experienced in other areas.

Climate change effects in Uganda

Even though the deleterious effects of climate change are many, this chapter concentrates on floods and droughts since the latter can be directly related to land degradation. Floods are caused mainly by sudden increases in precipitation or soil saturation following precipitation of several hours-duration. In 2007, much of the eastern region in Uganda, including the districts of Amuria, Bukedea, Kaberamaido, Katakwi, Kumi and Soroti in the Teso sub-region; Amuru, Gulu, Kitgum and Pader in the Acholi sub-region; Amolatar, Apac, Dokolo, Lira and Oyam in the Lango sub-region; Abim, Kaabong, Kotido, Moroto and Nakapiripirit in the Karamoja region; Bududa, Bukwo, Kapchorwa, Mbale, Manafwa and Sironko in the Bugisu (Elgon) sub-region; and Adjumani, Arua, Moyo, Nebbi and Yumbe in the West Nile sub-region; as well as Kiboga and Kamuli districts in central Ugand, were affected by flooding, water-logging and mudslides.[17] The occurrence of floods in these areas affected the ability of traditional communities to cope with the ever-changing climatic patterns. Also, day-to-day human activities could not be carried out without a great degree of inconvenience.

In response to these disasters, Yoweri Museveni, the President of the Republic of Uganda, declared the country's first-ever state of emergency in flood-affected areas of eastern Uganda on 19 September 2007. The state of emergency was endorsed by parliament on 25 September 2007.[18] The consequences of climate change in this case were diverse, ranging from closure of roads, displacement of people from their homes, closure of educational institutions, an increase in the rate of contracting HIV/AIDS, increase in waterborne diseases incidences, and a general food shortage in the region because of the general disruption of human activity. Interestingly, there has also been an escalation in the number of cases

of domestic violence including gender based violence mainly perpetrated by men against women, defilement, incest and rape of women in the region during the same period.[19]

The occurrence of the floods made women in the flood-affected areas generally insecure and vulnerable. Sadly, incidences of such insecurity-related cases were not routinely reported or documented; therefore, one had to rely on stories told by either the victims or their political representatives.[20] The situation in the flood-affected region in Uganda was exacerbated by the masculinisation of the concept of the head of the household, under the premise that all families contained an adult male who was economically responsible for maintaining the women and children. This was the case especially during the 2007 floods, where people were in dire need of assistance from government and aid agencies.[21] Sadly, where households were headed by only females, these households did not obtain relief donations because there were no men to represent their households.

Drought is another consequence of climate change; it affects human activity in general. It is characterised by scarcity of water for both domestic and agricultural purposes, and pastures for animals. It is increasing in frequency and severity, particularly in the semi-arid areas in Uganda where nomadism is practised. The cattle-corridor in Uganda stretches from the northeast of the country, across to the southwest and includes most areas of Karamoja, Teso, Nakasongola, Mubende, Rakai and the Ankole region.[22] Cattle-keeping tribes, most of whom practise pastoralism or nomadism (a practice that accelerates land degradation), mostly occupy these rangelands. These areas occasionally experience severe drought conditions. These conditions are largely attributable to human activity in these areas, although blame is normally attached to the natural conditions. In some extreme cases, such as in the Karamoja region in the northeast of the country, land degradation has culminated in desert-like conditions.[23] The frequent droughts in the region have lowered the water table, decreased rainfall, and increased temperatures.[24]

Access, control and ownership of land in the context of gender inequality

One of the bare minimum aspects of God-given and constitutionally ordained human rights belonging to everyone is the right to enjoy a clean and healthy

environment.[25] Enjoyment of this right, however, is affected by some of the human activities, which though initially intended to improve human wellbeing result in environmental degradation. Some human activities modify the environment, but it is important to note that some ecosystems may, more than others, be prone to degradation. For instance, coral bleaching can occur in a single exceptionally warm season, while long-living organisms such as trees may be able to persist for decades under a changed climate, but may be unable to regenerate.[26] Gender roles and the household division of labour,[27] even when known as being indirect contributors to climate change, are not given the prominence and attention they deserve by the community. These factors are given a low level of attention yet their impact on land and its subsequent degradation and eventually the effects on climate change may be enormous. This is so even if they directly and indirectly contribute to issues of access to land, land use and land-use patterns and ultimately land degradation which is a precursor to climatic change.

Access to, control and ownership of land; determine land-use patterns and specific activities performed on it. Some of the activities such as overgrazing and over-cultivation contribute to the escalation of soil erosion, which is an initial stage in serious land degradation. Degraded lands are devoid of vegetation cover, which should act as a buffer zone for climatic modification processes. Gender roles, which attach to one's right of access to land, determine what activity a woman or man will do in respect to the land she or he harnesses. All these variables eventually contribute to land degradation, each in its unique manner. It is also important to note in this context that land degradation precedes climate change. Climate change may degenerate into arid or desert-like conditions, or precipitation for a long time, which may result in rivers or lakes flooding their banks. Arid or desert-like conditions affect human activity much as floods do, and as a consequence, the rate at which human activity occurs drastically changes. Ultimately, when considering the foregoing, adaptation to climatic change calls for the inclusion of more equitable gender relations in land-related policies and legislation, although the ultimate process of effecting the changes may be gradual and slow.[28]

Ownership and the general process of access to land define social status and gender power relations in the household, village, and other social structures outside the household and local communities. Effective control of one's rights with regard to land, which society firmly grants to men and denies women,

therefore determines one's ability to control the activities carried out in respect to the land resource. This, in turn, determines whether or not a particular parcel of land will be utilised in a sustainable manner or not. For most women in Uganda, effective rights in land remain elusive, even as their marital and kin support erodes and female-headed households multiply. In the case of Ibanda Town Council, for instance, women have struggled for and won fairly extensive rights of access to and control of land.[29] They can apply to register land in their sole capacities or jointly with their spouses or any other persons in accordance with the country's land laws. Their full enjoyment of these rights is, however, watered down by custom which demands that some male person should support a woman in very serious development ventures such as those concerning land.[30] Preliminary findings of field research conducted in Ibanda Town Council suggest that women who register land in their sole names still co-opt their male relatives or friends to assist them in land development endeavours.[31] In some of the cases identified during the Ibanda Town Council study, a few women who had begotten children before marriage had purchased land and registered it in their sole names with a view of later transferring it to those earlier begotten children. Traditionally children begotten by women before getting married could not be given land by the families where their mothers were subsequently married.[32] The same study identified that on the other hand, men who had produced children out of marriage either before or after their subsisting marriages were in position to give them part of the family land and, in most cases without seeking consent from their wives. A conclusion drawn from the findings of that study is that access to land and its ownership among the people of Ibanda Town Council has gender connotations that favour the male gender.

In respect to gender roles and land degradation, Mwalimu Julius Nyerere, the late President of the United Republic of Tanzania, once stated that women in Africa toil all their lives on land, they do not own or control what they produce and at the end of a marriage, through divorce or death, they can be sent away empty-handed.[33] Much as this trend may be gradually changing, largely because of globalisation,[34] one may still find evidence to show that women are not firmly attached to their natal or spousal homes. Using as an example the Batagwenda, an ethnic community in the Ibanda District, once a marriage ceremony known as *okuhingira* (a ceremony akin to the giving-away ceremonies of other cultures) has been performed, a daughter ceases to belong to her natal home; she becomes inherently part of her spousal home.

The cultural songs that are sung during the performance of that ceremony indicate that she then belongs to her husband's home and would not be expected at her natal home at any time, except as a visitor. Echoing Mwalimu Nyerere's statement, however, this person then never becomes an integral part of her husband's home. She may, for instance, be divorced or mistreated in a manner that points to the fact that she is a stranger in that home. Her return to the natal home is never anticipated at marriage this is hence not an acceptable notion to her relatives. Women, in this context, are not considered the equal of men; merely the 'subjects' of men.[35]

The whole process of gender inequity is rooted in the desire by patriarchal society to retain dominance over women. The implications of this relationship in respect to the land resource is that women in the described circumstances may not develop land in a sustainable manner; they may be motivated by their social location in society and work only to earn a simple livelihood or to satisfy household and societal demands as they arise. This attitude towards land may lead individuals to carry out activities that also, and importantly for the present discussion, lead to land degradation.

Indeed, a United Nations (UN) report states that statistics worldwide attest to the fact that women form just over half of the world's population, perform two-thirds or 60 per cent of the world's working hours and contribute 50 per cent of the agricultural production.[36] Women in Africa alone are responsible for 85 per cent of agricultural production and processing. They earn one-tenth of the world's income and own one-hundredth of the world's property.[37]

In the 21st century, a general realisation, that women and men ought to enjoy equal rights in land and also participate equally in decisions concerning its utilisation, has emerged. This realisation, however, is not uniformly appreciated. Men and elderly women consider this to be a young women's 'liberation' movement to overturn the social power relations that have sustained the former in power for quite a long time. They especially appear scared of the move to share rights in land equally with young and emancipated women. Some members of society have ignored this movement, contending that it will disappear over time.[38] Some of them feel that it is a dangerous distraction from the central issues of class politics. Some of them may simply be excited by it but, as it turns out, women and men, in one way or another, are threatened and confused by it. As soon as it is touched, the everyday reality of our relationships is also touched.[39] One gender scholar, Agarwal, recalls some of her experiences with

the Indian Minister of Agriculture at an Indian Planning Commission Seminar on Land Reform. After her talk, the minister retorted thus: '[A]re you suggesting that women be given rights in land?' She deduced from the Minister's reaction certain prevailing assumptions about the family (in India, and certainly elsewhere in the world) which implies that: '[T]he stability of the family as an institution is linked to the maintenance of unequal resource positions between women and men; and economic self-interest plays a significant role in intra-family gender relations that would be revealed with particular starkness in gender conflict over a critical form of property such as land.'[40]

Agarwal proceeds to underscore the role of intra-family bargaining power in a bid to reconcile gender differences in a family. She points out that there are a number of factors which determine bargaining power at the family level, namely, individual economic assets and communal, as well as social and legal, recognition of the legitimacy of the claim.[41] She observes that the complexity of bargaining would be considerably less if the social legitimacy of a person's claim to some share of the contested item is recognised and only the size of that share is in dispute, than if the legitimacy of claiming any share at all in the item is unaccepted. According to her, the intra-household gender division of subsistence resources and of ancestral land are at the centre of the bargain. The rights of the female family members to basic subsistence are usually not in dispute, although the proportionate shares for them in arable ancestral land might be disputed in many communities.[42]

LAND DEGRADATION

General

It would appear that society, which is predominantly patriarchal in nature, is not ready to accept modern views on gender, gender relations and roles which inspire them to assign to the various genders certain social-cultural obligations. Social-cultural obligations contribute to land degradation in a peculiar manner. It seems that land-use patterns such as crop farming, animal farming or agro-forestry, impact greatly on either land degradation or its conservation in the long run. For instance, agro-forestry, which in the case of Uganda is largely under the domain of men, enhances the country's capacity to act as a carbon sink and facilitates the maintenance of the water cycle (which also contributes

to the aesthetic value of the environment). Whether the outcome of human activity is land degradation or conservation, the resultant effect shall be climate modification,[43] either for the worse or for the better.

Climate change, in turn, affects other environmental issues: it may lead to loss of biodiversity, desertification, stratospheric ozone depletion,[44]freshwater availability and air quality improvement or pollution, which ultimately affects human beings' enjoyment of the right to a clean and healthy environment. For example, it is now known that the relationship between changes in atmospheric ozone and their environmental effects includes the oxidising power of the lower atmosphere, the self cleansing power, which is a complex phenomenal relationship. This cleansing occurs most rapidly in the tropics and at mid-latitudes in summer.[45] Biological resilience and technical adaptations may buffer some of the impacts of climatic change on land productivity in the short term. Sustained and increased climatic change, however, would eventually cause a decline in land productivity and hence, human activity. This is so because ecosystems entail complex, dynamic and interactive processes, and climate change could cause critical thresholds to be passed.[46]

Causes of land degradation

There are many causes of land degradation. The list includes both human and natural activity as a consequence of wear and tear. Some of these are know, together with their relationship with the frequency and magnitude of climatic fluctuations, including daily, seasonal, inter-annual and decadal variability such as El Nino and the sources of greenhouse gases.[47] According to McMichael, the predicted impacts of climate change are particularly dependent upon estimates of changes in climate variability and occurrence of extreme weather, such as temperature and precipitation extremes, and severe tropical storms.[48] However, these factors are not given the attention they deserve. Climate change is inevitable, although in most cases it is not easy to observe and identify that it is occurring and progressively escalating with time. The possibilities for observing the symptoms leading to land degradation are obscured by the ever-increasing demand for natural resources in a bid to improve people's livelihood. At the same time, in the majority of cases, there are no specific or appropriate measures in place to mitigate the impact of human activities on the land resource. It is also possible that those whose activities contribute to land degradation may

not even be aware that once land degradation reaches unmanageable levels; it is not so easy to reverse to near its original state.

Aspects of land degradation may be localised to particular areas. The resultant climatic changes, however, may be widely spread to cover vast areas on the globe. This aspect was explored by Agora[49] while discussing the 'chaos theory', which was championed by Edward Lorenz, a meteorologist at the Massachusetts Institute of Technology in the 1950s. According to Agora, Lorenz discovered that a very slight shift in the initial data about weather conditions fed into analysis models would result in drastic differences in simulated weather conditions after a number of iterations.[50] Agora's demonstration could be viewed as a basis for a scientific explanation as to why desert-like conditions spread from the centre of deserts such as the Sahara desert in the north and the Kalahari in the south of the African continent. The impact of climatic change also falls disproportionately upon developing countries and poor, disenfranchised people within all countries; it also falls disproportionately upon women and men, depending on their locality and roles. This exacerbates inequities between developed and developing economies, and between genders in respect to health status, and access to adequate food, clean water and other resources.[51]

Gender roles and land degradation

Land degradation, which the present author considers a precursor to climate change, begins with low levels of natural resource exploitation at individual or household level, which, in turn, has a bearing on gender roles and division of labour. Assigned gender roles and household division of labour disempower women from actively contributing to decisions concerning the management of the land resource, yet they are richly endowed with traditional knowledge which, if relied on, could help check the effects of land degradation and climate change. Household decisions on land use set the pace at which a particular parcel of land will be utilised before it is left to regain its natural nutrients. The decisions made with regard to land use contribute to land degradation or its conservation because they determine whether the activity to be carried out will be deleterious to the land or not. The social constructs of gender roles and division of labour demand that women extract as much as possible from the land resource in a bid to satisfy the high food and other basic requirements of their households. The whole system of decision making, however, excludes

women from participating in these activities; they are largely incorporated at the implementation level, which renders the entire issue of decision-making a hoax because even the implementation process is planned for at the initial stage when decisions are adopted.[52]

Society perceives men as decision-makers for their households, but as passive participants in the process of extracting natural resources.[53] This view is illustrated by understanding the example of the social construct of the Karimojongs in the north eastern part of Uganda. Among the Karimojong community, women are never regarded as equal to men. This inequality begins at an early stage when the youth are initiated into adulthood.[54] For example, the term *asapan* (a complex of rituals marking the initiation of young men into the authority cycle of the Karimojong tribe), is applicable only to males and not to females.[55] Another aspect of female exclusion among the Karimojongs is that while men are initiated into adulthood by fellow men, female initiation ceremonies are never presided over by women; in the latter instance the ceremony is also presided over by elderly men. After the females have been initiated into adulthood, they are assigned the duty of bearing children which is articulated by the following saying: 'May you bear children! May you multiply and become old …'[56] On the other hand, after the initiation ceremony, males are assigned the role of looking after cattle and defending their communities. In general, Karimojong women become responsible for bearing and raising children, gathering building materials from the natural environment, building and keeping homesteads neat, and cultivation. For their part, men engage in herding animals (largely cattle), which they move from place to place in search of pastures and water. They also guard their communities from external aggression.[57]

A simplified version of land degradation

A simplified version of land degradation may only target aspects that relate to the extraction of natural resources, such as building material, or clearing land for cultivation, which, in the case of the Karimojongs, are basically roles performed by women. Men's roles among the Karimojongs and other nomadic communities in Uganda, such as looking after large herds of animals, may be more deleterious to the environment than clearing of vegetation. This is so because in the case of other activities, no one goes back to extract the resources, such as building materials, unless the vegetation has rejuvenated and grown,

while in the case of grazing animals, the activity is continuous and may degrade the land to unmanageable levels at a more sustained pace.

In the latter case, pastures are never afforded sufficient time to rejuvenate to levels that can protect the top soil layer from erosion. Moreover, the constant trampling of the top soil layer by animals accelerates the disintegration of soil particles, which renders these particles loosely attached to each other and thus prone to erosion. An analysis of men's role in the whole process of land degradation reveals that it is twofold. First, they encourage or even compel women to degrade the land resource by virtue of the roles assigned to them at household levels, and second, men are active participants in the degradation process by virtue of their activities, including, for example, overgrazing. The over-simplification of the whole process of land degradation therefore, compounds the problem because it is never attended to in time and in an appropriate fashion.

Gender roles, social patterns and land degradation

Gender roles and the household division of labour in Uganda reflect a systematic social pattern. Among the Batagwenda in the districts of Kamwenge and Ibanda in the south west of Uganda, women, for instance, carry out much of the cultivation tasks in preparation for seasonal and perennial crops. Men clear shrubs and fell trees to make it easier for women to carry out cultivation activities. Where there is no male in the home, however, women proceed and clear the vegetation without meeting any specific hardships. This example explains why assignment of gender roles has no direct bearing on one's sex, and makes it clear that it is the social-cultural perception of what a particular sex should do as a matter of convenience. What is important in all these examples is that if the activities carried out by each gender are not sustainable, then the gender constructs and the assignment of roles to women or men is rendered meaningless. For example, in the case of cattle keepers, men keep large stocks of animals that exceed the capacity of the natural vegetation to feed them throughout the year. In the case of cultivators, the same parcels of land are cultivated season after season and year after year without giving them time to recover the lost vegetation cover and soil nutrients. In all these instances, it is immaterial whether the person carrying out the activity is a woman or man; the question to be asked is rather: what is the impact of such a person's activity on the land resource?

According to preliminary findings of research currently being conducted in Ibanda Town Council in Uganda, men are generally the driving force behind all aspects of land degradation in that locality; they demand much from the women in terms of household sustenance.[58] Women, in turn, do all they can to extract as much as possible from the land resource. This situation is exacerbated by the fact that women in that locality are not afforded an opportunity to contribute to decisions concerning the land they harness. In the long run their activities, namely cultivation of land for agriculture, lead to land degradation, which, when sustained, depletes the natural vegetation cover. This, in turn affects the water cycle which interrupts the process of evapotransipiration. Consequently, there is likely to be a change in rain patterns which translates into climate change effects.[59]

In summary, the relationship between gender roles, land degradation and climate change can clearly be understood if one examines their sociocultural, economic and political foundations. It is also important to understand the conceptual underpinnings of these aspects. This understanding enables us to underscore the importance of gender roles in the whole process of land degradation and, consequently, climate change. As mentioned earlier, gender power is heavily weighted against women. Overall, the resultant human activity culminates into either land conservation or its degradation. When the nexus between gender roles, land degradation and climate change is complete, the element of gender roles still remains either obscure or unimportant.

LINKING CLIMATE CHANGE TO LAND DEGRADATION

General

The social intent to exclude women in the decision-making process regarding access, ownership and utilisation of land, manifests itself in the activities they conduct on land. Gender roles, coupled with low levels of formal education for women in a number of developing countries, take them closer to land-based activities without informing them of the repercussions of over-utilisation or extraction of the land resources. The consequence of this is that socially-determined, gender-based land degradation occurs.

Land degradation in this respect becomes a consequence of unsustainable human activity in respect to the land resource as conditioned by gender-social-cultural values. The effect of sustained over-utilisation of land (soil and

vegetation) is to modify climatic conditions in a more-or-less irreversible fashion or to a state that is too expensive to reverse. A complete relational model of gender roles, land degradation and climate change[60] then becomes functionally an outcome of the socially and culturally constructed gender roles that ignore the ability of women to equitably contribute to the decision-making process at the household level and also as regards their inputs into land tenurial policies at the national level. Land degradation, which started as a simplified household aspect and was translated into a national issue, ends up as a regional and eventually a global phenomenon. This gender-based land degradation is difficult to reverse by policymakers at the national level because society is unable to unpack those policies in order to understand the root mishaps that inform them, and the patriarchal social values which would enable them to deal with these appropriately.

Addressing climate change-related issues

It is important to note that, traditionally, developing countries paid little attention to the problem of environmental degradation, contending that it was a characteristic of developed countries, which, due to high levels of industrialisation, science and technology, had initiated problems of pollution and over exploitation of the natural resources in general.[61] Today, however, most countries, including those striving to overcome depressing economic situations, have realised that environmental problems honour no geographical boundaries and are actively taking steps to avert the problem of land degradation. Traditional communities, such as the pastoral Karimojongs who occupy the cattle corridor in northeastern Uganda, and who have been passive participants in controlling land degradation, have now been integrated into the overall government development process to avert the problem of land degradation.[62]

There has also emerged a global paradigm shift in the whole process of managing the land resource. This shift has compelled governments in many countries to change their traditional policy initiatives and tenurial systems and instead implement measures that promote the role of traditional communities and women, in particular with regards to the management of the land resource. Under the new paradigm, bottom-up approaches to policy matters are gradually replacing the top-down approaches that previously formed the basis of most governments' development programmes.[63] In the case of Uganda, for instance, land management issues are now well articulated in the decentralisation

programme that begins with the grassroots communities and moves to the centre to merge with the central government structures.[64]

The Local Governments Act, Cap. 243, for example, decentralises and devolves functions, powers and services to local governments. It requires local governments to ensure good governance and democratic participation in the control of decision making of the people.[65] Management of land in Uganda is structured in accordance with the structures established under the Local Governments Act.[66] Decentralisation of land management in Uganda brings on board a significant cross-section of the citizenry into the decision-making processes concerning land in their localities, since this is done up to the village council level.[67] Much as this may not be the sole mitigation measure to problems associated with land degradation in Uganda, the system instils within the local communities a sense of social or community accountability when their activities come tangentially incompatible with those of the larger community. At the same time, government programmes are tailored towards catering for the whole country, because it is now realised that land degradation is not restricted to the small demarcated zones such as the cattle corridor, but also extends to several other parts of the country.[68]

GENDER ROLES, LAND DEGRADATION AND CLIMATE CHANGE

During the 20th century, the land surface temperatures globally increased by about 0,6 degrees Celsius. Changes in climate are the result of internal variability within climate systems and external factors, both natural and anthropogenic. Emissions and the degradation of the land resource are now significantly modifying the concentrations of some gases in the atmosphere. The principal anthropogenic gas responsible for land degradation is carbon dioxide, the concentration of which has increased by 31 per cent since 1750. This has been the highest recorded level for the last 20 million years.[69] Other anthropogenic gases include methane, nitrous oxide and oxides of nitrogen.[70] The burning of fossil fuels and land-use change, especially deforestation, predominately increase land degradation and climatic change patterns.

Today, there is unprecedented conversion of the natural habitat to human uses.[71] The rate of harvesting from the land resource is high; this is coupled with unsustainable human practices, including over-cultivation, overgrazing,

deforestation and poor irrigation practices. These exacerbate land degradation. Coupled with pollution of the air and water, these activities greatly reduce the robustness of systems to cope with variations induced by climatic change. The resilience of systems to recover from such degradation also decreases. These pressures are present in developed and developing countries, but the dilemma is felt particularly in developing countries. Over-exploitation of the land resource cannot be divorced from the social and economic issues including food security, migration, and political issues which are closely linked to land degradation.[72]

The world's climate system is an integral part of complex life-supporting processes, one of the many large natural systems that are now coming under pressure from the increasing weight of human numbers and increased economic activities. Globally, climate change is characterised by major events, including drought, floods, heatwaves, avalanches and windstorms.[73] The differential gender decision-making process in respect to issues of land resource management is essentially a sequential aspect characterised by general uncertainty. On the one hand, women are not sure of the next step men and society in general will take in respect to their status in the home. On the other hand, men in developing countries feel insecure because they are gradually losing their social power to women because of global social influence.

The social-gender dynamics at household and nationwide levels are structured on patriarchal values translate into national policies that never provide adequate space for all the role players in day-to-day management of the land resource. The male-gendered society determines who makes a contribution in the decisions that will ultimately affect the whole society and also whose input shall be taken into account when taking decisions at the household level and making policies at the national level. Ultimately, policies made by governments in respect to land tenurial systems, access to land and use of land, fail to stop land degradation and consequently climatic change because they are never balanced mostly because they lack female input into decision-making.

Whether one views women's access to land from a historical perspective or simply from present-day configurations, one point emerges most clearly, namely that, both in the past and at present, women have had limited access to land. Overall, men control decisions relating to land and also the processes by which women access land.[74] Decision-making processes concerning land determine a number of aspects relating to land use and, ultimately, the level of degradation to which a particular parcel of land is subjected.

CONCLUSION

While discussing the subject of gender roles, land degradation and climate change and the cause-effect relationship each has with the other variables, a number of issues were raised in this chapter. Among these is that of unbalanced gender power relations. Gender power relations inform society of which activity should be performed and by whom. This, as was highlighted above, is weighted against women because they bear the brunt of men's negative response to change. The imbalance is largely felt at the point of determination of gender roles, which impact on activities on land that later translate into climate change through the agency of land degradation. Therefore, the cause-effect relationship between gender roles, land degradation and climate change is pre-empted by the social-cultural aspect at play at the time of assigning roles to society members. In order to better understand this causal-effect relationship, one must first understand the conceptual underpinnings that inform these variables. In this respect, this research makes it clear that women have limited access to land and that, on the other hand, men control decisions relating to land and also to the processes by which women access land. Overall, the resultant human activity from the assignment of gender roles, therefore, culminates into either land conservation or its degradation, depending on the direction given or anticipated at the time of assigning those roles.

In conclusion, it is important to note that, when the nexus between gender roles, land degradation and climate change is complete, the element of gender roles still remains either obscure or is never afforded appropriate prominence. This may be why it may not be easy to reverse climate change once it has occurred because no serious attention is paid to its main causative agent. An understanding of the linkage between gender roles, land degradation and climate change is therefore useful in addressing the social-cultural causes and probably their impact on climate change in Uganda.

NOTES

1 United Nations Framework Convention on Climate Change, 1994, article 1.

2 A J McMichael, A Haines, R Sloof, et al (eds), *Climate change and human health: an assessment*, prepared by a task group on behalf of the World Health Organisation, the World Meteorological Organisation and the United Nations Environment Programme, Geneva: 1996, 129.

3 The United Nations Convention to Combat Desertification in those Countries Experiencing Drought and/or Desertification, Particularly Africa, adopted at the United Nations Conference on Desertification in 1997.

4 P Bigombe Logo and Elise-Henriette Bikie, Women and land in Cameroon: questioning women's land status and claims for change, in L Muthoni Wanyeki (ed), *Women and land in Africa: culture, religion and realising women's rights,* London: Zed Books, 2003, 31.

5 L Sarkar and B Sivaramaya, *Women and law: contemporary problems,* Indian Association for Women's Studies, New Delhi: Vikas Publishing House PVT Ltd, 1994, 29.

6 S Tamale, *When hens begin to crow: gender and parliamentary politics in Uganda,* Kampala: Fountain Publishers, 1999, 28.

7 Ibid.

8 Ibid.

9 Logo and Bikie, Women and land in Cameroon, 31.

10 Tamale, *When hens begin to crow*, 32.

11 *http://www.freedictionary.com/patriachy,* (accessed 5 May 2009).

12 Sarkar and Sivaramaya, *Women and law*, 29.

13 S Meer (ed), *Women, land and authority: perspectives from South Africa*, OXFAM (UK and Ireland), Cape Town: David Philip in association with National Land Committee, 1997, 9.

14 Ibid.

15 *The National Action Plan for Uganda (NEAP),* 1995.

16 The Republic of Uganda: State of Environment Report, 2006/2007.

17 United Nations Office for Coordination of Humanitarian Affairs, *Partnership for Humanity, Situation Report No. 7.*

18 Ibid..

19 Interview with Mary Amajo (former Woman Member of Parliament for Kaberamaido, one of the districts constituting the greater Soroti region in northeastern Uganda, and Chairperson for Uganda Women Parliamentarians in the Seventh Parliament of the Republic of Uganda, Office of the Chairperson for UWOPA, Parliamentary Building, Kampala, 2007.

20 Ibid.

21 Ibid.

22 G Busingye, A critical examination of the legal regime on control of desertification and management of drought in Uganda, LL.M thesis, Makerere University, Kampala, 2000, 4.

23 Meer, *Women, land and authority*, 9.

24 United Nations Office for Coordination of Humanitarian Affairs, Uganda: *Water Scheme Proposed for Parched Karamoja.*

25 The Constitution of the Republic of Uganda, 1995, Art. 39.

26 WMO and UNEP, *Climate change 2001: synthesis report stand-alone edition,* 17.

27 Within the African setting, most women are assigned household chores and other activities that keep them in or near the home. Men, on the other hand, are assigned tasks such as hunting and grazing of animals, all of which take them off the homestead for most of the time.

28 J Asiimwe and E Nyakoojo, *Included yet excluded: a study of women's land rights in the districts of Pallisa and Kapchorwa*, Kampala: Uganda Land Alliance and Action Aid, 2000. See also Uganda Land Alliance, The Kibaale land question, Uganda Land Alliance Research Series No. 1, 2003.

29 Interview with P Kirindi at Ibanda Town Council on 26 July 2008.

30 Interview with Dr Eric Gamurorwa Buhazi, the Chairperson of Ibanda District Land Board on 18 July 2008 at the Ibanda District Headquarters.

31 Ibid.

32 Ibid.

33 Asiimwe and Nyakoojo, *Included yet excluded*, a preface page, unnumbered.

34 According to S Tamale, in her book *When hens begin to crow*, 30, 'globalisation' is a straitjacket of the universal and globalising economic order. I understand that the term is fluid and may not have a universal definition. However, for purposes of this paper, it is restricted to that universalised global economic order, the impact on gender roles, which may be a subject of further research.

35 Ibid.

36 Asiimwe and Nyakoojo, *Included yet excluded*, 1.

37 Ibid.

38 W Ncube et al, *Paradigms of exclusion: women's access to resources in Zimbabwe*, Harare: WLSA Research Project, 1997, 64.

39 V J Seidler, *Recreating sexual politics: men, feminism and politics*, London and New York: Routledge, 1991; cited in Imelda Whelehan, *Modern feminist thought: from the second wave to 'post-feminism'*, Edinburgh: Edinburgh University Press, 1999, 64.

40 B Agarwal, *A field of one's own: gender and property in South Asia*, Cambridge: Cambridge University Press, 1994, 60.

41 Interview with Eriseeba Kyamulesire at Ibanda Town Council on 26 July 2008.

42 Ibid.

43 I consider that, when the land is modified by human activities, the resultant modifications contribute to climate change.

44 A J McMichael et al, *Climate change and human health*, 11.

45 I E Galbally and C R Roy, In the tropical troposphere: a review in Mohammad Llyas (ed), Ozone depletion: implications for the tropics, University of Science Malaysia, Penang, Malaysia and United Nations Programme, Nairobi, 1991,139.

46 A J McMichael et al, *Climate change and human health*, *an assessment*, prepared by a task group on behalf of the World Health Organisation, the World Meteorological Organisation and the United Nations Environment Programme, Geneva: 1996,17-42.

47 S Hales et al in A J McMichael et al, *Climate change and human health: risks and responses* 79.

48 A J McMichael et al, *Climate change and human health: an assessment*, prepared by a task group on behalf of the World Health Organisation, the World Meteorological Organisation and the United Nations Environment Programme, Geneva: 1996, 33.

49 G Busingye, A critical examination of the legal regime on control of desertification and management of drought in Uganda, 7.

50 Agora, What obligation does our generation owe to the next? An approach to global environmental responsibility: do we owe a duty to future generations to preserve the global environment? 192.

51 Ibid, 77

52 This position is strongly supported by women I interviewed in Ibanda Town Council during my field research for my doctoral degree studies. In one focus group discussion, women informed me that, in some cases, they may not even plant the type of crop they are expected to plant when the planting season begins because their husbands have to forecast which crop will be marketable at harvest; that is the crop that will be planted during that season.

53 Ibid.

54 According to the Karimojong culture, both girls and boys must go through an initiation ceremony to be considered adult.

55 A Pazzaglia, *The Karimojong: some aspects*, Bologna: Camboni Missionaries, 1982, 123.

56 Ibid, 126–127.

57 The Republic of Uganda, *Karamoja Integrated Disarmament and Development Programme (KIDDP), Creating Conditions for Promoting Human security and Development in Karamoja 2007–10.*

58 Interview with Michael Kibeirere at Ibanda Town Council during field research in July 2008.

59 I am currently undertaking research for my doctorate degree on Law and Gender Relations in Land Decision-making Processes in Uganda using Ibanda Town Council as a case study.

60 The gender-roles-land-degradation-climate-change relational model is one of cause and effect. It starts with social-cultural constructs of gender, assigning to different genders different roles and then each of those genders performing certain tasks in relation to land. Some of the tasks carried out are degrading in nature, they culminate in climate change. Climate change, in turn, influences what activities are to be carried out by each gender. That completes the relational model.

61 Johnson (ed), The earth summit, *International environmental law and policy series*, 243–4. Note that even developed countries like the US and Portugal at first argued that desertification was a regional problem that did not require a global convention which would benefit those countries experiencing serious drought and desertification. A compromise was, however, later reached, and arrangements were made to convene for an International Convention in 1994.

62 The Republic of Uganda, *Karamoja Integrated Disarmament and Development Programme (KIDDP), Creating Conditions for Promoting Human security and Development in Karamoja 2007–10.*

63 G Busingye, A critical examination of the legal regime on control of desertification and management of drought in Uganda, 87.

64 Section 3 of the Local Governments Act, Cap. 243 provides for the district as the basic unit of administration under the decentralisation programme. Other units of the local government's administration are Local Council, V, or the District Council, IV, or the County Council, III, or the Sub County Council, II, or the Parish Council and I or the Village Council. Section 43 of the Land Act, Cap. 227 requires that utilisation of land in Uganda be done in accordance with other laws, the Local Governments Act is one of such laws.

65 J T Mugambwa, *Principles of land law in Uganda*, Kampala: Fountain Publishers, 2002, 33.

66 Uganda Land Alliance, *Reviewing the implementation of the Land Act: critical issues for the national land policy,* 2007, 3.

67 Section 3 of the Land Act, Cap. 227, for instance, gives powers to the parish committee to process certificates of customary ownership of land by people residing in the parish.

68 K Musoke, Drought hits more districts, *The New Vision Newspaper*, 4 August 2000.

69 Sarkar and Sivaramaya, *Women and law*, 232.

70 Ibid, 235.

71 A M Akol, B Isabirye, M J N Okwakol, Composition of ground foraging ant assemblage in relation to land use change in Mabira forest, Uganda, available on the internet (accessed 7 May 2009).

72 Ramnayya, Kutty and Migongo-Bake (eds), Land tenure and environmental degradation in the drylands of Asia, case studies from India, Mongolia and Nepal, a UNEP-sponsored publication, 1999, 1.

73 WMO and UNEP, *Climate change 2001*, 236.

74 W Ncube et al, *Paradigms of exclusion*, 64.

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Part 2

Climate Change Mitigation

3 Climate change and informal institutions in the Lake Victoria Basin

Donald A Mwiturubani

ABSTRACT

The Intergovernmental Panel on Climate Change (IPCC) analyses of impacts of climate change suggests that in sub-Saharan Africa, where the majority of the population depend on rain-fed agriculture, economic activities are likely to be more vulnerable to climate change. This is so because the coping mechanisms of the indigenous communities in the rural areas are limited due to lack of appropriate technology. A survey of households and in-depth interviews with key informants in the Lake Victoria Basin (LVB), however, illustrate that local people in the LVB, through their informal institutions, have been developing different strategies to deal with the impacts of climate change. These findings also suggest that the strategies developed are in most instances adaptive to the changing ecological conditions and are effective and useful in responding to natural resource constraints as caused by climate change. The strategies employed include: creating and implementing specific rules on access to and utilisation of some specific natural resources, such as those in the water catchment areas; creating and implementing rules on the type of crops to be grown (mainly cassava and sweet potatoes); creating and implementing restrictions

on the type of harvests to be sold; and disseminating knowledge of weather forecasts informed by indigenous-based tools and indicators to understand the onset and end of rainfall. These findings form the basis for concrete recommendations to the governments in the region to formulate policies and enact laws to support informal institutions and indigenous-based technologies for sustainable development.

INTRODUCTION

Climate change is a global concern which typically threatens livelihoods and, more generally, the sustainability of the majority of any population.[1] The impacts of climate change are felt at different levels: global, regional, national and local. This chapter examines practices at the local level developed, by local people, to minimise and cope with the impacts of climate change. The focus of the present enquiry is specifically on rules and mechanisms created and implemented by informal institutions in managing natural resources. It also analyses cultural and social practices related to production systems and food management. The study on which this chapter is based was conducted in the Lake Victoria Basin (LVB) with particular focus on the Mara River Sub-Basin (MRSB), Tanzania.

For the purpose of natural resources management and control, Tanzania is divided into nine basins with sub-basins.[2] These are Pangani, with its major Pangani River; Wami/Ruvu, with their major Wami and Ruvu Rivers; Rufiji with its major Rufiji River; and Ruvuma, with its major Ruvuma River and the southern coast. All these drain into the Indian Ocean. Others are Lake Victoria, Lake Nyasa, Lake Tanganyika, Lake Rukwa, and the internal drainage basins of Lake Eyasi, Manyara and Bubu depression. The MRSB, with its major Mara River, is a sub-basin within the LVB basin. The MRSB and its major Mara River originate from southwest Kenya in the steep slopes of the Mau escarpments at an elevation of approximately 3 000 m above mean sea level.[3] The Mara River then flows to Lake Victoria, 1 100 m above mean sea level in Tanzania, for a distance of about 350 km.[4] The entire basin covers an area of 13 750 km^2, of which 4 812,5 km^2 (35 per cent) lies in Tanzania, and the remaining 8 937,5 km^2 (65 per cent), in Kenya. The MRSB is located in a semi-arid zone in the LVB. The rainfall is bimodal with brief periods of rain falling in November to January, and longer periods in March to May. The average annual rainfall in the MRSB ranges between 500 mm to 1 250 mm, with highlands receiving more rainfall than the lowlands.[5]

This chapter commences by contextualising certain socioeconomic conditions prevailing in Africa, with specific reference to the sub-Saharan region in the context of vulnerability and adaptation to the impacts of climate change. This is considered against the received, albeit flawed, wisdom that Africa is unable to manage its own natural resources.[6] Section three describes both formal and informal institutions that govern natural resources, including access, use and control thereof, with specific reference to water resources. Section four discusses in detail the role of informal institutions, namely the associations of traditional leaders in natural resources management. The section further examines rules on access to and utilisation of natural resources; rules on agricultural practices, and their roles in averting climate change risks and impacts. Section five examines the process of disseminating weather forecast information to local people, while section six explores the challenges facing informal institutions in setting rules to govern natural resource access and utilisation. The remainder of the chapter draws several conclusions and proposes some recommendations relating to the foregoing analysis.

AFRICA'S ECONOMIES AND THE IMPACT OF CLIMATE CHANGE

The climate change discourse started to gain increasing national and international attention in the 1980s. As a result, several governments came together in 1988 and formed the Intergovernmental Panel on Climate Change (IPCC). This led to the United Nations Framework Convention on Climate Change (UNFCCC), which was tabled in 1992 at the United Nations Conference on Environment and Development (UNCED).[7] UNCED, popularly known as the Rio de Janeiro Conference, focused on, among other issues, policy issues related to climate change adaptability. Africa, and more particularly the sub-Saharan region, are among the most vulnerable regions and are particularly exposed to the impacts of climate variability and change.[8] Africa's vulnerability arises from a combination of many factors, including extreme poverty, frequent natural disasters such as droughts and floods, and developing economies that are primarily dependent on natural resources and are thus extremely vulnerable to weather fluctuations. Vulnerability is the function of exposure, sensitivity and adaptive capacity of the people and their economic activities to climate change.[9] Therefore, the capacity to anticipate, cope with, resist and recover from

the impact of hydrological disasters, such as droughts, indicates the level of vulnerability.[10] Africa's high vulnerability to the impacts of climate variability and change is also attributed to its low adaptive capacity.[11] Despite low adaptive capacity, some communities have developed traditional adaptation strategies to cope with climate variability and extreme events. Examples include: creating informal institutions to regulate the use of natural resources; adjustments to planting dates to take advantage of early rainfall; planting drought resistant crops; and periodic long-distance movements by nomadic pastoralists to areas less affected by drought in response to changing climates.

Agriculture is the most important economic activity in the LVB, supporting over 80 per cent of the population of about 30 million people, but 60 per cent of these depend on rain-based rural economies, generating in the range of 30–40 per cent of the countries' gross domestic product (GDP).[12] Rain-fed agriculture in the LVB constitutes more than 95 per cent of the agricultural land use and it has undergone enormous environmental changes within the last 40 years.[13] Climate change and land degradation have been repeatedly recognised as being among the major contributors of rapidly evolving changes in the basin that seriously threaten its ecosystem functions, overall biodiversity and the livelihoods of it populations.[14]

INSTITUTIONAL ARRANGEMENTS IN NATURAL RESOURCES MANAGEMENT

Sustainable management of natural resources in river basins is an important but very complex issue. The conditions and requirements for its achievement could vary from place to place over time, since it depends on factors such as geographical location, ecological conditions, socioeconomic issues, institutional arrangements, and cultural background. Both formal and informal institutions have been established in Tanzania to manage and allocate natural resources among and between different users. Institutions, be they formal or informal, could potentially provide incentives to groups and individuals, and also structure human action and interaction, especially in economic activities, in collective action and in sustainable natural resource allocation and use. Institutions have dual facilities to constrain and liberate different actions in society, that is, either prohibit people from doing something or prescribe conditions for when something is done with respect to socioeconomic and environmental activities.[15]

Although different scholars[16] admit the difficulty, and acknowledge various contradictions, in defining the term 'institution', there is a common understanding that an institution is best described as a set of rules governing human beings and their activities. This can be seen from the definitions of two reputable scholars.[17] North[18] defines institutions, as 'the rules that govern a society or, more formally, are the humanly devised constraints that structure and shape human actions and interactions between members of the society and with the surrounding environment'. Ostrom[19] defines institutions as 'the set of rules actually used (the working rule or rule-in-use) by a set of individuals to organise repetitive activities that produced outcomes affecting those individuals and potentially affecting others'. North notes two forms of institutions, namely formal (constitutions, policies, laws and property rights) and informal (taboos, codes of conduct, norms and traditions). He further notes that institutions can be created, such as constitutions, or institutions can simply evolve over time, such as common law. Institutions, therefore, according to North, are creations of human beings and they hence evolve and are continuously altered by human beings.[20] Moreover, the ways institutions evolve and develop have an influence on the natural resource management and socioeconomic development of a society over time and space.

To manage natural resources in the specific basins, institutions, both formal and informal, (customary) are established to coordinate and set rules and regulations to govern the utilisation of the resources. In Tanzania, for example, most river basins have River Basin Water Boards (RBWB) and River Basin Water Offices (RBWO) established under the Water Utilization (Control and Regulation) Act.[21] These institutions have a basin-wide responsibility for resource allocation, in this instance, water.[22] In the LVB, formal institutions include the Lake Victoria Basin Water Office (LVBWO), based in Mwanza. Although the LVBWO was established by Act No. 10 of 1981,[23] which is the amendment act to the principal Water Utilization (Control and Regulation) Act No. 42 of 1974, which aims to control, regulate and allocate water resources for different uses in the LVB, there are limited water-use rights granted to users. The latter limits sustainable utilisation of water and other natural resources in the basin because users lack incentives to manage the resources. The only user rights have been granted to the Water User Associations (WUAs) for boreholes. Other formal institutions include the Lake Victoria Environmental Management Project (LVEMP) based in Mwanza, with subsidiary offices in

Musoma and Bukoba mainly dealing with the development of Lake Victoria's water resources and controlling water hyacinth (*Eichhornia crassipes*); and Mara River Initiative Project (MRIP) based in Musoma, dealing with the management of natural resources in the Mara River Sub-basin. MRIP works in collaboration with local communities to establish and implement strategies and mechanisms to manage natural resources. The RBWO, however, places significant emphasis on water supply for domestic and industrial uses, with little or no emphasis on environmental conservation.

Similarly, there are informal institutions that are established under customary rules to govern access, control, ownership and utilisation of natural resources.[24] These institutions play important roles in preventing the degradation of natural resources and/or restoring already degraded resources in order to minimise the effects of some extreme climactic events, such as droughts and floods.

Writing on the relationship between formal and informal institutions, Cousins[25] notes that formal institutions are rules enforced by the state, i.e. underscored by law, while informal institutions are rules enforced endogenously. Thus, as Boesen, Maganga and Odgaad[26] note, customs and codes of conduct developed under specific socioeconomic and cultural conditions are therefore meant to govern informal institutions and are dynamic. While institutions, such as the RBWO, that grant resource user rights have accordingly been developed by the state (formal institutions), informal institutions are based on customary laws.[27] Local communities have been developing informal institutions with rules, norms and regulations over time to govern access to natural resources and the use of natural resources in the specific sociocultural and ecological conditions. This is generally the case in most developing countries, where the majority of the population live in rural areas and depend on natural resources for their survival. In these conditions, access to, utilisation and control over natural resources seem to be governed by customary systems based on culture.[28] Thus, while informal institutions are mainly based on sociocultural practices of the local people, formal institutions are governed by policies and legislation.

POLICIES AND LEGISLATION IN NATURAL RESOURCES MANAGEMENT

Appropriate policies and legislation create an enabling environment for sustainable natural resource management and development. A policy is a government's

main governance mechanism to provide guidelines for implementing development plans and strategies. For natural resources, a policy sets broad criteria and procedures intended to provide guidance to planners and decision-makers and those charged with power to implement and execute natural resource-based development plans. To operate effectively and efficiently, laws are enacted to enforce the implementation of the policies. A law defines the legal entitlement to the specific natural resource and identifies the rights and obligations tied to its allocation and use and, consequently, provide the prescriptive parameters for the resource's development. Some of these laws facilitate natural resource management on a river basin basis. In Tanzania, for example, water resource development is governed by both law[29] and policy.[30] According to the 2002 Water Policy, water-based institutions, both formal and informal, are expected to play a greater role in water resource exploration, assessment, allocation, pollution control, catchment management, and basin planning and development. The policy, however, seems to afford more attention to formal institutions while informal institutions of water resource management are not afforded the same. Other sector-specific policies in Tanzania include the Agricultural Policy,[31] the National Land Policy[32] and the National Forestry Policy,[33] which are all equally important in governing natural resource use and management. Since these policies are sector-specific they sometimes create conflicts in their implementation. The National Environmental Policy,[34] for example, failed to harmonise sector-specific policies with a view to creating a common policy which cuts across different related sectors, such as forestry and water. The National Environmental Policy describes the role of sector-specific policies without necessarily indicating how different sector-specific policies merge. The conflicting natural resource policies could be one of the exacerbating factors that contribute to natural resource degradation in the country and accordingly, does not contribute to establishing a sound formal policy and legislative base to address issues such as the impacts of climate change.

Similarly, the uncoordinated informal and formal institutions have affected natural resource development, particularly as far as allocation, access and control are concerned. Chancellor, Hasnip and Oneill write: 'There is generally a gulf between institutions particularly the officials of government institutions and local people institutions resulting in poor communication and poor appreciation of others' needs and expectations.'[35] These existing weak institutional arrangements, particularly in the river basins, have in all

probability been exacerbating natural resource mismanagement in most river basins in Tanzania. The challenges associated with conflicting formal and informal systems of natural resource management are further exacerbated by the fact that local people have limited knowledge about the policies and legislation governing water resources. Successful and sustained natural resource management requires the commitment of relevant institutions, policies and legislation. Certain studies[36] indicate that over 80 per cent of local people have limited knowledge regarding natural resource-related policies and legislation. Government and other responsible institutions seem not to have plans to disseminate the guidelines and laws governing natural resources as stipulated in the relevant national policies and legislation. Moreover, in Tanzania, some policies and laws lack clear strategies and mechanisms to protect the environment from degradation. For instance, water laws[37] seem to be inadequate to facilitate proper catchment management and to protect water sources from degradation. The primary objectives of the Water Utilization (control and regulation) Act No. 42 of 1974 and its subsequent amendments, No. 10 0f 1981 and No. 17 of 1989,[38] seem to be focused on water allocation, that is, administrative issues of granting water rights, and water pollution control, including setting water quality standards and permissible effluents standards. Few provisions are put in place to minimise or combat the degradation of natural resources.

Governments would therefore be well-advised to integrate formal and informal systems for sustainable natural resources management. Gillingham[39] notes that the existing environmental problems in river basins are accelerated by the tendencies of formal river basin-based institution officials to ignore the basic principles of customary systems of natural resources utilisation. To show the need to integrate customary and formal legal systems in natural resources management Gillingham writes: 'If water managers attempt to impose change on water users by altering statutory law, such initiatives can be rendered ineffective if the water users do not integrate them into the customary rules which govern their daily water use'[40]. It is further important to note in this respect that formal and informal systems can contradict or complement one another in natural resources management. North[41] notes here that formal rules can compliment and increase the effectiveness of the informal constraints through lowering information, monitoring, and enforcement costs and hence rendering informal constraints possibly more efficient.

THE ASSOCIATIONS OF TRADITIONAL LEADERS AND NATURAL RESOURCES MANAGEMENT

Background

Informal institutional arrangements play a significant role in natural resource management in the LVB and, particularly, the MRSB. The most common and effective informal institutions in governing access, use and control in the MRSB, are the associations of tribal traditional leaders, which are governed by taboos, codes of conduct, norms and traditions. These institutions are important in governing local people's involvement in different sociocultural, economic, political and environmental activities, including the utilisation of natural resources. Members of these informal institutions are mostly elder men who are elected based on particular social, political and cultural characteristics of the family, including extensive knowledge of the spatiotemporal changes of surrounding natural resources and local medicines. The number of members of the associations of tribal traditional leaders per village range between 15 and 20, usually consisting of a chairman, secretary and treasurer. These associations have powers, based on customary laws, to set rules and enforce these in their areas of jurisdictions. They therefore play an important role in settling cultural, social, economic and political matters and conflicts as reported to them and/or observed by one or more members of the association.

In the LVB and specifically the MRSB, tribal traditional leaders are the local experts in several aspects, including, *inter alia*, the society and surrounding environment, local medicines, knowledge of environmental changes in their area, and location of different resources. Traditional leaders are superior individuals in society and are highly respected by members of their community. Tribal traditional leaders are only older men, mainly 60 and above years of age. This gender and age, specifically, seem to reflect gender division of labour in the community, both in the production system and knowledge about the surrounding environment. Through their role of taking livestock to pasture and water, men seem to gain extensive knowledge of the dynamic nature of the surrounding natural resources as compared to their women counterparts.[42] Although each village has the association of tribal traditional leaders, there are, however, information flows from one village to another, provided that the same ethnic group(s) inhabit the villages concerned. Tribal traditional leaders play

the key role in setting rules to govern and control all cultural practices, such as ritual activities, and utilisation of some specific resources, particularly forests and water resources. Spiritual leaders further design mechanisms to implement the rules they set, also with the view to ensuring that local people adhere to those rules and regulations. The main rules that relate to coping mechanisms as regards the impacts of climate change include rules on access to and utilisation of some specific natural resources, rules on the type of crops to be grown, and restrictions on the type of harvests to be sold. Traditional leaders are also responsible for disseminating knowledge and information on weather forecasts, and are informed by indigenous tools and indicators to understand the onset and end of rainfall in this respect.

Rules on access to and utilisation of natural resources

Traditional leaders typically impose limits on access to those natural resources, which are believed to be important for the livelihoods of local people. The most important natural resources that would require some restrictions in this respect include water resources; natural forests believed to control rainfall; and certain trees, such as fig trees, which are believed to be a source of water. There are also restrictions and prohibitions on felling trees for making charcoal intended for commercial purposes. Furthermore, bushfires are prohibited and non-compliance is heavily punished. The main objective of limiting access to these resources, is conservation, with the view to reducing or curbing degradation. Forms of restrictions of access to and utilisation of specific natural resources include the uses for which the resources are intended; the time of a day to which one is allowed to access the resources; the ability of social groups to access the resources; and the quantity of the resources to be harvested or utilised.

Traditional leaders use different strategies and mechanisms to enforce the rules they set on access to and utilisation of natural resources. These strategies and mechanisms include practising ritual activities within and around the natural resources, and setting penalties for violators of the rules. The penalties are socio-culturally constructed, including separating violators from participating in and sharing sociocultural and economic activities with other members of the society. Others include paying fines of livestock, local brews and money. This would accordingly coerce each member of the community to adhere to the rules to avoid penalties. Ritual activities, on the other hand, place limitations

(by informal rules) on access to and utilisation of certain areas and resources by restricting the access of some social groups believed to degrade natural resources to areas where ritual activities are practised. Traditional leaders claim to have local medicines that, when applied to a specific area, harm any unauthorised person visiting the area. For example, one man is claimed to have injured himself in the process of cutting down trees. For this reason, therefore, only traditional leaders have access to and authority over utilisation of forests and forest products located in and around areas where ritual activities are practised. These areas are mainly near or around water sources, within natural forests, and under certain large trees. The result is that local communities respect highly sensitive natural resources within and around these areas because they are aware of the rules, and in most instances agree with these rules. This, in turn, is expected to reduce degradation of natural resources and consequently would reduce levels of vulnerability to the impacts of climate change.

Rules on agricultural practices

One of the key impacts of climate change and variability relating to human security in the LVB is food insecurity. This is so because over 80 per cent of the population in the basin depends on rain-fed agriculture as their main source of livelihood. To minimise the impacts of climate change on agricultural production, traditional leaders set rules, informed by knowledge of rainfall variability and change, on what, where and when to plant certain crops. For instance, growing drought-tolerant crops such as cassava and sweet potatoes may be made compulsory for each household when less rainfall is expected in a specific year. This has made cassava and sweet potatoes, which were not the main food crops in the MRSB prior to the 1970s drought,[43] the main food crops in the area. It has, for instance, been made compulsory for each household to grow cassava and sweet potatoes as a strategy to minimise the impacts of droughts and thus improve food security.

Furthermore, decreased rainfall seems to have compelled traditional leaders to introduce the second cultivation season, that is, the 'short' season, to supplement food deficits in the 'long' season due to unreliable rainfall. When rainfall was sufficient and reliable, harvests from long seasons were sufficient. The decrease and unreliability of rainfall may have led to the reduction of harvests during the long season, compelling local people to introduce the short

cultivation season. Other factors such as population increases at the household level and commercialisation of agriculture may, however, have caused the shift from one cultivation season to two cultivation seasons in the year, due to increased food requirements. Similarly, commercialisation of agriculture may have increased demand for land leading to a reduction of land for food crop production.

Other agriculture-related rules, practices and coping strategies which are commonly used in the LVB in response to climate change and variability, include selecting the type of landscape (land surface units) where crops are grown, when crops should be grown (cultivation seasons), and techniques employed during cultivation. What, where, when and how to cultivate crops in the MRSB depends on, among other factors, the knowledge of the amount of rainfall in a specific time period (season) and the capacity of different landscapes to hold water. For instance, when there is insufficient rainfall over protracted periods of time, local people cultivate in the lowlands with relatively high moisture content. They also construct and grow crops on ridges in order to tap surface run-off water, thereby increasing moisture sufficiency for plant growth. Similarly, during heavy rainfall, ridges reduce surface run-off and therefore minimise impacts on the land, such as soil erosion. This strategy ensures sustainability of food sufficiency at household levels throughout the year.

Furthermore, traditional leaders set rules to limit households from selling food crops following harvests. When weather forecasts, based on indigenous indicators, indicate either insufficient or late onset of rainfall, each household is prohibited from selling their harvested food as a strategy to increase food storage and security for future use. In some cases, members of households are also prohibited from having celebrations or cultural practices that require extra food. For instance, when low rainfall and, as a consequence, a smaller harvest is expected, traditional leaders prohibit circumcision ceremonies that normally take place every two years.

Informal institutions and dissemination of weather forecast information

To set specific rules or adopt a specific strategy, traditional leaders employ knowledge of the past, current and future weather conditions related to rainfall. The knowledge of rainfall variability is based on a number of elements observed

over a number of years. The need to understand rainfall variability has required traditional leaders in the MRSB to develop tools for forecasting rainfall onset and end in order to prepare for the expected adverse hydrological conditions, or to prepare to take advantage of the expected favourable hydrological conditions in their socioeconomic activities. The tools for rainfall forecasts that have been developed have been based on practices and experiences gained while interacting with the environment, particularly when practising socioeconomic and political activities.

The main tools that have been developed and employed for forecasting rainfall in the MRSB, are divided into seven major categories, namely: elements of weather, wild animal behaviour, insect behaviour, astronomy, water body characteristics, bird behaviour, and fishing. These tools are used to predict the beginning and end of rainfall. A single tool and its indicator(s), however, are not sufficient to forecast the onset and/or end of rainfall. Instead, spiritual leaders use a combination of tools and their indicators to reach a decision concerning the expected hydrological condition in their area.

Thus, traditional leaders, as an institution, disseminate knowledge on expected weather conditions to the local communities, which is a critical process necessary for enhancing the adaptive capacities of the smallholder communities in rural areas to climate change. Traditional leaders, through their associations, are therefore sources of information on weather or new and potential strategies for averting climate change risks. Smallholder communities could therefore benefit greatly from weather forecasts in a number of ways. For example, knowing in advance if the rainfall will be normal, below or above average, could help them chose the most suitable crop/varieties, adjust to their cropping practices, or take other measures necessary to maximise benefits or minimise losses.[44]

Challenges facing informal institutions

Informal and formal institutions seem not to complement one another. For instance, the granting of water rights to private companies or individuals, and the allocation of land to individuals or private companies which is done by formal institutions, deprive traditional leaders of the right to impose any rule over the land and resources. Since local people seem to have limited knowledge of policies and legislation, these people do not give due support to rules and regulations imposed by formal institutions and, instead, they rely on informal rules. Ruttan[45]

establishes the hypothesis that institutions governing natural resources should follow the principle 'restraint for gain', that is, if users are able to agree on the rules in operation, it becomes possible to follow the rules. Similarly, Gillingham[46] observes that, in Tanzania, formal rules have been ineffective because formal institutions tend to ignore the customary systems of the local people.

Furthermore, rapid population growth due to in-migration, for example, migration of livestock keepers together with their livestock, has put informal institutions at risk. Migrants to specific ecological systems alter the natural states due to increased pressure on natural resources. Migrants with different sociocultural and political backgrounds also disrupt the management systems of natural resources of the local communities. Moreover, migrants lack alternatives to earning their livelihoods, which leads to overexploitation of natural resources, including water, fuel wood, wild meat and land for cultivation. These and other needs have led to deforestation, degradation of catchments and general encroachment on marginal lands, making the land vulnerable to the impacts of climate change.

Transboundary resources are also difficult to manage through informal rules as they cut across different socioeconomic and political boundaries. For instance, the main water catchment in the MRSB is the Mau escarpments, which lie in the MRSB, Kenya. This renders rules set by traditional leaders in the MRSB in Tanzania inapplicable to the Kenyan side.

Urbanisation is another challenge facing informal institutions in the management of natural resources in the LVB. Urbanisation in the LVB and Africa in general is increasing at an alarming rate. With urbanisation, informal systems lose their strength because urban areas are mostly inhabited by people from different socioeconomic and cultural backgrounds. The major problem seems to be a lack of adequate policies and legislation to support these informal systems of natural resources management.

CONCLUSION

This chapter has illustrated the roles that institutions and, in particular, informal institutions play in governing day-to-day natural resource use and management thereof at the local level. Institutions, be they formal or informal, can provide incentives to groups and individuals, and also structure human action and interaction, especially in economic activities, individually or collectively, in sustainable natural resource allocation and use. Institutions can either constrain or liberate different actions in society, and also establish rules to be followed before or when performing different socioeconomic and cultural activities. With respect to natural resources, rules and regulations can prohibit people from doing something, impose conditions on actions and also permit certain socioeconomic, political and cultural activities at specific locations over certain resources during a specified period of time. These rules, as this chapter demonstrated, are important in natural resource management and would enhance the resilience of resources to the impacts of climate change at the local level. It is, however, essential that, since informal institutions are important to sustainable natural resource management, they are supported by more formal policies and legislation.

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PART 3

Climate Change Adaptation

4 Adaptation policies in Africa

Challenges and opportunities in the application of tools and methods on climate change

Senay Habtezion

ABSTRACT

Scientific advances in seasonal as well as multidecadal predictions in climate variability and change have laid bare the enormity of challenges in adaptation to the adverse impacts of climate change. They have also smoothed out some impediments to pushing forward the United Nations Framework Convention on Climate Change (UNFCCC)[1] process. A range of tools and methods now exist, or are in prototype phase, which are designed to facilitate access, understanding and application of climate data which could be employed by least developed countries (LDCs) in the design of appropriate adaptation policies, strategic pathways and enabling legislation. These tools and methods are essential for making science-based policy decisions on adaptation. Yet, the complexity and cost associated with such data, tools and methods do not always match the manpower and technological capacity of African LDCs and, as such, their effect on the design of adaptation processes is bound to be limited. This chapter dwells on policy and legal challenges, and opportunities, in the use of tools and methods for adaptation by focusing specifically on Eritrea as a case study. It is maintained that effort needs to be made through the UNFCCC process, as well

as possible regional initiatives, to enhance capacity of African LDCs in application of available tools and methods on climate change. Parallel to such efforts, regulatory measures are needed to ensure harmonisation of environmental/natural resource related laws and policies and coordination among relevant institutions, with the view to facilitating adaptation mainstreaming into development planning. In this regard, it is further maintained that any future regulatory attempts need to take due account of local coping strategies at national and regional levels.

INTRODUCTION

There is now general consensus that existing, as well as future, climate change-related global arrangements, even if they were to be keenly followed through, would not alone stabilise greenhouse gases (GHGs) and avoid climate change.[2] With this realisation, adaptation to impacts of climate change and variability is indispensable. This is especially true for Africa where, chiefly due to the continent's low adaptive capacity, the impacts of climate variability and change are expected to be immense. The fourth assessment report by the Intergovernmental Panel on Climate Change (AR4),[3] documents evidence related to the widespread impacts of climate change on livelihoods and ecosystems. The continent is identified as one of the regions most vulnerable to climate variability and change due to multiple stresses and low adaptive capacity.[4]

Contrary to popular belief, adaptation to adverse impacts of climate variability and change is not a novel phenomenon in Africa. People have been dealing with such impacts for decades. African societies have thus continuously developed local adaptation strategies[5] to cope with extreme weather events, such as droughts and famine. Yet 'the expected regional changes in climate and the subsequent impacts – especially on water availability, agricultural production and human health – will severely strain their coping capacity.'[6] In sum, the reality is that it will be increasingly difficult for African countries to cope with impacts of climate vulnerability and change.

This chapter deals with policy and legal challenges and opportunities in the use of much-needed tools and methods for adaptation to the adverse impacts of climate change, by focusing on the Eritrean scenario as a case study. The first part briefly introduces the concept and utility of adaptation mainstreaming and the nexus with climate tools and methods. Part two then defines and explains the use of applicable methodologies/approaches, methods and/or tools that are currently being employed for assessing vulnerability and risks, and furthermore investigates the policy and legal challenges associated with these. Part three assesses adaptation-sensitive legislative and policy tools in Eritrea with specific focus on challenges and opportunities in the use and application of tools and methods for adaptation to climate change. It then proceeds to assess the implications of these for other African LDCs. The final section presents conclusions drawn from the findings of the research.

ADAPTATION MAINSTREAMING

Improving adaptive capacity is critical to reducing vulnerability to climate change. Low adaptive capacity is linked to an array of factors, including, *inter alia*, deterioration of ecological base, poverty, land distribution, and high dependence on natural resources. Climate change is not only an environmental issue; it is also a development issue.[7] As such, an integrated approach to adaptation is imperative. Adaptation has to be integrated within the broader milieu of sustainable development and poverty-reduction strategies.[8] Such integration presupposes the existence of appropriate policies and legal and institutional groundwork for coordinating multisectoral and multistakeholder adaptation-related interests and concerns.

Adaptation to climate variability and change is a process. There is a link between the past, the present and the future. Past climatic impacts would need to be assessed and responded to in order to increase adaptive capacity and resilience and formulate plans and policies that address future risks. Such assessments necessitate the use of scientific means, not only to analyse climatic data, but also to determine proper adaptation responses to the problems identified.[9] Science- based adaptation decision-making is a requirement under the UNFCCC process and is bound to involve the application of different scientific methodologies/approaches, and tools.

TOOLS AND METHODS

As noted in the preceding paragraph, the UNFCCC requires its developed country members to undertake national impact assessments of climate change

and report their adaptation efforts. Although not a strict requirement for LDCs at this stage, these countries also ordinarily submit their reports. In undertaking these assessments, parties are expected to utilise applicable methodologies/ approaches,[10] methods,[11] and/ or tools[12] for making these assessments (impact, vulnerability and risk) with sectoral or multisectoral applications (for example, scenario-building methods and stakeholder analysis tools). Some of these methods and tools are designed to assist in crafting adaptation pathways and policies following vulnerability, impact and risk assessments. Selection, understanding and application of these tools could be exceedingly challenging. In addition, new tools and methods are constantly being developed and the application of those that are already in use is steadily being refined.[13] Many of the tools and methods have intellectual property rights (IPRs) attached to them and, hence, are costly.[14] It must be noted that the Bali Action Plan (2007)[15] has launched a comprehensive process to enable the full, effective and sustained implementation of the UNFCCC through long-term cooperative action that will be operational beyond 2012. The plan attaches equal weight to mitigation and adaptation, and identifies technology and finance as the key mechanisms to enable developing countries to respond to climate change. With technology transfer, the focus normally has been on 'hard' technologies. Methods and tools for, among others, vulnerability, impact, risk assessment; and adaptation decision-making, are not conventionally discussed in the ongoing discourse on technology transfer.[16]

The following section assesses the policy and legislative tools in Eritrea in light of the opportunities and challenges faced in adaptation mainstreaming, science-based adaptation decision-making and the associated access to and application of tools and methods.

THE ERITREAN SITUATION

Climatic (vulnerability) context

Like most LDCs, Eritrea is highly vulnerable to climate variability and change and has low adaptive capacity. The country is composed of low-lying coastal regions, arid and semi-arid areas, areas that are highly susceptible to drought and desertification, fragile ecosystems (for example, mountainous ecosystems), and its fledgling economy is highly dependent on fossil fuels. Its low adaptive capacity is also attributable to handicaps in social capital, technology and human resources.[17]

Constitutional context

The Constitution of Eritrea contains a notable enunciation on sustainable development:

> In the interest of present and future generations, the State shall be responsible for managing all land, water, air and natural resources and for ensuring their management in a balanced and sustainable manner; and for creating the right conditions to secure the participation of the people in safeguarding the environment.[18]

The Constitution of Eritrea is yet to be enforced[19] and the above constitutional construct is yet to be interpreted by the judiciary. It is not, however, difficult to see that the constitution could potentially be progressively interpreted to attach value to lofty environmental ethics such as sustainable development, intergenerational equity and public participation in environmental management.

Climate change is a sustainable development issue as its impacts are bound to impinge on the environment, natural resources, livelihoods and, indeed, the economy. The above constitutional construct could thus be positively construed to serve as a basis for policy and legislative development on adaptation to adverse impacts of climate change in Eritrea.

Adaptation policy and legislative context

Eritrea acceded to the UNFCCC on 25 March 1995. No policy tool on climate change adaptation has been established in Eritrea to date. Yet some incidental statutory and policy tools to address adaptation issues do exist within the broader policy context, especially in respect of achieving the goals of poverty reduction and sustainable development. Besides, the process of preparing the National Adaptation Programme of Action (NAPA) has helped raise awareness and create the groundwork for future consideration of adaptation in development planning.[20]

This section describes some of the policy and legislative tools in effect in Eritrea that might be of relevance to adaptation.[21]

Adaptation policy and planning

There is currently no specific policy or planning tool on adaptation that specifically relates to or deals with the adverse impacts of climate change in Eritrea. There are, however, a number of tools on poverty reduction, sustainable development and environmental protection and promotion that could be useful for future development of adaptation-related policy and planning instruments.

The Interim Poverty Reduction Strategy Paper (PRS) (2004) outlines the country's macro-economic framework and sets out actions to create the conditions for resuming rapid economic growth, and policies and programmes for poverty reduction.[22] The Eritrean Macro-Policy (1994) articulates sectoral priorities for the country and underlines that environmental considerations be factored in developmental plans.[23] The National Environmental Management Plan for Eritrea of 1995 (NEMP-E);[24] the Eritrean National Code of Conduct for Environmental Security (1995) (ENCCES);[25] the National Biodiversity Strategy and Action Plan (1998) (NBSAP);[26] the National Environmental Assessment Procedures and Guidelines (1999) (NEAPG);[27] the Environmental Assessment Procedures and Guidelines for Agricultural Projects (2005) (EAPGAP);[28] and the Draft National Coastal Policy (2006);[29] all articulate the need for sustainable development as a national goal.

The National Adaptation Programme of Action (NAPA)[30] process in Eritrea culminated, in 2007, in a document identifying and prioritising potential adaptation projects for each vulnerable sector.[31] The NAPA document also contains a seven-page annex setting out coping strategies and potential adaptation projects identified by stakeholders to the NAPA process (Annex 1) as well as project profiles (Annex II). The NAPA document describes key climatic hazards,[32] vulnerability,[33] national goals, plans and frameworks,[34] and barriers to the implementation of the NAPA results.[35] The latter is especially worth highlighting. The NAPA document sets forth the following as the major barriers to the proper implementation of NAPA results: lack of coordination in the implementation of projects and Multilateral Environmental Agreements (MEAs) (overlaps and duplication in mandates); chronic shortage of human resources and skills essential for the implementation of potential adaptation initiatives; policy gaps (lack of regional and sectoral policies); regulatory voids (absence of umbrella environmental coordination legislation and critical sectoral regulations, for example, on water); and funding (both national and international).[36]

Despite the existence of a number of tools on sustainable development and environmental conservation, the NAPA document shows that a lot remains to be done in terms of policy and planning for adaptation to adverse impacts of climate change. This is even truer when considering the appraisal in the NAPA policy that the country is extremely vulnerable to climate variability and change.[37]

Adaptation sensitive legislation

Currently, no legislation that deals with adaptation exists. As with the policy description in the preceding sub-section, there are, however, numerous sectoral statutes in various areas of concern that could be relevant to the future development of adaptation-related legislation.

Proclamation to Determine the Structure, Powers and Functions of the Government of Eritrea (1993); Proclamation To Determine the Powers and Functions of Ministries, Authorities and Offices of the Government of Eritrea (1991); and Proclamation for the Establishment of Regional Administration (1996); all govern the organisation of the government, especially those departments that deal with environmental and developmental issues, such as the Ministry of Environment, Land and Water and the Ministry of Agriculture and Finance. One of the biggest problems in environmental governance in the country in general is the absence of coordination between and among government agencies. While there are numerous sectoral statutes dealing with natural resources and the environment,[38] there is as yet no Framework Environmental Proclamation or a similar statute in Eritrea that coordinates sectoral activities and initiatives on the environment. This is considered a significant impediment to integrated, coordinated and aligned environmental governance. The latter concern is also considered a significant bottleneck in planning for adaptation to climate change and variability in Eritrea.[39]

CHALLENGES AND OPPORTUNITIES

Adaptation mainstreaming

As identified in the NAPA document,[40] a major bottleneck in the laws listed above is the absence of coordination. A cursory review of the relevant statutes dealing with government structure, powers and functions in Eritrea,[41] reveals that these laws have failed to keep abreast of the myriad institutional changes

that have taken place since the country's formal independence in 1993.[42] This, in part, has led to lack of clarity in respect of governance mandates and a resultant duplication and inefficiency in functions. In practice, a sense of needless competition between some government agencies is also apparent. The absence of an environmental coordination proclamation, also noted in the NAPA document, is a significant void. Efforts are currently underway to revive the Draft Environmental Proclamation (2002) and it is expected that promulgation of a framework environmental proclamation will address most outstanding issues related to coordination of environmental activities in the country.[43]

The need to integrate adaptation into the country's development policy making and planning goals cannot be overemphasised. The fact that climate change issues are gaining visibility should be used not only as an opportunity to coordinate environmental activities, but also to ensure that policy and institutional coordination is done at more powerful organs of state, namely the Office of the President.[44]

Application of climate data, scientific tools and methods

Science-based adaptation decision-making and proper usage of climate data, tools and methods would arguably help facilitate integration of adaptation in development programmes and minimise the potential for maladaptation. Analysis of data and application of these tools and methods is bound to be technology-intensive and often requires specific application skills.[45] By prescribing the requirement of impact assessments in the context of integrated environmental planning and management, NEMPE[46] also highlights the need for science-based environmental management.

The reality, however, is that the level of science and technology in Eritrea is extremely low. Science and technology policy development should be considered in light of the country's 'institutes for setting standards, for the procurement and use of ICT (information and communication technology) … indigenous ICT production capacity … Digital telecommunication services … computer support services, institutes of research and training.'[47] The country has a very under developed science and technology infrastructure, low internet connectivity, and weak human and institutional resources, which would also include meteorological services. In addition, awareness with regard to climate variability and change and its impacts on Eritrea is low. Against this backdrop,

application of some climate tools and accessing and utilisation of climate data for efficient science-based adaptation decision-making will be among some of the most significant challenges for Eritrea. The challenges are even more glaring when the issues of cost for the use of intellectual property connected to the tools applicable for adaptation-related assessments and decision making is taken into account. In this regard, it could be argued that access to tools and methods on adaptation might be linked to national laws on intellectual property protection and transfer of technology matters (for example, through licensing procedures)..

The constitution and some policy and regulatory tools do give credence to the need to promote science and technology. A cursory review of the policy and legal instruments reveals that all major national instruments, including the Eritrean constitution,[48] the Macro Policy (1994),[49] as well as a number of other sectoral laws, provide an enabling environment for promotion, transfer and use of science and technology.[50] Article 9(3) of the Constitution of Eritrea, for example, charges the state with the responsibility to 'promote the development of art, science, technology', further adding that the 'state shall create an enabling environment for individuals to work in an atmosphere of freedom and to manifest their creativity and innovation'.[51] This could be interpreted as an allusion to some normative framework that not only encourages innovations and creations, but also safeguards the same.[52] Further, the prevalent intellectual property-related stipulations[53] (such as patents, trade secrets, and trademarks) are to be found in other national laws. These include: the Transitional Civil Code of Eritrea (1960); the Transitional Commercial Code of Eritrea (1960); the Transitional Penal Code of Eritrea (1957); and, to a certain measure, the Investment Proclamation (1994),[54] as well as the new Labour Code of Eritrea (2000).[55]

Currently, there is no single law specifically dealing with patents in Eritrea.[56] The regulatory framework for industrial property, if at all, could be characterised as deficient. Special industrial property laws have not been issued and a national industrial property office is yet to be created. Tools that would normally qualify for industrial property protection might therefore not enjoy the same protection under the existing national regime for IPRs.

That said, some tools and methods might be subject to protection under copyright laws. In Eritrea, copyright is governed by the Transitional Civil Code of Eritrea (1960) (articles 1647–1674). Under Article 1647 (1), the author of 'a work of the mind',[57] has an incorporeal right of ownership. Such 'works of the

mind' are categorised into different groupings, namely: literary works; musical compositions with or without text; works of figurative arts; illustrations, maps and related works. The list is but illustrative and not exhaustive, as could be deciphered from the catchall phrase employed in the relevant code stipulation.[58] This is in keeping with the 1886 Berne Convention on Copyrights.[59] The flexibility offered by this provision could therefore be invoked to protect some tools and methods (such as software) and databases of climatic information.

Implications for other African LDCs

A review of NAPA-related documents of African LDCs would reveal that the need for adaptation mainstreaming and capacity building in use and application of climate data, tools and methods is not unique to Eritrea.[60] Both issues are vital to all African LDCs, given their vulnerability to climate change and variability and low adaptive capacity.

As noted earlier, the long-term cooperative action envisaged under the Bali Action Plan (2007)[61] in the areas of transfer of technology and finance, offers some hope to adaptation efforts of all LDCs. It is possible that a sound regime for capacity building, technology transfer and financial mechanisms could evolve from the ongoing UNFCCC process and this could positively aid adaptation efforts of all African LDCs. The process, however, has been extremely slow.[62] The same is true with respect to developments in technology transfer schemes and operationalisation of the same.[63] With regard to the latter, it is remarkable that access to relevant climate data[64] and application of tools and methods are not being properly emphasised, not even as 'soft' technologies, which include 'capacity building, information networks, training and research'.[65] Science-based decision-making in adaptation is arguably the only sound approach to adaptation in Africa.[66] Capacity constraints in the proper use of climate data and the necessary tools could therefore thwart adaptation efforts.

African LDCs will likely face overwhelming challenges in pushing forward the UNFCCC agenda on financial mechanisms and technology transfer. Capacity constraints (in terms of negotiation skills and political leverage) will also play an adverse role in this respect. This challenge could, however, be turned into an opportunity. The NAPA process has identified numerous local coping strategies, a reference to indigenous adaptation know-how and a database has already been created by the UNFCCC Secretariat for easy access of the same. These strategies could be shared and could serve as a base for intra- and interregional cooperation on adaptation.

CONCLUSION

The Eritrean case study is illustrative of the challenges some African LDCs face in mainstreaming climate change adaptation into their development programmes and planning. The NAPA documents' description of implementation barriers attests to the vital need for effective institutional policy and legal coordination. In the Eritrean context, the first order of business should be to review and promulgate the Draft Environmental (coordination) Proclamation, which is already long overdue. The fact that adaptation to climate variability and change issues are gaining visibility at national, regional, national, and even local and city levels, ought to be used as an opportunity to reinvigorate the process and to carefully consider institutional, policy and planning linkages. Given the state of institutional affairs in the country, involvement of the Office of the President and Ministry of Finance is something that ought to be seriously considered. Adaptation mainstreaming will likely be an ongoing process and the use of science-based decision-making should be given due strategic importance. In this regard, in-depth study of the utility and efficacy, as well as the international and national proprietary regimes on use of the necessary tools and methods will be essential. The latter raises issues that are perhaps pertinent to all African LDCs and efforts should be made to study and constructively engage in the international UNFCCC process on adaptation financing and technology transfer.[67] As a parallel effort, significantly more investigations need to be conducted on local coping strategies, including those that have already been identified through the NAPA process, as well as those identified by other LDCs with the view to seeking ways of building synergies.

NOTES

1 *United Nations Framework Convention on Climate Change*, 9 May 1982, 1771 UNTS 107, 165; S. Treaty Doc No. 102–38 (1992); UN Doc A/AC.237/18 (Part II)/Add.1; 31 ILM 849 (1992).

2 See IPCC, Summary for policymakers, in the *Synthesis Report of the IPCC Fourth Assessment Report* (2007), 14, http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr_spm.pdf (accessed 7 March 2009).

3 IPCC, *The Fourth Assessment Report of the IPCC, Climate Change*, 2007.

4 See UNFCCC, *Background paper on impacts, vulnerability and adaptation to climate change in Africa*, African Workshop on Adaptation: Implementation of Decision 1/CP.10 of the UNFCCC Convention, Accra, Ghana, 21–23 September 2006, http://unfccc.int/files/adaptation/adverse_effects_and_response_measures_art_48/application/pdf/200609_background_african_wkshp.pdf (accessed 12 March 2009). 'The African continent contains the poorest and least developed nations of the world with low per capita GDP and life expectancy and high infant mortality. Literacy is in the bottom quartile globally; there is a high dependence on the natural resource base; weak governance structures; and a low capacity within African governments to respond proactively to changes. Armed conflict and terms of trade and aid dependence further complicate matters. Africa has a predominantly tropical, hot and dry climate and most of the population resides in the sub-humid and semi-arid zones.' See ibid, 33.

One recent study seeks to demonstrate the effect of a possible 2.5 degrees Celsius warming and its effect on different regions of the world. It notes that Africa will be among the most affected victims. (Eric A Posner and Cass R Sunstein, Climate change justice, Public Law and Legal Theory Working Paper No 177, University of Chicago Law School, Chicago, 2007). Accordingly, 'Damages of a 2.5 C Degree Warming As a Per centage of GDP' are estimated to be at India 4.93; Africa 3.91; OECD Europe 2.83; High income OPEC 1.95; Eastern Europe 0.71; Japan 0.50; United States 0.45; China 0.22; Russia 0.65; http://www.law.uchicago.edu/Lawecon/index.html (accessed 12 November 2008).

5 For information on past and present work on local coping strategies under the UNFCCC process, as well as a general database on the same, see http://maindb.unfccc.int/public/adaptation/ (accessed 12 March 2009).

6 Fatima Denton et al, *Adapting to climate change in Africa: the role of research and capacity development*, 2008, http://www1.worldbank.org/devoutreach/ (accessed 7 March 2008).

7 Mamadou Moussa Diakhite, *Mainstreaming adaptation to climate change into development planning and activities* (2007), working paper submitted to the Least Developed Countries Expert Group (LEG) meetings on NAPA preparation and implementation, Bangkok, August 2007. The author submits that climate change issues be linked to government organs in charge of planning and budgeting as opposed to departments dealing with environmental issues only. Page 7: 'In 2005, the OECD conducted a survey on the ministries hosting the UNFCCC national focal points, with a distribution as follows: environment 72%, foreign affairs 14%, meteorology 8%, and other/unknown 6%. These results could be read as the justification of more and more pressing calls to 'get climate change (and other MEA issues) out of the environment corner' and rise to central ministries to give better opportunities to be considered at the sharing of national budget resources.' Ibid.

8 M T J Kok (MNP), B Metz (MNP), A Verhagen (Plant Research International-Wageningen University and Research Centre) and S N M van Rooijen (MNP/CAP-SD), *Integrated development and climate policies: how to realise benefits at national and international level* (Policy Brief) Environmental Assessment Agency (MNP), 2006, 2. The brief states that such integration would bring along the 'demonstrated' benefits of reduced poverty, more employment, improvements in health, energy and food security and infrastructure as well as climate benefits. Ibid.

9 Dowing et al, Adapting to climate change in Africa, *Journal of Mitigation and Adaptation Strategies for Global Change*, 2(1) (1997) Kluwer Academic Publishers. 'The intersection of present vulnerability and the prospect of climate change in Africa warrants proactive action now to reduce risk of large scale, adverse impacts. The process of planning adaptive strategies requires a systematic evaluation of priorities and constraints, and the involvement of stakeholders.' Ibid, 1.

10 Methodology/approach is defined as 'a complete framework that prescribes an entire process for the assessment of vulnerability and adaptation and offers a broad strategic approach. An approach in some instances assembles certain methods and toolkits to support this process.' Examples include: IPCC Technical guidelines (1994), NAPAs guidelines (2002), Adaptation Policy Framework (2004). UNFCCC, *Compendium on methods and tools to evaluate impacts of, and vulnerability and adaptation to, climate change*, February 2008, 10, http://unfccc.int/files/adaptation/nairobi_workprogramme/compendium_on_methods_tools/application/pdf/20080307_compendium_m_t_complete.pdf (accessed 12 March 2008) The compendium is a 228-page document and it contains tables with Description, Appropriate Use, Scope, Key Output, Ease of Use, Training Required, Training Available, Computer Requirements, Documentation, Applications, Contacts for Tools, Documentation, Technical Assistance, Cost and References.

11 Method is defined as 'a set and sequence of steps or tasks that should be followed to accomplish the task that represents a part of large framework. Method can be implemented through using a number of tools. Examples include: methods for development and use of scenario data in the vulnerability and adaptation assessment, e.g. those presented in the UNEP Handbook (1998) and IPCC-TGCIA Guidelines on the Use of Scenario Data for Climate Impact and Adaptation Assessment (1999).' Ibid..

12 Tool is defined as 'a means or instrument by which a specific task is accomplished. Examples include: RCMs, impact models, decision tools (cost-benefit analysis, MCA, TEAM, ADM, etc.), stakeholder tools (vulnerability indexes, Livelihood Sensitivity Exercise, etc.).' Ibid.

13 Id. For a look into some of the tools that are being developed see http://www.weadapt.org/

14 Some of these tools have IPRs attached to them. See *supra* note 9.

15 The Bali Action Plan, adopted by the Conference of the Parties (COP) as decision 1/CP.13, focuses on four 'building blocks': adaptation, mitigation, technology transfer and deployment, financing. For UNFCCC COP 13 Decisions and Resolutions, see http://unfccc.int/meetings/cop_13/items/4049.php (accessed 12 March 2009).

16 See ibid.

17 Government of Eritrea (GoE), *National Adaptation Programme of Action*, April 2007, 1–4.

18 *The Constitution of Eritrea*, Art 8/3.

19 Although ratified by a constituent assembly on 23 May 1997, the Constitution of Eritrea has not been enforced in a court of law to date, pending restructuring of all government organs, including the Judiciary. Per Art 49 of the Constitution, a supreme court is to be established whose tasks will include interpretation of the Constitution;

> Article 49 – The Supreme Court
> 1. The Supreme Court shall be the court of last resort; and shall be presided over by the Chief Justice.
> 2. The Supreme Court shall have:
>   a) *sole jurisdiction of interpreting this Constitution* and the constitutionality of any law enacted or any action taken by government;
>   b) sole jurisdiction of hearing and adjudicating upon charges against a President who has been impeached by the National Assembly pursuant to the provisions of Article 41(6)(a) and (b) hereof; and
>   c) the power of hearing and adjudicating cases appealed from lower courts pursuant to law.
> 3. The Supreme Court shall determine its internal organisation and operation.
> 4. The tenure and number of justices of the Supreme Court shall be determined by law.

20 'The experience gathered in developing the NAPA also lays important groundwork for long-term climate change adaptation activities in Eritrea.' Statement by Mogos Wolde-Yohannes, Climate Change Focal Point, Director General, Department of Environment, Ministry of Land, Water and Environment, Asmara, Eritrea. See GoE *supra* note 17, v.

21 GoE, *Eritrea First National Communication Under the United Nations Framework Convention on Climate Change*, December 2001, 72–76.

22 Government of Eritrea, *Interim Poverty Reduction Strategy Paper* (I-PRSP), 2004, http://www.itacasmara.esteri.it/itacasmara/italian/side_menu/documenti/I-PRSP%20Eritrea.pdf (accessed 5 May 2004). Chapter II provides a comprehensive assessment of the poverty situation to gain a clear understanding of the extent, depth and distribution of poverty and the underlying causes and sources of *vulnerability* and the impact of the recent events (drought and border war) on the incidence of poverty. Chapter IV outlines the main elements of Eritrea's Interim Poverty Reduction Strategy, built on four pillars: '(1) Reinvigorating economic growth; (2) Creating income earning opportunities for the poor; (3) Enhancing access to and utilisation of essential services for human development; and (4) Promote active participation of the people in the political, economic and social aspects of nation building by putting in place an enabling environment and strengthening the institutional capacity. Attention is given to supporting policies and priority investment programs and institutional capability designed to directly assist the poor, including meeting targets and MDGs for selected national goals.' See ibid.

23 The Macro Policy requires that 'proper attention' 'be given to potential environmental consequences of investment decisions'. Ibid, Item 6.10.

24 The NEMP-E addresses major environmental issues and sets out possible policy choices, alternatives and order of priorities. The plan proposes a specific institutional structure for its implementation, envisaging the creation of an Eritrean Agency for the Environment. On climate change, it mentions that Eritrea intends to do 'everything possible to implement the provisions of the UNFCCC'. On energy, the following policy statements are articulated: 'Fuel wood substitution for domestic energy needs; Encouragement of energy conservation measures; Promotion of alternative transport systems to conserve energy and protect the environment, Encouragement of new and renewable energy systems: Promotion of geothermal energy: Promotion of small scale hydro-systems; Promotion of briquetting and bio-gasification and Capacity building to improve environmental management in the energy sector.'

25 The ENCCES sets out a series of commitments towards sustainable development of natural resources, sustainable management of wastes and cooperation on environmental matters, both at the regional and global levels.

26 The NBSAP documents what is currently known about biodiversity distribution at national level (NBSAP: 7–20); gives an overview of the status of legislation and other similar instruments dealing with biodiversity (NBSAP: 25–27); furnishes the principal components of the strategy; and describes, among other things, the principal activities which are considered to be essential elements of an effective biodiversity conservation and sustainable use in Eritrea.

27 The NEAPG outline national environmental impact assessment guidelines.

28 The EAPGAP outline specific sectoral environmental impact assessment guidelines. A similar draft also exists for road constructions.

29 The Draft Coastal Policy has the following objectives: a) The sustainable use of the coast for any development including but not limited to housing, tourism, recreation, ocean access, maritime industry, commercial and any other activities in appropriately designated areas; b) The location of coastal facilities and development that takes into account coastal processes including erosion, accretion, storm surge, tides, wave conditions, sea level change and biophysical criteria; c) The protection of public foreshore areas (setback) and public access to the coast including islands; d) The protection, conservation and enhancement of assets such as landscape, natural resources or indigenous and cultural values (Item 4).

30 See *supra* note 17

31 Id. Ranked set of adaptation projects in six sectors (22 projects out of 102 adaption projects in 7 sectors) namely Agriculture, Livestock, Forestry, Water Resources, Marine and Coastal Zones, and Public Health were identified.

32 Ibid, 5.

33 Ibid, 5.

34 Ibid, 7–8.

35 Ibid, 9.

36 See ibid.

37 See *supra* note 17 and the accompanying text.

38 The Fisheries Proclamation (1998); Tourism Proclamation, Proclamation (2006); Proclamation to Establish the Massawa and Assab Ports Authority (2005); Eritrean Free Zones Proclamation (2001); Revised Proclamation to Govern Petroleum Operations (2000); Revised Proclamation to Provide for the Payment of Income Tax on Petroleum Operations (2000); Electricity Proclamation (2004); Eritrean Electric Corporation Establishment Proclamation (2004); Proclamation to Reform the Land Tenure in Eritrea, to Determine the Manner of Exploiting Land and for Purposes of Development and National Reconstruction and to Determine the Powers and Duties of the Land Commission (1994); Regulations for the Distribution and Administration of Land (1997); Forestry and Wildlife Conservation and Development Proclamation (2006); Regulations for the Issuance of Forestry Permits (2006); and Regulations for the Issuance of Wildlife Permits (2006). Also important are the Draft Environmental Proclamation of Eritrea (2002); Draft Integrated Coastal Area Proclamation (2007); Draft Proclamation for the Establishment of the Coastal Authority (2007); Draft CITES Implementing Legislation (2005); Draft Integrated Water Resources Management Proclamation (2007). These pieces of legislation are expected to be adopted in the near future.

39 See *supra* note 36 and the accompanying text.

40 See *supra* note 17.

41 See *supra* note 33 and the accompanying text.

42 Eritrea was born as a new state in 1991, with basic departments. Following its formal independence in 1993 after a UN-Sponsored referendum, various ministries and institutions have been evolving. For relevant legislations on past and present institutional make up of the current government, see Proclamation to Determine the Structure, Powers and Functions of the Government of Eritrea 37 of 1993; Regulations to Determine the Powers and Functions of Ministries, Authorities and Offices of the Government of Eritrea, Legal Notice No. 14 of 1993, and Regulations to Determine the Powers and Functions of Ministries, Authorities and Offices of the Government of Eritrea, Legal Notice No. 16 of 1994.

43 See Ibid.

44 See *supra* note 5. Kiribati, often mentioned as a good case study in adaptation mainstreaming, has elevated the mandate of coordination of adaptation activities(formerly with in the Ministry of Planning and Finance) to the Office of the Prime Minister.

45 See *supra* notes 9–12 and accompanying text.

46 Ibid.

47 Kifleyesus Andemariam, Information technology policy & management in developing countries: the case of Eritrea, dissertation, University of Groningen, 1999, 240.

48 Art 9/3 of the Constitution provides that 'The State shall promote the development of the arts, science, technology and sports and shall create an enabling environment for individuals to work in an atmosphere of freedom and to manifest their creativity and innovation.'

49 Item 6/6 *Macro Policy of the State of Eritrea* (1994). Accordingly one of the main goals of the macro-economy is to 'keep Eritrea abreast of developments in production, transport and service technologies in order to assure an upgraded and modern economic system that is competitive in the world.' The Policy aspires to promote 'the transfer of up-to-date technology that would assure competitive edge to Eritrean Produce'. See *Id*. The development of high-tech telecommunication technologies is also equally accentuated. The document further calls for the establishment of a national institution to gather information about existing and emergent technologies worldwide, evaluate their appropriateness for Eritrean conditions, and make this fund of knowledge available to the public and private sectors. The purpose is to regulate the process of technology transfer and prevent suppliers of technology, be they nations or corporations, from exerting undue influence on the selection of particular technologies imported to Eritrea. Ibid.

50 These include Proclamation to Provide for the Establishment of an Eritrean Information Systems Agency (1994); Communication Proclamation (2000); Eritrean Science and Technology Development Agency Establishment Proclamation (2002); and Eritrea Telecommunication Services Corporation Proclamation (2003). The Transitional Eritrean Civil Code (1960); Transitional Eritrea Penal Code (1957); and the Transitional Eritrean Commercial Code (1960) have some application for S&T matters (for example, regulation of intellectual property).

51 Art 9/3 *The Constitution of Eritrea* (1997).

52 See also Art 21(4), ibid, which charges the state with the task of laying the requisite groundwork for the development of arts, science, technology and sports as well as encouraging popular participation in the same.

53 Industrial property is a term, which covers patents, utility models, industrial designs, trademarks, service marks, trade names, indication of sources or appellations of origin and the repression of unfair competition. Almost all of the components of industrial property are addressed in a lump sum in the 1960 Eritrean Transitional Commercial Code, but for trademarks and trade names for which a separate section is devoted. As far as trade secrets are concerned, however, there are no customised provisions addressing the same although, by the power of reasoning, one could make the argument that some provisions of the Transitional Commercial Code are so broad that trade secrets could be read into them. Although a separate patent legislation is envisaged under the Transitional Commercial Code (1960), this has not yet seen the light.

54 The relevant provisions in this proclamation are designed, as a matter of legislative and policy choice, to assure investors that their intellectual property rights will be safeguarded in return for their reciprocal duties of, inter alia, transferring technology.

55 The relevant provisions in this proclamation are worded to serve in the context of an employer-employee relationship to ensure equitability in the apportionment of rights between the two parties to an employment contract.

56 In the past the protection of intellectual property was left for a subsidiary legislation. See Article 148/2 of the *Transitional Commercial Code of Eritrea* (1960) according to which a patent legislation is said to be enacted in a future date. (The intended legislation has not as yet been promulgated.)

57 The *Transitional Civil Code of Eritrea* (1960) does not use the term 'copyright' in the whole body of Title XI of the code in reference to copyrightable works. Yet the term 'works of the mind' appears to be broader than 'copyrights' as the former can represent not only copyrightable works but also other intellectual works such as patents [especially design patents] and trademarks. These other areas of intellectual property might as well overlap with copyrights and this, however unintentional/intentional work of draftsmanship, is arguably praiseworthy especially granted that, as will be indicated later, there is essentially little legal protection in the industrial property rights in the country. Yet thorough reading of the subsequent provisions testifies to the fact that as a matter of fact what was intended to be covered is actually copyrightable works. In this connection the heading of the relevant section of the code also reads 'Literary and Artistic Works', suggesting more emphasis and drafter's intention on copyrightable works in the confined sense of the term.

58 The exact terminology employed by the code reads: 'and any other works created by the intelligence of their author and presenting an original character.' See Art 1648 (e) TCCE (1960).

59 Art 2 (1) *Berne Convention for the Protection of Literary and Artistic Rights*, 9 September 1886, as last revised at Paris, 24 July 1971, 828 U.N.T.S. 221.

60 NAPA project profiles of most all African LDCs state that resource problems will undermine adaptation efforts, e.g. Uganda, Sierra Leone, Lesotho, Central African Republic. The NAPA documents also place importance on adaptation mainstreaming.

61 See *supra* note 14 and the accompanying text.

62 In Poznan COP 14, the need for making adequate and predictable resources was highlighted. (FCCC/SBI/2008/L.21/Add.1) As it stands, LDC fund is a voluntary arrangement and the amount of contributions thus far made to the fund for implementation of NAPAs is US$172 million (ENB 2008 PP 3 quoting SBI conclusions (FCCC/SBI/2008/L.21)). Needless to say, this contribution will not meet the costs of project profiles of African LDCs. By way of illustration, Eritrea has a request for 33 149 000 for implementation of its NAPA-ranked project profiles out of 102 adaptation projects that need to be implemented. The implementation phase of NAPAs has yet to move forward, and ensuring sustainability and adequacy of the fund is something the continent has to persistently fight for within the ongoing UNFCCC process.

63 COP 14 has adopted decisions on capacity building and transfer of technology. With regards to the latter its decision, among other things, has endorsed a 'Poznan strategic programme on technology transfer'. See FCCC/SBI/2008/L.82.

64 It is to be noted that even downscaled climate data on some African regions now exists (see weAdapt.com). Still, this row data has to be interpreted using relevant tools and methods for it to be a wealth of knowledge that could be employed in the design of adaptation pathways, strategies and policies.

65 Cameron Hutchison, Does TRIPS facilitate or impede climate change technology transfer into developing countries? *University of Ottawa Law and Technology Journal* 3(2) (2006), 520, Note 4.

66 See Stockholm Environment Institute, *Policy brief: effective use of climate science to improve adaptation in Africa*, May 2008, http://wikiadapt.org/index.php?title=Effective_use_of_climate_science_to_improve_adaptation_in_Africa (accessed 5 May 2009).

67 See *supra* notes 14–15 and the accompanying texts.

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5 Policy, legislative and regulatory challenges in promoting renewable energy in Nigeria

Muhammed Tawfiq Ladan

ABSTRACT

Energy is essential for development. No developing society can hope to achieve economic sustainability without adequate energy supplies. Virtually every aspect of economic and social activity demands energy. The unavailability of modern forms of energy to some two billion of the world's population, and inadequate supplies to an estimated additional two billion people, is a major challenge to the achievement of the poverty, gender and health objectives of the United Nations Millennium Development Goals and the Plan of Implementation of the World Summit on Sustainable Development. At the same time, energy generation using fossil fuels is the principal source of greenhouse gas emissions that cause global warming. The mining and processing of fossil fuels can also endanger the lives of miners, cause severe land disruption and pollute land, air and waters. Furthermore, burning fossil fuels emits nitrogen and sulphuric oxides that are themselves toxic and are the precursors of urban smog and acid rain, while coal-burning power stations are responsible for mercury emissions that bio-accumulate in ecosystems, presenting a threat to human health as well as the environment. Providing the energy essential for

development while minimising environmental hazards is one of the principal challenges in the 21st century. Energy efficiency offers perhaps the greatest potential to greatly reduce the amount of polluting energy needed to achieve current and future development targets. By eliminating waste, efficiency can often be accomplished at a profit or with a very short payback period of a year or two. Renewable energy, in the form of energy produced from solar, wind, sustainably managed hydro, geothermal and biomass resources, offers the potential to significantly displace the need for polluting fuels. These renewable resources are emphasised in the Plan of Implementation of the World Summit on Sustainable Development. This chapter therefore contends that, while much has been written about the science, technology and policies for promoting energy efficiency and renewable energy, little has been written about the legislative and regulatory options necessary to implement these technologies and policies that make a reality in practice. By promoting clean and efficient energy use at the legislative and regulatory levels, governments can ensure that all stakeholders have the opportunity and incentives to adopt new practices that will help to mitigate climate change and reduce pollution while keeping on the path of economic and social development. It is against this background that this chapter seeks to realise the following objectives:

- To underscore the importance of efficient and renewable energy to produce electricity for the mitigation of climate change and sustainable development in Nigeria
- To provide an overview of the policy, legislative and regulatory measures available to promote energy efficiency and renewable energy in Nigeria
- To highlight the challenges and strategies to overcome the barriers to use and regulation of renewable and efficient energy for electricity in Nigeria

INTRODUCTION

Nigeria's indigenous energy resource development reveals that the country's oil reserves (the sixth-largest in the world) were put at 34 billion barrels for 2004 and 40 billion barrels by 2010, resulting in an effective growth rate of 2,746 per cent per annum. At this growth rate, the reserves will reach 68,7 billion barrels by 2030, double the 2004 value. Intense exploration activities are taking place in the offshore fields from the Niger Delta, while the potential of the inland

Benue and Chad Basins is yet to be exploited. By 2000, 53,5 per cent of natural gas reserves of 159 trillion square cubic feet (ninth-largest in the world) were associated gas. While the associated gas reserves will increase with oil reserves, there will be increasing activities in exploration for gas only. Corresponding substantial endowments of bitumen (31 billion barrels of oil equivalent and second-largest in the world), coal, hydropower and solar energy, as well as plans for their development, also exist.[1]

Energy is essential for development. No developing society can hope to achieve economic sustainability without adequate energy supplies. This is so because virtually every aspect of economic and social activity demands energy. The unavailability of modern forms of energy to some two billion of the world's population, and inadequate supplies to an estimated additional two billion people, is a major challenge to the achievement of the poverty, gender and health objectives of the United Nations Millennium Development Goals and the Plan of Implementation of the World Summit on Sustainable Development. At the same time, energy generation using fossil fuels is the principal source of greenhouse gas (GHG) emissions that are causing global warming. The mining and processing of fossil fuels can also endanger the lives of miners, cause severe land disruption and pollute land, air and water. Furthermore, burning fossil fuels emits nitrogen and sulphuric oxides that are themselves toxic and are the precursors to urban smog and acid rain, while coal burning power stations are responsible for mercury emissions that bio accumulate in ecosystems, presenting a threat to human health as well as the environment.

Providing the energy essential for development, while minimising environmental hazards, is one of the principal challenges in the 21st century. Energy efficiency offers perhaps the greatest potential to greatly reduce the amount of polluting energy needed to achieve current and future development targets. By eliminating waste, efficiency can often be accomplished at a profit or with a very short payback period of a year or two. Renewable energy, in the form of energy produced from solar, wind, sustainable managed hydro, geothermal and biomass resources, offers the potential to significantly displace the need for polluting fuels. These renewable resources are emphasised in the Plan of Implementation of the World Summit on Sustainable Development.

This chapter therefore contends that, while much has been written about the science, technology and policies for promoting energy efficiency and

renewable energy, little has been written about the legislative and regulatory options necessary to implement these technologies and policies. By promoting clean and efficient energy use at the legislative and regulatory levels, governments can ensure that all stakeholders have the opportunity and incentive to adopt new practices that will help to mitigate climate change[2] and reduce pollution, while keeping on the path of economic and social development. It is against this background that this chapter seeks to realise the following objectives:

- To underscore the importance of efficient and renewable energy to produce electricity for the mitigation of climate change and sustainable development in Nigeria[3]
- To provide an overview of the policy, legislative and regulatory measures available to promote energy efficiency and renewable energy in Nigeria
- To highlight the challenges and strategies to overcome the barriers to use and regulation of renewable and efficient energy for electricity in Nigeria

THE IMPORTANCE OF EFFICIENT AND RENEWABLE ENERGY IN THE NIGERIAN CONTEXT

For Nigerians, the quest for an uninterrupted electric power supply has been a long story of dashed hopes and expectations. Despite the promises made by successive administrations to prioritise the provision of efficient and renewable energy to produce adequate electricity for sustainable development, Nigerians have continued to experience erratic electric power supply for their different needs.[4]

Energy needs for different economic activities in rural areas of Nigeria[5]

The end-use energy requirements for different economic activities in the rural areas of Nigeria are illustrated in Table 1.:

Table 2 reveals the national energy consumption pattern as reported by a recent National Energy Study for the industrialisation of Nigeria (2006–2030),[7] which took into consideration the thinking of government in terms of the overall economy and the energy sector.

Table 1 Economic activities and energy requirements in the rural areas[6]

S/N	ACTIVITY	USE	KW
1.	Agro-processing	Flour grinding Oil expelling Crop drying Threshing	1–2 2–5 – –
2.	Small-scale industry	Saw milling Wool and cotton processing Stone crushing	10–30 5–25 5–25
3.	Household	Lighting Refrigeration Cooking Water pumping Ironing Radio/TV	0.2 0.3 0.4 (heat storage cooker) 0.5–1 0.5 0.1–0.3

Implications of climate change for the energy and industrial sectors of Nigeria[9]

Climate change, and more specifically the carbon emissions from energy production and use, is one of the most troubling problems facing society today. Climate change engages the energy sector particularly closely because energy is central both to the problem and to its solution. Hydropower generation is the energy source most likely to be affected by climate change. It is sensitive to the amount, timing, and geographical pattern of precipitation, as well as temperature. There is the potential for more intense rainfall events (which would require more conservative water storage strategies to prevent flood damage), greater probability of drought (less hydroelectric production), and less precipitation (less water available during warm months), all of which point to less hydroelectric capacity at current powerhouses.

Two categories of industries were identified as being vulnerable to climate change: (1) industries with activities that are dependent on climate (construction; transportation operations and infrastructure; energy transportation and transmission; offshore oil and gas production; thermal power generation; industries such as paper mills that depend heavily on water; pollution control; coastal-sited industries; and tourism and recreation); and (2), sectors in which

Table 2 Summary of national energy consumption computations for the household sector[8]

Fraction of households with air-conditioning					10,71%
Fraction of households with water heater					7,14%
	(Gas)LPG	Kerosene	Coal	Fuel wood	Electricity
% Households using an energy type for cooking	12,50%	76,79%	1,79%	67,86%	7,14%
% Household using an energy type for water heating	8,93%	67,86%	0	66,07%	25,00%
% Households using an energy type for lighting	0	87,50%	0	0	42,86%
Average annual energy cons. per household					
For cooking (unit/household)	22,06	34,79		2275,75	21,27
For water heating (unit/household)	3,47	7,86		785,61	132,66
For lighting (kg/household)	0	52,7		0	291,75
National consumption per yr					
For cooking (unit*)	$1,65x10^8$	$6,59x10^8$		$4,31x10^{10}$	$4,03x10^9$
For water heating (unit*)	$2,60x10^7$	$1,49x10^8$		$1,49x10^{10}$	$2,51x10^9$
For Lighting (unit*)		$9,98x10^8$		0	$5,53x10^9$
For A/C (unit*)					$2,20x10^9$
For Appliances (unit*)					$2,90x10^9$
Total (unit*)	$1,91x10^8$	$1,81x10^9$	$2,03x10^7$	$5,80x10^{10}$	$1,35x10^{10}$
National consumption (TOE)					
For cooking (TOE)	178,63	548217,3		$1,40x10^{10}$	89 811,29
For water heating (TOE)	28,09	123 860,2		$4,83x10^9$	560 033,5
For lighting (TOE)		830358,9		0	123 1697
For air conditioning (TOE)		0		0	490 974,6
For appliances (TOE)					645 586,2
Total (TOE)	206,72	1 502 437		$1,88x10^{10}$	3 018 102

* National units of the fuels are as follows: gas LPG (kg), kerosene (litre), coal (kg), fuel wood (kg), electricity (KWh).

economic activity is dependent on climate-sensitive resources (agro-industry, biomass and other renewable energy production).

Brief overview of rural applications of efficiency and renewable energy[10]

Due to a lack of access to modern electricity, rural populations resort to burning large quantities of wood to satisfy their everyday energy needs. For example, much of the cooking in developing countries is done on wood- or coal-burning stoves. Use of wood requires women and children to spend much of their time and energy collecting firewood. Using either wood or coal for cooking in enclosed buildings exposes occupants, particularly women and children, to highly concentrated health-damaging emissions and contributes considerably to carbon dioxide and other pollutant emissions. Wood burning also causes other forms of severe harm to the environment, including rapid deforestation, followed by irreversible biodiversity loss. Alternatives to wood burning for cooking, for example, include: fuel-efficient stoves that reduce wood and coal consumption and polluting emissions; hybrid fuels that incorporate biomass waste and reduce the harmful effects of coal burning; biogas units that yield gas from waste agricultural materials and improve sanitation while providing fuel for cooking and lighting; use of improved building materials and passive solar construction that reduce heating needs; and micro-hydropower and other renewable energy generators that provide clean electricity to rural off-grid communities.

Nigerian initiatives in climate change mitigation measures: efficient and renewable energy technologies

Climate change mitigation measures

National inventories to estimate the annual emissions of GHG have been undertaken in Nigeria for three years (1988, 1990 and 1994) and have been reviewed between 2001–2004,[11] using frameworks provided by the Intergovernmental Panel on Climate Change (IPCC) and other agencies. An emissions profile by sector indicates that CO (carbon dioxide) emissions have been dominated by the energy sector (for which gas-flaring, electricity generation and transport sectors constitute the most significant sources), and

Table 3 Summary of national emissions in Nigeria between 1988 and 1994

Gross emissions						
Sector	Year	CO_2	CH_4	N_2O	NO_X	NMVOC
Energy	1988	70 311	272,3	6,8	886,5	1 511,6
	1990	99 514	567,7	5,8	264,3	887,4
	1994	115 109	1 463,0	7,5	499,3	1 864,4
Process Industries	1988	1 970	0,1	0,0	5,8	78,2
	1990	2 171	9,6		0,5	134,6
	1994	1 761	0,1		0,5	366,8
Solvent Use	1988	0	0,0	0,0	0,0	40,8
	1990					
	1994	260	0,1		0,5	0,0
Agriculture	1988	0	506,7	0,0	0,0	0,0
	1990		1 711,0	12,6	134,9	
	1994		2 344,2	4,1	148,0	
LUCF	1988	1 040	159,2	1,0	18,1	4 011,8
	1990	76 040	18,5	0,1	4,6	
	1994	75 542	18,5	0,1	4,6	
WasteManagement	1988	0	201,2	0,0	4,0	11,9
	1990		425,7	0,0	0,1	
	1994	1 761	0,1		0,5	458,7
Total	1988	73 300	1 165,0	7,9	930,3	5 698,0
	1990	177 730	2 733,0	18,6	404,4	1 022,0
	1994	192 485	5 930,7	12,0	658,3	2 231,5

land-use change (with biomass harvests and forest conversion to managed lands as principal sources, while annual forest growth remains the principal sink or source of carbon removals).

Table 4 Sectoral and gross carbon dioxide-equivalent emissions for the years 1988 to 1994

CO_2 – Equivalent Emissions (Gg)					
Sector	Year	CO_2 GWP=1	CH_4 GWP=21	N_2O GWP=270	Total
Energy	1988	70 311	5 719	1 847	77 877
	1990	99 514	11 922	1 569	113 004
	1994	115 108	30 723	2 030	147 862
Process Industries	1988	1 970	1	0	1 971
	1990	2 171	202	0	2373
	1994	1 761	1	0	1 762
Solvent Use	1988	0			
	1990				
	1994	260	1	0	261
Agriculture	1988	0	10 641	0	10 641
	1990	0	35 931	3 402	39 333
	1994	0	49 228	1 107	50 335
LUCF	1988	1 040	3 343	270	4 653
	1990	76 040	389	35	76 464
	1994	75 542	389	35	75 966
WasteManagement	1988	0	4 225	0	4 225
	1990		8 940	35	8 942
	1994	1 761	1	0	11 762
Total	1988	73 300	24 465	2 144	99 909
	1990	177 730	57 393	5 009	240 132
	1994	192 485	124 545	3 227	320 256

The actual results of the analysis of emissions inventories collected (Table 3 below) indicate that between 1988 and 1994 the gross annual emissions were in the range of 178 to 192 Tg-CO, 2,7 to 5,9 Tg-CH , 11,95 to 18,55 Gg N O, 13,3

to 17,0 Tg CO, 404,3 to 658,3 Gg NO and to 1,0 to 2,2 Tg NMVOC. Inventories by sector have, in addition, been undertaken in some industrial sub-sectors, including agriculture. Results illustrated in Tables 3 and 4, below, indicate that the energy sector still dominates the other sectors in its contribution to gross national emissions.

It is recognised that currently available data have serious gaps and limitations.

Initiatives in efficient and renewable energy technologies[12]

Modern and efficient technologies have been used to develop and adopt devices for the utilisation of renewable energy resources by the following Research Centres of the Energy Commission of Nigeria: Centre for Energy Research and Development, Obafemi Awolowo University, Ile-ife, Osun State; Centre for Energy Research and Training, Ahmadu Bello University, Zaria, Kaduna State; National Centre for Energy Research and Development, University of Nigeria, Nsukka, Enugu State; and Sokoto Energy Research Centre, Usman Dan-Fodio University, Sokoto, Sokoto State. The centres at Ile-Ife and Zaria work on peaceful applications of nuclear science and technology, while those at Nsukka and Sokoto work on solar energy and other renewable energy sources.

Raw materials used for some of these devices comprise of more than 90 per cent local contents. Some of these appliances include:

- Solar crop dryers (such as the two-tonne capacity Rice Solar Dryer at Agbani, Enugu State and two-tonne capacity Forage solar dryer at the National Agricultural Production Research Institute, Ahmadu Bello University, Zaria, Kaduna State), which can be used to process agricultural products such as rice, maize, pepper, tomatoes, cocoa, tea and coffee
- Solar water heaters, for providing hot water in hotels and hospitals for bathing and washing, such the 1 000-litre capacity solar water heater at the maternity ward of Usman Dan-Fodio University Teaching Hospital, Sokoto, Sokoto State
- Solar PV water pumping for clean potable water, such as the 7,2 kWp solar PV plant at Kwalkwalama in Sokoto, the 2,85 kWp solar PV plant at the centre for mentally-ill Destitutes at Itumbuzo in Abia State and the 5 kWp solar PV plant at Comprehensive Health Centre in Laje, Ondo State
- Biogas plants for cooking gas and biofertiliser, such as the 20 m^3 biodigester at Ifelodun Cooperative Farm at Agege, Lagos State, the 10 m^3 biogas plant at Achara in Enugu State and the 30 m^3 biogas plant at Zaria Prison in Kaduna State; and the 5 kWp wind power plant at Sayya Gidan Gada in Sokoto State
- The Energy Commission of Nigeria, the Power Holding Cooperation of Nigeria and MTN-Nigeria are collaborating with the World Bank on a biofuel for rural electrification project in Nigeria. The biofuel is to be sourced from the *Jatropha* plant or any economically viable energy crop on a long-term basis. Similarly, the Energy Commission of Nigeria signed another memorandum of understanding with Green Shield of Nigeria (a registered nongovernmental organisation (NGO) with diversified interest in alternative energy sources) to produce biodiesel as a renewable energy for domestic and commercial uses in Nigeria, using the *Jatropha* plant.

OVERVIEW OF THE POLICY, LEGISLATIVE AND REGULATORY MEASURES AVAILABLE TO PROMOTE ENERGY EFFICIENCY AND RENEWABLE ENERGY IN NIGERIA

Policy goals for efficiency and renewable energy decision-making

What policy goals can guide rural applications of efficiency and renewable energy decision-making in developing countries?[13] While there is no single logarithm for determining universally applicable policy goals that can guide rural applications of efficiency and renewable energy decision-making, the policy goals need to consider the following:

- Promote rural applications of efficiency and renewable energy in all its ramifications
- Maintain fair, just and reasonable rates for rural electricity consumption
- Ensure uninterrupted electricity to rural areas
- Promote rural energy efficiency
- Promote technological innovations and transfer of renewable energy technologies to rural communities (and to the people who would directly benefit from their use)
- Facilitate and encourage effective competition, education, training and public participation
- Improve people's lives and livelihoods

- Meet goals of sustainable development, including obligations and norms as per multilateral environmental agreements such as those for GHG emission reductions

National Electric Power Policy, 2001[14]

The overwhelming objective of the Electric Power Policy Statement is to ensure that Nigeria has an electricity supply industry (ESI) that can meet the needs of its citizens in the 21st century. This will require a fundamental reform at all levels of the industry. A technically and commercially efficient ESI is critical for achieving Nigeria's growth and development goals.

Nigerian Electricity Regulatory Commission[15]

A privatised electricity industry, with competition over monopoly transmission and distribution grids, requires an effective regulatory agency that is independent both of government and of all the companies operating in the industry. This realisation saw the establishment of the Nigeria Electricity Regulatory Commission. The objective of the electricity policy is ultimately to establish a long-term electricity market structure in Nigeria in which multiple operators provide services on a competitive basis to the broadest range of customers. Under such a regime, competitive market forces would be the best determinant of the appropriate and sustainable levels of prices charged by various carriers for their services.

The Nigerian electricity fuel mix will, of course, continue to use and expand the use of hydrogeneration and will continue to use some liquid fuels. Nevertheless, natural gas (and the use of currently flared associated gas) represents the major likely fuel for the future expansion of generation. In addition, gas powered electricity generation is the most obvious growth market for the commercial development of gas markets and will be explored by the Independent Power Projects (IPPs).

National Energy Policy, 2003[16]

The overall energy policy objectives may be summarised as follows:

- To ensure the development of the nation's energy resources, with diversified energy resource options, for the achievement of national energy security and an energy delivery system with an optimal energy resource mix
- To guarantee increased contribution of the energy sector to national income and to productive activities
- To guarantee adequate, sustainable and reliable supply of energy at appropriate costs and in an environmentally friendly manner to the various sectors of the economy for national development

The energy policy further recognises the fact that a substantial per centage of Nigeria's urban poor and rural populace depend on fuel wood for cooking and other domestic uses. The rate of consumption of fuel wood far exceeds the replenishing rate, to such an extent that desert encroachment is now a serious problem in the country. Also associated with this is soil erosion and loss of soil fertility. Hence the policy states, among others, that: the nation shall promote the use of alternative energy sources to fuel wood; the use of wood as a fuel shall be de-emphasised in the nation's energy mix; and alternative energy sources to fuel wood must be explored.

Nigeria policy goals: renewable and efficient energy/rural electrification

In Nigeria, there is no national policy specifically dedicated to energy efficiency and renewable energy or its applications to rural areas. There are, however, other policy instruments on the environment and energy that may be relevant to supporting such applications. The Nigerian National Policy on the Environment provides that the goal of the policy is to achieve sustainable development in Nigeria, and in particular to: secure environmental quality adequate for good health and wellbeing; and to conserve and use the environment and natural resources for the benefit of present and future generations. Strategies to achieve this objective include:

- Implementing a detailed environmental impact assessment (EIA) strategy on all planned energy projects backed by detailed baseline ecological data against which subsequent environmental changes and/or impacts can be measured

- Developing a rational National Energy Utilisation Master-Plan that balances the need for conservation with the utilisation of premium energy resources for premium socioeconomic needs
- Encouraging the use of energy forms that are environmentally safe and sustainable, particularly solar energy
- Promoting and encouraging research into the development and use of various locally available energy sources, especially non-conventional resources such as geothermal, solar, wind and other complex forms of hydrocarbons other than oil and coal

On rural electrification, the primary policy objective is to expand access as rapidly as can be afforded in a cost-effective manner.[17] The rural electrification policy includes a full menu of options, namely, grid and off-grid, mini-grid, non thermal and renewables, while ensuring close coordination of rural electrification expansion with economic development objectives, and encouraging states, local communities as well as the private sector, to develop and contribute financially to rural electrification.

Legislative and regulatory framework for rural applications of energy efficiency and renewable energy

What legislative measures can best advance rural applications of energy efficiency and renewable energy in developing countries?[18] The legislative and regulatory provisions for promotion and regulation of energy efficiency and renewable energy for Nigeria are addressed below.

The 1999 Constitution of Nigeria[19] provides the legal basis for off-grid electrification in the form of renewable energy in rural areas falling within each state of the federation by empowering the House of Assembly of each state to establish electric power stations within their respective jurisdictions, and to generate and transmit and distribute electricity to areas not covered by the national grid system within that state amongst others.[20] The Nigerian Electricity Act[21] of 1988 is stated to be: '[A]n Act to provide for the regulation and control of electricity installations, and of the generation, supply and use of electricity energy.'[22] Every undertaking in the development of the sub-sector must comply with this act. Section 2 provides as follows:

> This Act and the regulation made there under shall apply in respect of any undertaking for the manufacturing, distribution or supply of electricity established by the Government of a State or any of its agencies to the same extent as the Act and regulations apply in respect of any such undertaking established by any other person or authority.

The Electric Power Sector Reform Act, 2005 (EPSRA) aims at deregulating the power sector, and developing the capacity to transmit and distribute the envisaged higher level of generation. This required a complete unbundling of the National Electric Power Authority into 18 other independent bodies. The federal government had hoped to generate 10 000 MW by December 2007, a figure that many people thought was too low for a population of 140 million. This conservative figure was not achieved.

With respect to hydroelectric power, the Water Resources Act governs water resources development in Nigeria.[23] This Act establishes the legal framework for the development of water resources. It places ultimate responsibility for the proper development of the nation's water resources on the Ministry of Water Resources and Rural Development. The Act vests rights to the use and control of water resources in the state.[24] This does not preclude the rights of individuals to take and use water for domestic,[25] or industrial purposes, including the generation of hydropower.[26] Nevertheless, a license is required for any person to operate any hydraulic work on the waterways or underground.[27] The mode of application is spelled out under section 10 of the act, which requires an application for the grant of a license to carry out hydraulic works to be made to the secretary in such form and manner and containing or be accompanied by such information and document as the secretary may from time to time prescribe.[28]

Biofuels in the form of wood, charcoal, and biomass constitute at least 70 per cent of the energy consumed in Nigeria. The demand for wood fuels, for example, is expected to rise by about 350 per cent by 2030 and beyond, while urban consumption is expected to grow by 250 per cent within the same period.[29] The requirements for an environmental impact assessment in respect of any project embarked upon by any private or public authority with likely environmental impact under the Environmental Impact Assessment Act No. 86 1992 all combine to reduce the trend towards massive deforestation in Nigeria.[30]

Other renewable energy resources that could, in principle, meet almost all of Nigeria's energy needs, such as solar power, wind power, geothermal energy and wave power, are not given any specific regulatory prominence. Nevertheless, the Energy Commission of Nigeria Act No. 109, Laws of the Federation of Nigeria (LFN) 2004, established the Energy Commission of Nigeria and charged it with responsibility for coordinating and ensuring general surveillance over systematic development of the various energy resources of Nigeria, including new and renewable energy sources.[31] The Jigawa Alternative Energy Trust Fund, in cooperation with the United States Department of Energy, is constructing a solar electric project in Jigawa State. The project is a result of a US$600 000 solar rural electrification and water-pumping project for three villages in Jigawa State.[32]

The National Environmental Standards and Regulations Enforcement Agency (Establishment) Act, 2007 Act No. 25, provides, under section 2, that the agency established in terms of this law, shall, subject to the provisions of the act, have responsibility for the protection and development of the environment, biodiversity conservation and sustainable development of Nigeria's natural resources in general, and shall have control over environmental technology, including coordination and liaison with relevant stakeholders within and outside Nigeria on matters of enforcement of environmental standards, regulations, rules, laws, policies and guidelines.

Although existing laws in Nigeria are skewed towards fossil fuels and secondarily hydropower, there is recognition that an appropriate legal framework is a prerequisite for maximising investment opportunities in the renewable energy sector.

CHALLENGES AND STRATEGIES RELATING TO CLIMATE CHANGE MITIGATION, USE AND REGULATION OF RENEWABLE AND EFFICIENT ENERGY IN NIGERIA

Challenges and barriers to climate change mitigation in Nigeria

Substantial data gaps exist in the national database for both the emissions inventories and mitigation analyses considered above.[33] For instance, gaps in the database were observed in all other emissions-relevant sectors, such as the upstream energy sector, industries, agriculture, land-use change and wastes management. The back-up statistics, which could have made the estimation of petroleum products consumption in the downstream sectors possible, are also currently weak. There are, for example, no statistics on the total number of vehicles in Nigeria from year to year. The data published annually only includes the annual new vehicle registrations.

A number of barriers to implementing and/or improving future national mitigation analysis identified in both the energy and forestry sectors include: low literacy level; lack of/low level of awareness of the mitigation technologies and their potential benefits; inefficient energy use; inappropriate energy pricing; financial constraints; low income-level; technological incapability; and pressures from population growth.

Challenges and barriers to renewable and alternative electricity sources in Nigeria

Renewable electricity

In accordance with the provision of the EPSRA Act 2005, it is expected that targets on access to electricity will be met through grid-based extension, independent mini-grids for remote areas with concentrated loads where grid service is not economical or will take many years to be established, and stand-alone renewable electricity systems for remote areas with scattered small loads. The interest here is on renewable energy which is defined to include energy from solar, wind, biomass cogeneration and gasification, less intrusive hydro, geothermal and hydrogen sources.[34]

The current total contribution of renewable energy to the energy mix is approximately 35 MW composed of 30 MW small hydropower and 5 MW solar PV.[35] A number of barriers were identified as militating against the development of the renewable electricity industry. These include:

- Policy and regulatory issues, including guarantees of access to the grid for renewable energy
- Financial and investment barriers, since renewable energy has high initial costs and Nigeria lacks manufacturing capacity for components of renewable energy. The average electricity tariff in Nigeria is about 6,75 per KW-h (about 5 US cents). The average cost of sources of renewable electricity for mini hydro is 5–10 cents, solar PV is 20–40 cents, biomass power 5–12 cents, and wind power 6–10 cents. Thus, financial incentives for market entry are currently lacking. Incidentally,

these relatively higher cost initiatives may be needed to satisfy the electricity needs of the poor who cannot afford high tariffs and are not represented in government to influence favourable policies for renewable sources of energy
- Technological barriers of full import-dependent renewable facilities
- Low public awareness and poor standards and quality control from the regulatory agencies
- Inadequate assessment of resources
- Intermittency of resource availability

Alternative sources of electricity

Even if the country were enabled to generate sufficient electricity for its population from the thermal, hydro and gas sources, there would still be the need to explore other available options. This is the practice worldwide. Countries the world over are, for example, considering electric power sources that may not only be cheaper, but are also sustainable and environmentally friendly. Coal, solar energy and nuclear energy are for the above reason currently being promoted as alternative sources of electricity.

CONCLUSION

It is evident from the above that the use of renewable energy can lead to the development of rural industries with attendant job opportunities and thus contribute to poverty alleviation. The proper management of renewable energy resources in the rural areas can play an important role in environmental protection.[36]

As Nigeria's economy improves, its per capita GHG emissions may approach those of developed nations. This combined with continued gas flaring and a large population, will further worsen Nigeria's standing as a key emitter of GHGs globally, with all the attendant consequences on all sectors of the economy, particularly the energy and industrial sectors, as well as the rural populace and urban poor.

Although the reforms in the electricity industry are commendable considering the enactment of a new sector law in 2005, the establishment of the regulatory agency, rule-making and fair management of the sector by the agency, the crisis in the energy sector today justifies the need for the sector to be disciplined by accountability and transparency mechanisms in the management of energy

resources and budgetary allocations for effective separation, transmission and distribution of electricity nationwide.

Also, the legislative and regulatory framework for rural applications of efficiency and renewable energy is a combination of policy instruments seeking to set clear goals, legislative requirements and subsidiary instruments that provide legal bases for policy perspectives, as well as institutional mechanisms for policy implementation.

An example of the regulatory requirements needed to promote renewable energy may be found in the treatment of small hydro projects. Hydropower for rural electrification can help minimise local, regional and global environmental impacts in the long run, while ensuring people's livelihoods. These benefits, not just those pertaining to hydropower, but to all renewable energy resources, can hardly be realised without a coherent and adequate legislative and regulatory framework that sets out the policy and laws, as well as institutional mechanisms for concretising the gains that will flow from rural applications of renewable energy. Furthermore, the sustainability of a national GHG emissions inventory and climate change mitigation measures require, inter alia, the following:

- The determination of future emissions with the view to establishing the extent of mitigation measures needed to lower emissions without compromising sustainable development
- Provision of local financial resource commitments and budgets for GHG inventories and mitigation options assessment by the government to support the activities of institutions working in this field
- The identification of relevant projects and activities needed in the short to medium-term to improve current national data on emissions inventories and mitigation analysis in Nigeria
- The use of as many adaptation strategies as possible to mitigate the adverse effects of climate change on, particularly, the energy, industrial and agricultural sectors of the Nigerian economy, as well as on the rural populace and urban poor
- Provision of a creative range or mix of policy instruments to deal effectively with the issues involved in adapting to climate change in Nigeria

NOTES

1 See A S Sambo et al, Nigeria's experience on the application of IAEA's energy models (MAED and WASP) for national energy planning: A paper presented during the Training Meeting/ Workshop on Exchange of Experience in Using IAEA's Energy Models and Assessment of Further Training Needs, held at the Korea Atomic Energy Research Institute, Daejon, Republic of Korea, 2006, 9.

2 According to President Umaru Musa Yar'adua: Over 30 million out of 140 million Nigerians from various states of the federation are threatened by climate change which leads to increased degradation of the ecosystem, desert encroachment and deepening poverty of the populace. Quoted from *Leadership Newspaper*, Abuja, Wednesday, 26 March 2008, 28.

3 Epileptic electric power supply is crippling Nigerian small-, medium- and large-scale enterprises in the industrial sector of the economy: Northern Nigerian State Legislative Speakers warned. Quoted in *Business Day Newspaper*, Abuja, Nigeria, Wednesday, 20 February 2008, 1.

4 See The energy crisis in Nigeria, in *NewsWatch Magazine*, 3 March 2008, 1–29.

5 See I H Umar, Keynote address delivered at a one-day workshop on 'Nigerian urban poor: energy needs and sustainable livelihoods', Lagos, 23 June 2004, 1–13.

6 Ibid, 10, table 5.

7 See A S Sambo et al, Nigeria's experience on the application of IAEA's energy models for national energy planning, 1–32.

8 Ibid, 7, table 1.

9 See generally, The Nigeria Environmental Study/Action Team (NEST), Ibadan, Nigeria, and Global Change Strategies International (GCSI), Project on Nigeria: climate change, Executive summary, Canada: March 2004, 1–17.

10 See I L Worika, Comparative law evaluations of sustainable energy: the African perspective: a paper delivered at a Colloquium in Shangai on 'The Law of Energy for sustainable development', November 2003.

11 See generally, NEST, *supra* note 9, and Review of GHG emissions inventories mitigation assessments and the framework for the implementation of a national emissions data system in Nigeria (Synthesis report), 2001–2004, 1–10.

12 See Energy Commission of Nigeria, Brochure on major achievements, 2007, 1–7.

13 See generally, United Nations Environment Programme, Nairobi, Kenya, UNEP *Handbook for drafting laws on energy efficiency and renewable energy resources*, 2007, 25–105.

14 See section 7, Policies of the Federal Republic of Nigeria, 1999–2007, 207–253.

15 Ibid, 221–2.

16 See National Energy Policy of Nigeria, 2003, in *Policies of the Federal Republic of Nigeria*, 1999–2007, section 8, 257–351.

17 On Rural Electrification Policy, see chapter 7 of the National Electric Power Policy 2001, *supra* note 14, 240–241.

18 See UNEP Handbook, *supra* note 13, 2007, 106–237.

19 Cap. C.23 Vol.3, Laws of the Federation of Nigeria, 2004.

20 Ibid, section 14 to part II of the Second Schedule to the Constitution.

21 Cap.E7 Vol.5, Laws of the Federation of Nigeria, 2004.

22 Ibid, see the preamble to the Act.

23 Water Resources Act Cap. W2, Vol.15, Laws of the Federation of Nigeria, 2004.

24 Section 1(1) of the Water Resources Act provides:

> 'The right to the use and control of all surface and groundwater and of all water in any water course affecting more than one state as described in the schedule to this Decree together with the bed and banks thereof, are by virtue of the Decree and without further assurance vested in the Government of the federation.'

25 See section 2 of the Water Resources Act.

26 Section 3 of the Act states as follows: 'Any person or any public authority may acquire a right to use or take water from any water-course or any ground water described in the schedule to this Decree for any purpose in accordance with the provisions of the Decree and any regulation made pursuant thereto.'

27 Ibid, section 9(1).

28 The secretary referred to here is the secretary charged with the responsibility for matters relating to water resources. The federal government, with the Japanese government's technical assistance through the Japanese International Co-operation Agency (JICA), prepared a National Water Resources Master Plan, http://www.fao.org/ag/agl/aglw/aquastat/countries/Nigeria/index.stm (accessed 11 September 2008).

29 See M Adesanya Olugbenga, Elysian energy for a sustainable Nigeria, URL:http://www.worldenergy.org/wec-geis/publications/default/tech_papers/17th_congress/2_3_03.asp (accessed 20 September 2008). Regulations to stem the tide of dwindling forest resources in size and volume can be traced to the basic norm, 1999 Constitution of Nigeria, which provides in section 20 that: 'it is an obligation of the state to protect and improve the environment and safeguard the water, air and land, forest and wild life of Nigeria'. Under article 24 of the African Charter on Human and Peoples' Rights (Ratification and Enforcement) Act, Cap. 10 L.F.N. 1990, 'All people shall have the right to a general satisfactory environment favourable

to their development.' http://www.nigerialaw.org/African%20Charter%20on%20Human%20and%20Peoples'%20Rights.html

30 For Nigeria's EIA Act No. 86 of 1992, see http://www.elaw.org/resources/text.asp?id=2690

31 See section 1(2) of Cap. 109 L.F.N. 1990. See generally http://www.nigeria-law.org/LFN-1990.html

32 See Jigawa State, Nigeria, Extending opportunities to the edge of the desert, http://www.self.org/nigeria.asp

33 See NEST, *supra* note 11.

34 Defined by the Nigerian Energy Master Plan as small (below 30 mw), mini (below IMW), micro (below 100kw) and peco (below 1kw).

35 See Federal Ministry of Power and Steel *Renewable Electricity Policy Guideline*, December 2006.

36 See M T Ladan, *Biodiversity, human rights and access to environmental justice in Nigeria,* Zaria: Faith Publishers Ltd, 2007, 15–20.

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6 Biofuels in Tanzania: legal challenges and recommendations for change

Eliamani Laltaika

ABSTRACT

Inspired by change of policy in favour of 'alternative fuels' in industrialised countries, the bioenergy industry has attracted considerable attention among government leaders, entrepreneurs, and local and foreign investors in many developing countries. This chapter provides a historical account of the rise of biofuels and their current status in Tanzania. Surveying evidence of climate change, rising prices of fossil fuels and the ever-increasing demand for energy, the chapter underscores the importance of investing in alternative fuels in Tanzania. It proceeds to discuss the effects of agrofuels on biodiversity conservation, food security and land tenure. The author opines that precautionary measures should be adopted (and implemented) to ensure that this propelling industry does not cause more harm than good to the environment.

INTRODUCTION

The past few years have seen increased attempts by governments to diversify their energy sources for industrial, transport and domestic use. The main

driving force is the realisation that the use of fossil fuels is a leading cause of human-induced climate change[1]. Other factors include the need for energy security, increased demand for energy due to improved life standards, especially in emerging economies such as China, and ever-increasing prices of fossil fuels.[2] Governments worldwide are devising policies aimed at exploring and commercialising alternative and renewable sources of energy, notably also including biofuels.[3] The term biofuels refers to the liquid, solid or gas fuel derived from biomass either from recently living organisms or from their metabolic waste.[4] Common examples of biofuels are ethanol, methanol and biodiesel.[5] Ethanol alcohol can be obtained through the fermentation of sugar crops such as sugarcane, sugar beet, and sweet sorghum, or of starchy crops such as corn and cassava.[6] Methanol can be obtained from wood or woody crops by means of a wood gasification process followed by compression and methanol synthesis.[7] Biodiesel fuel, on the other hand, can be obtained from oil crops, such as soy-bean, rapeseed, sunflowers, and palms, by extracting the oil with suitable solvents or through mechanical pressing and then converting the oil into diesel fuel by a transesterification process.[8]

Biofuels, therefore, is a general term used to describe all the above forms of fuels and the plants from which they are obtained.[9] Based on their socio-economic impact, biofuels have been classified into two types: first generation biofuels made from food crop feedstock, and second generation biofuels made from non-food feedstock and agriculture and forestry waste, such as woodchips and straw.[10] Research into, production of and markets for biofuels have grown tremendously in the past ten years following industrialised countries' express interest in this type of renewable energy. The US, for example, has indicated that it will support the use of biofuels as one of the principal ways of combating climate change.[11] The EU, likewise, has aimed to replace ten per cent of motor transportation fuel with renewable energy such as biofuel by 2020.[12] As a result of this 'biofuels wind' blowing from the North to the South, developing countries have been inspired to embark on large-scale, commercial biofuels production.[13] Through biofuels production and commercialisation, developing countries expect to see tangible benefits including, among other: creation of employment and diversification of the rural economy, creation of a market for agricultural energy crops, and saving of foreign exchange equal to the value of imports substituted.[14] Although these benefits are welcomed by both developing and developed countries as they are in line with the Millennium

Development Goals[15] and the Kyoto Protocol,[16] the biofuels industry still poses a myriad of legal, policy and institutional challenges to developing countries. Using Tanzania as a case study, this chapter analyses some of these challenges including, food security, environmental conservation and land tenure security. The chapter is divided into three parts which, respectively: describe the study area and the current status of biofuels in the country; analyse social and environmental impacts of biofuels; and propose legal and policy recommendations aimed at striking the appropriate balance in this respect.

TANZANIA: ECONOMIC GEOGRAPHY, CLIMATE CHANGE AND THE BIOFUELS INDUSTRY

Economic geography

Tanzania is a sovereign republic situated on the East Coast of Africa. It is bordered by Kenya and Uganda to the north; Rwanda, Burundi and the Democratic Republic of the Congo (DRC) to the west; and Zambia, Malawi and Mozambique to the south. To the east, it borders the Indian Ocean. The country occupies 945 000 km^2 with a total population of 37 million.[17] Tanzania is a union between Zanzibar (comprising the Islands of Ungula and Pemba) and mainland Tanzania formerly known as Tanganyika.[18] This chapter focuses on Tanzania mainland. Economically, Tanzania is a poor country with a gross national income (GNI) per capital of only US$280.[19] More than 75 per cent of the population lives in rural areas and agriculture is the mainstay of the economy, providing employment to 80 per cent of the workforce. It also accounts for nearly one-half of gross domestic product (GDP), and provides 85 per cent of exports.[20]

Climate change

Global climate change is no longer a myth. In Tanzania, effects of climate change are so evident that even the staunchest of 'climate deniers' may find it difficult to maintain their denial. The shrinking snow of Mount Kilimanjaro is echoed by many scientific authorities as a major sign of climate change in the country.[21] As a result of such change, it has been predicted that temperatures will rise by 2–4 degrees Celsius by 2100.[22] Rainfall will decrease by 0–20 per cent in

the interior part of the country. Moreover, climate change will lead to sea level rise of 0,10–0,90 meters and this will aggravate flooding in the coastal areas. [23] Agriculture, transport and tourism sectors will also be affected and this will intensify poverty.[24] It is predicted that Tanzania may lose up to ten per cent of its grain production. Maize, which is the staple food of Tanzanians, will especially be affected. The Tabora-Dodoma region, which is one of the leading maize production zones, will lose up to 80 per cent of its yield by 2075.[25] The flow of many rivers will be reduced and this will affect irrigation, hydroelectric power production and the economy in general. [26] As part of its reporting obligation under the United Nations Framework Convention on Climate Change (UNFCCC), and a strategy to address climate change locally, the government of Tanzania has undertaken an in-depth analysis of the impact of climate change on agriculture, health, and water. The analysis is also intended to serve as a technological needs assessment for adaptation and poverty reduction.[27] It is against this background that Tanzania seeks to promote biofuels for, among other benefits, creation of employment and contribution to a cleaner environment through reduction of greenhouse gases (GHGs) and other vehicular emissions.[28]

The biofuels industry

Tanzania's interest in biofuels has been received with mixed feelings. Some commentators have characterised the biofuels industry as a 'mixed blessing'.[29] More critical analysts have likened biofuels production to colonialism.[30] The government of Tanzania, on the other hand, has maintained that biofuels offer the country an opportunity to diversify its rural economy and reduce the amount of foreign currency used to import fuels.[31] In 2006, the government established the National Biofuels Taskforce[32] (NBT) charged with, among other tasks, designing biofuels policies and regulations suitable for Tanzanian conditions.[33] Through the Tanzania Investment Centre (TIC) the government has also ensured an attractive environment for investors in the biofuels sector. This includes exemption from value added tax (VAT) and exemption from import duties for all investors.[34] A German Technical Cooperation (GTZ)-commissioned study identifies 80 per cent of Tanzania's arable land as suitable for bioenergy crop cultivation.[35] Foreign companies already existent in Tanzania to invest in the biofuels sector include PROKON Renewable Energy Solutions and Systems Ltd of Germany, Mitsubishi Corporation of Japan, J&J Group (Pty) Ltd Pretoria, South Africa, and Sun Biofuels of the United Kingdom (UK).[36] In spite of the absence of a national biofuels policy and any other specific legislation for renewable energy, these companies have acquired land and some have already started with their investment activities. Sun Biofuels, for example, has acquired 8 200 ha from Mtamba Village in Kisarawe, displacing approximately 11 000 people [37] As a consequence, the lack of legal and regulatory mechanisms has led to strong criticism, and even mistrust, of biofuels investors in the country.[38] Nongovernmental organisations (NGOs), human rights activists and other concerned individuals have repeatedly urged the government to consider the adverse effects of biofuels on food security, environmental protection and land security.[39] It is against this background that the two sections below explore these challenges and recommend appropriate legal and policy measures to ameliorate the current situation.

EFFECTS OF BIOFUELS

Food security

Food security exists when 'all people, at all times, have access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life'.[40] According to this definition, the two most important factors for food security are accessibility and availability.[41] Food insecurity, therefore, is a result of a lack of either food accessibility, or unavailability, or both. The right to food (which encompasses both availability and accessibility) is recognised as a fundamental human right in international law.[42] The Universal Declaration of Human Rights (UDHR)[43] and the International Covenant on Economic, Social and Cultural Rights[44], among other international law instruments, provide for the right to adequate food.[45] According to the African Commission on Human and Peoples Rights (African Commission), state parties must protect access to food from interference by powerful third parties.[46] Some countries have entrenched the right to food in their constitutions,[47] whereas in others it is interpreted by the courts as a part of the right to life.[48] The causes of food insecurity can be socioeconomic[49], ecological[50] or political.[51]

Although food insecurity predates the advent of biofuels,[52] the latter have contributed their fair share in worsening the situation.[53] First generation biofuels compete with food directly, whereas second generation biofuels compete

with it for land, water and other inputs, increasing food prices.[54] The results of legal and scientific enquiries into the matter suggest that there is uncertainty as to whether biofuels and food security can coexist.[55] This was the main theme of the High Level Conference on World Food Security organised by the Food and Agriculture Organization (FAO) of the United Nations (UN) in June 2008.[56] Unlike other parts of the world, the direct link between biofuels production and food insecurity is rather difficult to establish in Tanzania. This is so because food insecurity is rather rampant and can reasonably be described as a chronic problem, although there have been improvements in recent years.[57] Generally, many researchers[58] agree that converting arable land into biofuel farms can be a leading source of food insecurity.[59] Farmers can also be enticed, by the high prices of bioenergy crops, to abandon their traditional crops, consequently reducing food production.[60]

The land question

The advent of biofuels and the subsequent 'scramble for land' among multinational companies interested in growing biofuels in developing countries, have been perceived as a threat to land tenure security among rural poor.[61] According to the United Nations Permanent Forum on Indigenous Affairs (UNPFIA), 60 million indigenous people may be displaced by biofuels.[62] In Tanzania, approximately 11 000 peasants currently face eviction in order to pave the way for a British company, Sun Biofuels, to grow *Jatropha*[63] in an 8 200-ha area of land.[64] Pastoralists and hunter-gatherers, such as the Maasai and Hadzabe in northern Tanzania, are equally in danger. The mere fact that pastoralists' traditional land has not been titled or experienced any permanent construction activity, leads some unscrupulous people, including government leaders, to assume that such areas are 'no-man's land' and could be taken by anybody. Ringo Tenga, a land rights researcher with the University of Dar es Salaam, recounts one incident of land grabbing in the pastoralist district of Monduli in Arusha region, in which prominent businessmen, military leaders and government officials used dubious title deeds to grant themselves thousands of acres of land belonging to pastoralists.[65]

The government is also at the forefront of moves to evict pastoralists from their ancestral lands for a myriad of 'projects', ranging from wheat farms to the establishment of national parks. Ironically, the same government which

allocates village lands to biofuels investors has insistently announced that more than 80 per cent of the total arable land in the country is unoccupied and forms a part of the 'land bank' ready to be allocated to investors. Such a position then begs the question: why evict local communities if such 'idle land' is available?[66] Due to a lack of deliberate efforts to protect vulnerable groups, it is widely believed that biofuels will cause more harm than good to local communities unless a clear policy instrument is adopted to protect them. Such a policy should also protect the environment from which these communities eke their living.

This chapter now turns to effects of biofuels on the environment.

Biofuels and environmental degradation

As a result of the biofuels boom, forest clearing has taken place at an unprecedented rate around the world.[67] This practice goes against the UNFCC's Conference of the Parties (COP) decision to Reduce Emission from Deforestation in Developing Countries (REDD) in particular, and the Clean Development Mechanism (CDM) system in general, which is considered by many to benefit developing countries like Tanzania and local communities which have been custodians of forests for millennia.[68] To minimise this problem, it is important that the CDM and REDD programme be implemented to bring about tangible benefit. At the moment, the African continent benefits the least from the CDM project.[69] Forest clearance also contributes to the loss of biodiversity[70] in general and agrobiodiversity in particular.[71] Large-scale biofuels cultivation reduces both the diversity of biota and management diversity, and may also aggravate food insecurity.[72] The government of Tanzania, therefore, should protect agrobiodiversity, not only because it is part and parcel of biodiversity in general, but also due to the fact that more than 80 per cent of its farming community practices traditional agriculture and depends on the foregoing for food security.[73]

Another aspect of environmental degradation that comes to the fore as a result of the agrofuels industry is the uncontrolled introduction of invasive species. An invasive species (also known as exotic or non-native species) is 'an alien species which become established in natural or semi-natural ecosystems or habitat as an agent of change and threatens native biological diversity'. [74] These species are intentionally or unintentionally introduced to new areas and they have had widespread ecological and economic effects in

different parts of the world.[75] Introduced plants, among other types of exotic species, displace and threaten native species and alter fire regimes, nutrient cycling, energy budgets and hydrology.[76] Tanzania is party to, among other international legal instruments for the control of alien invasive species, the Convention on Biological Diversity, 1992 (CBD).[77] The country therefore also has various obligations as regards the control of alien invasive species within the context of the biofuels industry.

How can these challenges be dealt with without compromising human rights and environmental conservation? This chapter seeks to answer this question in the following section.

LEGAL AND POLICY RECOMMENDATIONS

The Tanzanian energy sector is in crisis.[78] Lack of deliberate efforts to address the root cause of the crisis led to the resignation, in February 2008, of the then Prime Minister Edward Ngoyai Lowassa and two cabinet ministers, Ibrahim Msabaha and Nazir Karamagi, after they were implicated in an energy deal scandal.[79] According to a Parliamentary Select Committee (PSC) appointed by the Speaker of the National Assembly, Lowassa had abused his offices to award a contract to a US-based company, Richmond Development Holding, to produce electricity in the country during the 2006 energy crisis. The company was supposed to start producing electricity by using generators in December 2005. However, no generators were bought until the end of 2006, while Richmond was receiving US$100 000 per day in terms of the government contract.[80] Although Lowassa's resignation is unquestionably a commendable act of political responsibility, it has done nothing to help the energy sector. To save it from total collapse and to prevent the consequential implications for the national economy, major legal, policy and institutional reforms are needed.[81]

There is also a need to diversify sources of energy in general and to promote new and renewable energy in particular. Currently, out of a total of 37 million Tanzanians, 90 per cent depend on biomass (charcoal and wood fuel), 7,5 per cent on oil and gas, and 1–1,5 per cent on coal, solar power and wind.[82] One way of diversifying such energy sources is to invest in the production of biofuels. As already indicated above, there are various socioeconomic and ecological challenges related to growing bioenergy crops.

In view of the foregoing, the following section recommends legal, institutional and policy measures to address some of these tensions and challenges. The investigation commences with a review of existing structures, suggesting that they can be used as a stepping stone for these much-needed reforms.

Law on biofuels: The Rural Energy Act No 8 of 2005 as a model law

Tanzania has no law on biofuels. Enacting a new law is often also a drawn-out and bureaucratic process. In order to save resources and take advantage of the prevailing world struggle for alternative energy, it is recommended that the Rural Energy Act[83] be amended to cater for the biofuels industry. Save for provisions related to biofuels, food security, land acquisition and other challenges illustrated above, the relevance of this law to biofuels cannot be overemphasised. It introduces many aspects that could promote a viable biofuels industry in the country. The following are a few of the elements it introduces.

Modern energy supply, economic growth and sustainable development in rural areas

The Act acknowledges that modern energy supply[84] 'promotes growth in economic production and productivity as well as social welfare'.[85] It is acknowledged that none of the eight Millennium Development Goals (MDGs) can be achieved without an efficient energy supply.[86] To achieve universal primary education, for example, energy is needed in the rural areas to attract teachers and relieve especially young females of their traditional role of being required to travel far in search of firewood for cooking and heating.[87] Since the world is strategising to move away from fossil fuels, this principle could be utilised to enact a biofuels law for sustainable rural development in Tanzania.[88]

The Rural Energy Board

Part three of the Act establishes the Rural Energy Board,[89] whose function it is, among others, to facilitate extended access to modern energy services for economic uses, health and education.[90] This is a multisectoral board that includes representatives of the civil society and even the donor community. Since the board targets development in rural areas where biofuels companies are looking for land, it is recommended that its mandate be extended to cover the biofuels sector.

The Rural Energy Fund

The Act establishes the Rural Energy Fund, which has as its mandate to provide grants to subsidise the capital cost of projects that are developed by private and public entities, cooperatives, and local community organisations.[91] The current international climate change law contains flexible mechanisms such as the CDM. It is recommended that this fund be strengthened to reach more people and encourage establishment of as many energy efficiency projects as possible that may attract CDM funds. At the moment there is only one registered CDM project in Tanzania.

A biofuels policy for Tanzania

A policy on biofuels is very important as a fundamental base for proper legal and regulatory intervention. Such a policy should be crafted to address specific socioeconomic and environmental issues that may not be included in the Act described above. Specifically, it is recommended that the policy should make a clear distinction between first and second generation biofuels. The former should not be allowed because it may aggravate food security issues explained in part three above. More importantly, the policy should provide clear strategies for taking energy to rural areas. This should be so because, in many parts of Africa, rural people produce what they do not consume. The policy should also address blending and standard issues in order to ensure that production does not compromise quality. Some existing policies support this sector, although not expressly. The National Energy Policy of 2003, for example, although it does not specifically mention biofuels, supports use of modern biomass for the provision of reliable, affordable and environmentally friendly energy.[92] However, given the need for a specific policy on biofuels, this chapter recommends a thorough review of the existing policy framework, followed by an 'upgrade' of the newly developed Biofuels Guidelines into a policy. The guidelines[93] provide for, and address, many of the challenges discussed above. These include, among others, the following:

Food security*:* The guidelines acknowledge that production/farming of biofuels may result in negative impacts, especially on the availability of food and a rise in food prices.[94] To address this particular concern, the guidelines require biofuel developers to use a portion of land acquired for biofuels production to grow relevant food crops, applying state-of-the-art agricultural techniques. This could be one of the guiding principles of the proposed biofuels policy. It is in line with both the Tanzania Vision 2025 and the Millennium Development Goals. By improving rural agriculture, Tanzania will simultaneously address food insecurity and poverty.

Land acquisition: The guidelines contain commendable provisions on the danger of land conflicts, including displacement in rural areas, posed by the biofuels industry. On this particular issue, which is one of the most controversial in Tanzania, the guidelines provide that no displacement of people should be allowed for biofuels development. The guidelines further provide that, due to 'controversies around biofuels investments', village authorities must be guided by the biofuels one-stop shop centre (an office created by the guidelines) on all matters concerning land acquisition. If this same spirit is promoted to policy level, and theory is translated into practice, local communities in Tanzania will arguably be relieved of all their concerns that the biofuels industry is another opportunity for land grabbing.

Environmental conservation: The guidelines take into consideration environmental threats posed by biofuels, including forest clearing, biosafety and invasive species. It therefore mandates biofuels developers to carry out an environmental impact assessment (EIA) prior to the start of any project.[95] Moreover, the guidelines require biofuel seeds to be produced according to the regulations governing seed production in Tanzania; and they are not to be imported or exported without a permit from the ministry responsible for agriculture.[96] It is recommended that these precautionary measures be incorporated in the biofuels policy and that they are translated into a binding law to save the country from the risk of enormous environmental damage posed by the biofuels industry, including forest clearance and the introduction of invasive species as illustrated above.

CONCLUSION

This chapter has shown that biofuels offers various opportunities for Tanzania to improve its energy security while simultaneously addressing climate change and sustainable development. It is also a potential way to increase income of rural farmers and other stakeholders. However, this opportunity is not without its risks. It has been argued that biofuels can cause land conflicts, environmental degradation and food insecurity. It is for the law to see to it that the right

balance is maintained. The current opposition to biofuel initiatives among environmental activists and local communities is, by and large, due to the lack of clear legal and policy provisions. It is hoped that concerned authorities in Tanzania will play their part in establishing legal and policy instruments needed for the proper regulation of the biofuels industry.

NOTES

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2 D Zillman, C Redgwell, Y Omorogbe et al (eds), *Beyond the carbon economy energy law in transition*, Oxford: Oxford University Press, 2007, 6–7.

3 Relevant European Union Laws on biofuels include the Biofuels Directive 2003/30/EC of 27 May 2007 and the Biofuels Taxation Directive 2003/96/EC of 8 May 2003.

4 Corporate Europe Observatory (CEO), The EU's agrofuel folly: policy capture by corporate interests, Briefing paper, 2007, http://www.corporateeurope.org/agrofuelfolly.html#note07 (accessed 16 March 2009).

5 Mario Giampierto, Sergio Ulgiati and David Piementel, Feasibility of large-scale biofuel production: does an enlargement of scale change the picture?, *BioScience* 47(9) (1997), 587–600.

6 Giampierto et al, Feasibility of large-scale biofuel production, 587.

7 Giampierto et al, Feasibility of large-scale biofuel production, 587.

8 Giampierto et al, Feasibility of large-scale biofuels production, 587.

9 Many authors use the word 'biofuels' to refer to plants from which biofuel is extracted and the same term to mean by-products, such as ethanol. See, for example, Giampierto et al, 'Feasibility of large-scale biofuel production' compared to the Worldwatch Institute's *Biofuels for transport: global potential and implications for energy and agriculture*, London: Earthscan, 2006.

10 Inigo Del Guayo, Biofuels: EU law and policy, in Zillman et al (ed) *Beyond the carbon economy energy law in transition*, Oxford: Oxford University Press, 2007, 265–337

11 The Renewable Fuels Standard (RFS), a programme established by the Energy Policy Act of 2005, requires the use of 28,4 billion litres of biofuels in the US by 2012. See new developments at http://www.hrccc.org/images/CRS_report_on_RFS.pdf (accessed 19 March 2009).

12 See Commission of the European Communities, Communication from the European Commission: *An EU strategy for biofuels 2006*, http://ec.europa.eu/development/icenter/repository/biofuels_2006_02_08_comm_eu_strategy_en.pdf (accessed 19 March 2009). See, also, Directive 2003/30/EC of the European Parliament and of the Council of 27 May 2003 on the promotion of biofuels or other renewable fuels for transport: [2003] OJ L123/42.

13 Flagship examples in Africa include Tanzania, Ethiopia and Ghana. See Worldwatch Institute, *Biofuels for transport*, 336–339.

14 Some of these benefits are enumerated in United Republic of Tanzania (URT), Guidelines for sustainable development of liquid biofuels and cogeneration in Tanzania, Dar es Salaam: 2008.

15 United Nations, UN Millennium Development Goals (MDGs), http://www.un.org/millenniumgoals/, (accessed 16 March 2009). For the relationship between MDGs and energy, see Yinka O Omorogbe, Promoting sustainable development through the use of renewable energy: the role of the law, in D Zillman, C Redgwell Y Omorogbe et al (eds), *Beyond the carbon economy energy law in transition*, Oxford: Oxford University Press, 2007, 39–59.

16 Kyoto Protocol to the Framework Convention on Climate Change, opened for signature March 16, 1998, 37 ILM 22 (1998) (entered into force 16 February 2005) ('Kyoto Protocol'). The Kyoto Protocol requires Annex I countries to reduce their GHG emissions. The use of fossil fuels, especially for transportation, accounts for up to 25 per cent of global GHG emissions.

17 For more information on Tanzania, refer to the official government website at www.tanzania.go.tz

18 According to the Constitution of the United Republic of Tanzania of 1977, each part of the republic exercises autonomy over certain issues, referred to as 'non union matters'. Environmental management falls under this category.

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20 Ibid.

21 G Kaser, DR Hardy, T Mögl et al, Modern glacier retreat on Kilimanjaro as evidence of climate change: observations and facts, *International Journal of Climatology*, 24 (2004), 329–339. See also, Organisation for Economic Development and Co-operation (OECD), *Development and climate change in Tanzania: focus on Mount Kilimanjaro*, Paris: OECD, 2003.

22 M Mwandosya, B Nyenzi and M Luhanga, *The assessment of vulnerability and adaptation to climate change impacts in Tanzania*, Dar es Salaam: Centre for Energy, Environment, Science and Technology, 1998.

23 Ibid. See also M Hulme, R Doherty R, T Ngara, Global warming and African climate change: a re-assessment, in P S Low (ed) *Climate change and Africa*, Cambridge: Cambridge University Press, 2005, 29–40.

24 Mwandosya et al, *The assessment of vulnerability and adaptation to climate change impacts in Tanzania*.

25 Ibid.

26 Mwandosya et al, *The assessment of vulnerability and adaptation to climate change impacts in Tanzania*, 1–24.

27 See The National Plan of Action (NAPA) 2007.

28 United Republic of Tanzania, Guidelines for sustainable development of liquid biofuels and co-generation in Tanzania,1.

29 This view is shared by some NGOs engaged in the biofuels business (Godfrey Lelya, Programme Officer, Olkonerei Development Organisation per. com).

30 See Land Rights Research and Resources Institute (LARRRI) & Joint Livelihood Initiative for Tanzania, Bio-fuel development in Africa: opportunities, threats and challenges for rural small-holders in Tanzania, Report of the Forum held at Land Mark Hotel, Dar es Salaam, 12 January 2008, http://www.hakiardhi.org/HA-Docs/biofuel.pdf (accessed 16 March 2009).

31 Tanzania imports 100 per cent of the oil and gas used for transportation.

32 This is a multisectoral committee composed of members from the following ministries and other stakeholders: Ministry responsible for Planning, Economy and Empowerment; Ministry of Energy and Minerals; Ministry responsible for Agriculture and Food Security Ministry of Labour; Employment and Youth Development; Ministry of Finance; Vice President's Office – Division of Environment Ministry of Water and Irrigation; Ministry of Lands, Housing and Settlement Development; Attorney General's Chambers; Tanzania Investment Center; Tanzania Petroleum Development Corporation; Community Finance Limited; Tanzania Sugar Producers' Association.

33 William M Ngeleja (Minister for Energy and Minerals) Biofuels development in Tanzania, Paper presented at the Third German-African Energy Forum, Berlin, Germany, 23–25 April 2008.

34 United Republic of Tanzania (URT), Procedure for obtaining certificate of incentives, Tanzania Investment Centre TIC, President's Office, 2008.

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36 Ngeleja, Biofuels development in Tanzania, 5.

37 Oxfam, Another inconvenient truth: how biofuel policies are deepening poverty and accelerating climate change, Oxfam Briefing Paper, 2008, 141.

38 Time to come clean on bio-fuel threat, *The Citizen*, 24 July 2008, at http://allafrica.com/stories/200807240343.html (accessed 19 March 2009).

39 See Land Rights Research and Resources Institute (LARRRI) & Joint Livelihood Initiative for Tanzania: Bio-fuel development in Africa.

40 FAO, Rome declaration on World Food Security and World Food Summit Plan of Action, (document W3613/E), Food and Agriculture Organisation of the United Nations, World Food Summit, 13–17 November 1996, Rome, http://www.fao.org/docrep/003/w3613e/w3613e00.htm (accessed 12 March 2009).

41 See also the General comment by the Committee on Economic, Social and Cultural Rights on the right to adequate food, Comment No. 12 (1999).

42 This is one of those rights regarded as 'second generation human rights', meaning social-economic and cultural rights. States are obliged to use 'maximum available resources' to provide their respective subjects with these rights.

43 ILM, see Article 25.

44 ILM see Article 11(1) and (2).

45 Article 6 (the right to life) of the International Covenant on Civil and Political Rights (CCPR) has also been interpreted to impose a duty on states to eliminate malnutrition.

46 Social and Economic Rights Action Centre (SERAC) and the Centre for Economic and Social Rights v Nigeria – Communication 155/96. See also C Mbazira, Reading the right to food into the African Charter on Human and Peoples' Rights, *ESR Review* 5(1) (2004), 5.

47 See, for example, Article 27(1)(b) of the Constitution of the Republic of South Africa of 1996.

48 India is a flagship example. See Francis Corolie Mullin v The Administrator, Union Territory of Delhi (1981) 2 SCR 5/6-529.

49 Social-economic disparities in society make it difficult for the poorest of the poor to get sufficient access to food, in spite of its availability. See Allan G Smith, *Human rights and choice in poverty: food insecurity, dependency and human rights based development aid for the third world rural poor*, Westport: Praegar, 1997.

50 Ecological causes of food insecurity are usually related to land degradation, water availability or pests. See Hari C Sharma, *Biotechnological approaches for pest management and ecological sustainability*, CRC Press, Boca Raton, 2009.

51 Politically-induced food insecurity may involve insufficient attention to the agricultural sector, unequal distribution of food, and economic policies that distort food markets. See Amartya Sen, *Poverty and famines: an essay on entitlements and deprivation*, Oxford: Clarendon Press, 1982; and Expertise Centrum voor Duurzame Ontwikkeling (ECDO), *Size does matter: the possibilities of cultivating Jatropha curcas for biofuel production in Cambodia*, Amsterdam: Universiteit van Amsterdam, 2006.

52 Parker Shipton, African famines and food security: anthropological perspectives, *Annual Review of Anthropology*, 19, 353–394. See also H C Srivastava, *The history of Indian famines from 1858–1918*, Agra: Sri Ram Mehra and Co., 1968.

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57 United Republic of Tanzania URT, *Follow-up of the implementation of the World Food Summit Plan of Action*, Ministry of Agriculture Food Security and Cooperatives, 2006.

58 J Peters and S Thielmann, Promoting biofuels: implications for developing countries, Ruhr Economic Paper No. 38, Essen: RWI Essen, 2008. See also JRC, Biofuels in the European context: facts, uncertainties and recommendations, JRC working paper, 19 December 2007.

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10.5 million hectares are under cultivation. It appears that we have plenty of land but when we start hearing that villagers are being compensated to give way to these multinationals to cultivate biofuel plants then we start asking ourselves why? In Kisarawe, Rufiji, Kilwa, Bagamoyo, Handeni and elsewhere talk of villagers being compensated by these multinational renewable energy corporations is rife and in some cases villagers are almost being compensated to give away their ancestral homes, tiny food crop farms and graveyards to give way to these huge investments. Why shouldn't authorities show these multinationals, which have both the capital and expertise, virgin land which is lying idle to do their spadework other than repeating mistakes which we have committed with the mining sector in the past?' (The Citizen 2008b).

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risks associated with the use and release of living modified organisms resulting from biotechnology which are likely to have adverse environmental impacts that could affect the conservation and sustainable use of biological diversity, taking also into account the risks to human health; (h) Prevent the introduction of, control or eradicate those alien species which threaten ecosystems, habitats or species.'

78 The advent of climate change has seen the decline of the level of water in many rivers and dams previously relied upon for production of hydro-electric power (HEP) causing unprecedented inefficiency in electricity generation in the country. See the 2007/2008 Budget Speech of the then Minister of Energy and Minerals Nazir Karamagi to Parliament, http://www.tanzania.go.tz/budgetspeech/2007/pdf/nishati.pdf

79 BBC, Tanzanian PM to resign over graft, http://news.bbc.co.uk/2/hi/africa/7232141.stm

80 Parliament of the United Republic of Tanzania, *Executive Summary of the Parliamentary Select Committee's Report on Richmond Development Company LLC 'Mwakyembe Committee Report'*, Unpublished report presented to Parliament on Wednesday, 6 February 2008.

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82 United Republic of Tanzania, National website, http://www.tanzania.go.tz/energyf.html

83 This is an Act to establish the Rural Energy Board, Fund and Agency to be responsible for promotion of improved access to modern energy services in the rural areas of Mainland Tanzania and through a fund within the agency board, to provide for grants and subsidies to developers of rural energy projects for related and consequential matters.

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89 See sections 6–13.

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94 See section 31 of the guidelines.

95 See section 35 of the guidelines.

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Part 4

The Clean Development Mechanism

7 Towards sustainable development

An African perspective on reforming the Clean Development Mechanism

Phillipa Niland, Olivia Rumble and Michaela Lau

ABSTRACT

The idea behind the Clean Development Mechanism (CDM), one of the three flexible mechanisms created by the Kyoto Protocol to the United Nations Framework Convention on Climate Change (UNFCCC), is that developing nations will benefit from sustainable development in the form of 'climate-friendly' projects that reduce emissions of greenhouse gases while developed nations receive Certified Emissions Reduction (CERs) credits that may be used for compliance purposes.

However, since its inception, a number of problems have arisen with the CDM. This chapter critically analyses the problems inherent in the formulation and implementation of the current CDM from an African perspective. It considers an array of possible solutions to these shortcomings with a view to informing the possible reform of the CDM in the Copenhagen Protocol, which will replace the Kyoto Protocol at the end of the first commitment period in 2012. Included, within this discussion is an analysis of options for scaling up the CDM to promote more active participation of African nations in the post-2012 climate regime.

INTRODUCTION

With the Kyoto Protocol nearing the end of its 2008–2012 compliance period, the dust has not yet settled on the issue of how a post-Kyoto framework will be structured to address climate change.[1] Although there is clear consensus that climate change is a critical problem with greenhouse gas (GHG) emissions having risen by 24 per cent globally since 1990,[2] the current legal framework is unlikely to be sufficiently comprehensive to address the magnitude of the problem. Without adequate policies and measures to address this increase, emissions are projected to increase at least 25 per cent, and as much as 90 per cent by 2030.[3] Therefore, much hangs upon the Copenhagen negotiations in December 2009, where a post-Kyoto agreement will be fashioned.

The Kyoto Protocol can be described as revolutionary in the international collaboration to address climate change because it puts into place a framework for legally binding reductions of GHGs by 38 leading industrialised countries, each of which agreed to reach a specific reduction target during the period 2008–2012. A key achievement of the protocol was the establishment of three market mechanisms designed to help developed countries achieve their Kyoto commitments. One of these, the Clean Development Mechanism (CDM), was created as a means through which developed countries could reach their GHG reduction targets in a cost-effective manner, whilst at the same time contributing to the sustainable development priorities of developing countries. As such, the CDM was envisioned, and has indeed become, the primary avenue through which developing countries can participate in the protocol.

At its inception, it was hoped by developing states that the CDM would be a means whereby technology would be able to leapfrog across borders and continents, as well as a mechanism under which they could achieve their development objectives whilst simultaneously preparing for the anticipated carbon constrained economy of the future.[4] The practical application of the CDM thus far has, however, resulted in a mixed picture. While there are stories of success, the CDM has also, on the other hand, failed to live up to the expectations for all developing parties. Much therefore hangs upon the ensuing Copenhagen negotiations with respect to its future shape and form.

The CDM necessitates reform for two important reasons. First, it should be reformed precisely because it has been such an astounding success for some parties. In 2008, there were 3 967 projects in the CDM pipeline, with 1 170 projects having been registered.[5] Similarly, the primary and secondary CDM market in 2007 was worth nearly US$13 billion, a US$7 billion increase from 2006.[6] In addition, over 15 new countries have now entered the project pipeline for the first time, many of them in sub-Saharan Africa and Central Asia.[7] Second, given the scientific evidence available today, the need for scaled-up action on climate change is becoming more and more apparent. The CDM, in a reformed and scaled-up version, presents an opportunity to promote greater involvement by developing nations in the immediate future whilst still allowing them an opportunity to develop without binding emissions limitations. Thus, in order to continue the CDM success story and to promote greater participation by developing nations in the climate change regime, the failures and shortcomings of the CDM must be considered and addressed by the post-Kyoto regime.

Criticism of the CDM has been considerable. For instance, the early crop of CDM projects was faulted for failing to adequately contribute to the environmental, social and economic development priorities of host countries.[8] Instead, the trend has been for investment to follow projects that have clear reductions and simple additionality. The type of projects easily meeting these criteria, such as those that reduce the release of N_2oand methane, are perceived as providing only a modest 'development dividend' for their host communities and therefore they have often failed to provide the sustainable development dividend that was envisioned with the CDM.[9] There have also been observations that the flow of investment from the CDM is skewed toward a small sub-set of developing countries with the ironic result of the CDM bypassing those least-developed countries, particularly in Africa, that are most in need of it.[10] Concerns have also been expressed over the environmental integrity of the CDM, especially with respect to additionality and supplementarity. Further criticisms have been levelled at the CDM's institutional structures, in particular concerning institutional inefficiency, prohibitive costs, capacity constraints, a lack of resources and extensive delays.[11] There has also been a lack of assistance to those states, amongst which African states are prominent, struggling to access the CDM bureaucracy due to capacity and awareness constraints. Lastly, the Adaptation Fund, the subsidiary fund of the CDM, has also been target of several criticisms, not least of which has been concern over the inequitable or inadequate distribution of funds to finance adaptation in developing countries.[12]

This chapter thus serves as an attempt to provide some creative and comprehensive suggestions to the challenges highlighted above and it is hoped that it may draw attention to some useful solutions to the crisis at hand. To this end, the chapter

will address the current constraints of the CDM and propose areas of reform with respect to its scope, criteria and verification procedures, and institutional structure, as well as its funding mechanism. The proposals have been shaped in a way that attempts to preserve the present institutional framework whilst introducing changes that are realistic but at the same time sufficiently far-reaching to address the magnitude of the challenge ahead.

THE CLEAN DEVELOPMENT MECHANISM IN A NUTSHELL

The CDM was created with the dual purpose of assisting Annex I States (developed nations) in achieving compliance with their quantified emission limitation and reduction commitments, and to assist parties not included in Annex I to achieve sustainable development.[13] As such, at the most basic level, it permits countries and companies to invest in sustainable GHG-reduction projects in non-Annex I States. The emissions reductions achieved by the individual projects are translated into Certified Emissions Reductions (CERs), credits equal to the equivalent of one metric ton of CO_2, that may be used by the Annex I State to meet its Kyoto target.[14]

In order for an activity to qualify as a CDM project, the activity must comply with certain substantive, as well as procedural, requirements which are laid down by Article 12 of the Kyoto Protocol, read with the Marrakech Accords of 2001 which provide modalities for the functioning of the mechanism.[15] An exposition of the precise processes to be followed and in-depth analyses of the substantive requirements can be found in various scholarly papers and will therefore not be undertaken here.[16] The current contribution aims, instead, to focus on the problem areas of the requirements and procedures, and possible solutions to these problems.

THE APPLICATION OF THE CLEAN DEVELOPMENT MECHANISM

Developing and developed country participation

In order to stabilise GHG emissions at levels that avoid dangerous anthropogenic interference with the global climate, it will be necessary for key developing

countries with rapidly growing economies to take on increasingly meaningful roles in reducing global emissions. Unfortunately, however, developing countries have consistently proved to be unwilling to have imposed, what is perceived to be, any form of cap on their emissions and, in consequence, on their economic growth.[17] Perhaps, however, the political climate has changed and the time may be ripe to reintroduce the so-called 'evolution' mechanism that proved to be so contentious in the run-up negotiations to the Kyoto Protocol.[18]

The application of such a mechanism, which envisages eventual binding commitments for all parties, could, for example, be based on various objective factors such as a country's capacity-responsibility index, defined as the sum of emissions per capita and gross domestic product (GDP) per capita, the Human Development Index, a governance index, historic responsibility based on a weighted average of past CO_2 levels, as well as institutional affiliation.[19]

Moreover, developing countries could be incentivised to agree to such a proposal if newly graduating countries had relatively softer targets which, for example, could be based on intensity levels,[20] or action targets,[21] instead of absolute emissions targets.[22] The feasibility of such a proposal is also bolstered by the fact that there are some signs that a few larger developing countries have already started to consider climate mitigation in their domestic frameworks.[23] Similarly, relatively large emitting countries, such as South Africa, have also shown a willingness to set limits on their emissions.[24]

However, this said and taking into account the objective factors listed above, the reality remains that many African states will not face binding targets in the upcoming protocol. Yet those states' need for sustainable development, as well as adaptation to the effects of climate change, which are expected to hit the poorest countries the hardest, and particularly those in Africa, remains a pressing concern.[25] A reshaping and expansion of the CDM is thus of utmost importance to these states.

The following sections shortly outline the major problems encountered with the CDM and propose solutions to these challenges.

INCREASING THE SCOPE OF THE CLEAN DEVELOPMENT MECHANISM

In order to adequately address the issue of climate change, not only will developed nations need to take on greater emissions cuts, but the need for developing

nations to realign themselves to a cleaner growth path will also increase. To stabilise global emissions in 2030 back at today's levels, a UNFCCC study has suggested that the additional Investment and Financial Flows (I&FF) required needed in 2030 will be approximately US$180–225 billion.[26] These additional I&FF amounts are comparably large in relation to the current funds within the UNFCCC and the Kyoto Protocol, but are relatively small in comparison with the estimated global GDP (0.3-0.5 per cent) and global investment (1,1-1,7 per cent) in 2030.[27] Special attention will also have to be paid to developing countries which will require a large share of this I&FF because of their expected rapid growth rate.[28] If significantly expanded, the carbon market, which is already playing an important role in shifting private investment flows, offers the potential to address the need for additional I&FF.

After a thorough survey of the various proposals put forward, both at the negotiating tables and by academics alike, it is the authors' opinion that the most advantageous and feasible approach would be to expand the manner in which projects are grouped so as to include the sectoral CDM and ultimately sector no-lose targets. Similarly, our analysis suggests that the type of eligible projects should be expanded to include Reducing Emissions from Deforestation and Degradation (REDD), the restoration of wetlands, as well as sustainable forest management so as to both scale up the carbon market and also reduce the inequity of the distribution of CDM projects.

The sectoral Clean Developed Mechanism

The sectoral CDM would involve the expansion of the CDM from current project-based and programmatic activities to activities based upon whole sectors, such as transport, energy and forestry, and would result in the crediting of emission reductions below a baseline determined for an entire sector.[29] The baseline would be determined by the government of a developing country and activities under the CDM would be shifted to the government level.[30] As a result, developing country governments would be responsible for coordinating actions within sectors and would receive credits directly.[31]

The sectoral CDM holds the potential for GHG mitigation on a scale that far outpaces the current project-based and programmatic CDM.[32] This is so because the sectoral CDM approach could channel investment to entire sectors of the economy, thus allowing for the much-needed restructuring and

'decarbonisation' of these sectors.[33] It would allow project boundaries that have both high and low abatement costs to be drawn, hence making the overall CER price competitive by allowing projects within that sector to benefit from economies of scale. Thus, unlike under the current CDM, the sectoral CDM envisages that different types of activities, that would ordinarily have to be registered as individual projects, be grouped together, allowing those kinds of activities with low abatement costs to 'subsidise' those activities currently overlooked due to high abatement costs. In other words, activities which have a beneficial development aspect but that are on their own not sufficiently cost-effective for the CDM, would be encouraged.

In consequence, it is hoped that the introduction of the sectoral CDM will encourage developing countries to enact ambitious climate policies, since a reward for such a policy-decision would be found in the creation of and receipt of CERs for successful sectoral activities.[34] Furthermore, the sectoral CDM holds the potential for encouraging those kinds of projects currently overlooked.

Sector no-lose targets

The sectoral approach could furthermore be complemented by the adoption of sector no-lose targets (SNLTs) for certain identified industries, a tool which may offer a means of reducing emissions from large international industrial emitters on a broader scale, whilst having the advantage of being free of the additionality requirement, as well as general procedural CDM requirements.[35]

Under a SNLT approach, governments would negotiate emission caps for identified sectors in industrialised countries and SNLTs in developing countries where emission reductions below the baseline, as internationally agreed upon, would be able to generate credits for developing countries. Hence, SNLTs would be part of the negotiation in which overall quantitative outcomes are agreed.[36] The key feature of such targets is that whilst developed states would be penalised for emissions above their targets, developing countries would not be penalised in accordance with the 'no-lose' feature of the proposal.

However, SNLTs are only feasible for certain types of industries and projects and thus have been proposed as a separate but complementary mechanism to the CDM. For example, electricity generation, cement, aluminium or steel production, as well as 'upstream' emissions of oil and gas production, such as gas flaring, would all be feasible since they reflect smaller numbers of large sources

and thus baselines are easier to determine.[37] On the other hand, a SNLT approach for sectors such as buildings and transport, which tend to have large numbers of small sources, would create significant challenges.[38]

Increasing the variety of eligible Clean Development Mechanism projects

As already suggested, allowing for additional mitigation options would enable countries to reach more ambitious reduction targets at little or no extra cost and would hopefully result in more inclusive participation in the future climate change regime. Another way of achieving this end would be to allow for avoided deforestation, referred to in the negotiations as REDD.

Since Montréal, many countries and observers have developed positions on this issue in response to the formal proposal put forward by Papua New Guinea and the Coalition for Rainforest Nations.[39] In this proposal, it was suggested that countries which lowered their rate of deforestation below a historical baseline should be compensated with financial incentives, like CERs.[40] The proposal suggested that baselines be determined at a national level, overcoming issues like carbon leakage, one of the barriers for an earlier inclusion of forest conservation.[41] Momentum in the debate to include this type of CDM project has since increased due to growing scientific evidence drawing attention to the fact that deforestation contributes between 15 and 20 per cent to global total GHG emissions and is the largest source of emissions from developing countries.[42] Additionally, REDD projects offer a substantial amount of potential co-benefits, such as biodiversity, watershed, and soil conservation, and direct attention to important issues in rural development.[43]

Despite the difficulties in measuring such projects, it is suggested that developing countries continue to push the agenda of REDD at the forthcoming negotiations because of the inclusive participation and sustainable benefit advantages it offers. This is particularly true in the African context, where farming is the predominant livelihood of most populations.[44] An increase in agriculture to feed the ever-growing populations on this continent is the easiest way to ensure food security. Such action will, however, lead to further deforestation and soil exhaustion, which is likely to be further exacerbated by the use of biomass fuels for cooking and other household activities. Thus, the expansion of the CDM to include REDD activities that prevent deforestation and destruction of

remaining forests holds huge potential for Africa, both from a purely participatory, as well as from a sustainable development, perspective.

In lobbying for REDD, a way to mitigate against the present bias against such projects would be for developing countries to establish buffer zones that could serve as a form of insurance where under the host state would assume liability for the reversal of any removal or degradation to the forest.[45] Similarly, such projects should, like other land use, land-use change and forestry (LULUCF) projects, be awarded only temporary credits.[46] Lastly, it is suggested that not only forests but other land-use practices become eligible project types. Within this category, for example, the restoration of wetlands, as well as sustainable forest management and other sustainable land management activities, could all present themselves as feasible and effective project activity types for developing countries.[47]

CORRECTING DISTRIBUTIONAL IMBALANCES AND IMBALANCES IN PROJECT TYPES

Although the CDM has proven effective in engaging East Asian countries in mitigation efforts,[48] it has been less successful in engaging other regions, in particular Africa which accounts for only two per cent of CERs generated.[49] In comparison, it is estimated that three countries alone, i.e. China, India and Brazil, will account for more than 70 per cent of the abatement from CDM projects by 2012.[50] It has been suggested that part of the reason for this imbalance is the lack of capacity to perform these projects.[51] Similarly, it has been suggested that the imbalance may be caused by the fact that the use of energy within Africa is comparatively low. What little energy is used tends to be biomass or hydropower collected by households.[52] As a result, Africa has not been an ideal host for CDM projects because it lacks both the institutional framework to support the CDM as well as the high-emitting pre-existent technologies which result in higher levels of CERs under the CDM baseline rules than would occur if clean technologies were in place.[53] The Chinese example illustrates how the early adoption of approved hydrofluorocarbon (HFC) methodologies, as well as a large number of pre-existing high-emitting HFC industries, were both significant factors in making China the largest producer of CERs by volume.[54]

The illustration above highlights not only the geographic imbalance in project distribution, but also the imbalance of project types within the CDM

pipeline. To date, most projects have tended to be projects with low abatement costs that generate significant amounts of CERs, such as N2O and landfill gas projects, whilst projects such as LULUCF, solar and residential energy efficiency projects, which have longer term sustainable development benefits, tend to be less desirable.[55]

To counteract both these tendencies, it is suggested that the Conference of the Parties, serving as the Meeting of the Parties (COP/MOP) should create a list of priority projects and another list of priority states. Projects which do not qualify as priority projects or which do not take place in priority states, would have a proportion of the value of each CER that it is estimated to generate, discounted. A priority project or a project in a priority state would thus be able to generate a higher value of CERs than non-priority projects.[56] It is hoped that with this simple tool, some of the investment flows within the CDM can be redirected towards Least Developed Countries (LDCs), particularly on the African continent, by creating an incentive for investors to invest in CDM projects in those states and in those project types that are mostly being overlooked under the current CDM regime.

REFORM OF THE VERIFICATION AND CERTIFICATION CRITERIA

As stated above, a reform of the CDM should not only focus on broadening participation across all developing nations, but must instead also focus on rectifying problems inherent in the make-up of the mechanism. Although the scaling-up, expansion and redistribution measures discussed thus far will go a long way towards ensuring more sustainable development opportunities for Africa, any reform of the CDM must also preserve and promote the 'moral' and environmental integrity of the mechanism because without such integrity, the ultimate purpose of the mechanism, i.e. to combat climate change, will be undermined and this may prove to bring about devastating consequences.

One criticism that has been levelled against the current CDM is that activities are not geared towards altering the energy pathways of developing states, (there is insufficient focus on the attainment of sustainable development), despite the fact that this is one of the dual aims of the mechanism.[57] As such, this criticism is levelled in the first instance against the moral integrity of the mechanism but ultimately also undermines the environmental integrity of the

mechanism and the climate regime as a whole. The root of this shortcoming in the CDM is to be found in two important factors. First, as was stated above already, those kinds of projects with high development linkages, such as energy or transport projects, are being overlooked because activities in such areas are often of a dispersed nature, have relatively high transaction costs, and yield relatively low CER volumes compared to other projects.[58] Second, a cause that is pertinent in the African context, the assessment of a project's contribution to sustainable development of the host nation, is left entirely up to that state.59 The reality, however, is that many African states simply lack the capacity to assess this matter, and it appears that a project may be approved simply because it provides investment.[60]

A further point of concern is the extent to which environmental integrity of the CDM has been upheld. This concern is a complex and intricate one that is linked to both the substantive criteria as well as the processes of the CDM. In particular, the problem is linked to the requirement of additionality, the consequent setting of baselines and the monitoring of actual emissions reductions achieved by the project based on this baseline and the methodologies used to measure reductions. The additionality requirement means that 'business as usual' activities are not to be credited with CERs. Instead, only activities that reduce emissions of GHGs below those that would have occurred in the absence of the CDM project can create CERs.[61] Determining additionality, however, is a complex procedure which involves the assessment of a hypothetical future scenario. Several commentators have, in particular, noted that a significant number of projects register as 'false positives',[62] with recent estimates suggesting that additionality is questionable in up to 40 per cent of registered projects.[63] This implies that a carbon leakage on a scale that has the potential to undermine the efficacy of the entire climate regime may be under way.

Furthermore, it is not only the concept of additionality itself that is based on a hypothetical scenario, but also the implementation of the concept in practice.[64] In essence, it is logically impossible to accurately assess the amount of CERs generated by a project, as such assessments will always be based on hypothetical projections of future emissions without the project in place. As a result, much emphasis has been placed on the integrity of methodologies used to measure GHG reductions. Because of this emphasis, the existing bottom-up development of methodologies by project participants has proven to be both lengthy and cumbersome and has hampered the implementation of many projects.[65]

Lastly, the criterion that the CDM must be supplementary to the domestic mitigation action of Annex I States has given rise to debates because there is neither clear definition of supplementarity in Article 12, nor in the modalities governing the CDM.[66] The benefit of defining supplementarity is that it will provide a more precise understanding of the extent to which developed states must quantify their actions and to what extent they have acted domestically.

Sustainable development

In order to ensure that the CDM attains both of its stated goals, it will be necessary to provide guidance on the concept of sustainable development so as to ensure its environmental integrity. In this regard, it appears that one of the major obstacles has been a lack of objective criteria against which host states can measure projects. It is therefore proposed that, as part of the solution to this problem, a broad definition of the concept should be established by the Executive Board (EB) and approved by the COP/MOP. In this way, host states are provided with an objective list of factors with which to assess the development linkage of the project.[67]

It is further recommended that developing states wishing to participate in the CDM be required to lodge a sustainable development policy with the COP/MOP. Such a policy will have to be in line with the broad outline of sustainable development as defined by the EB and the COP/MOP, but should also take into consideration the specific circumstances of each country. This approach would arguably ensure that sustainable development is afforded greater priority in the new regime, while still giving primacy to national sovereignty.[68]

Additionality and baselines

One way of mitigating the effects of the additionality problem would be to require a certain per centage of all CERs generated be retired. As an incentive to adopt the 'CDM Gold Standard', a WWF initiative providing for a more stringent set of CDM criteria, projects of this nature will not be required to discount any CERs.[69]

Because additionality has been difficult and costly to prove, particularly in countries with low institutional capacities, it will be necessary to address further reform in a way that protects the environmental integrity of the project

whilst taking into account the African reality of severe capacity constraints. One way of achieving this may be by shifting methodologies for baseline development and additionality testing from a bottom-up to a top-down approach in specific sectors, based on objective criteria such as technology penetration rates or sectoral benchmarks, where possible.[70]The additionality testing procedure may also be further streamlined if the EB, together with the COP/MOP, chose to identify certain projects as per se additional where, for instance, certain established technologies such as wind power are used. Although these lists and benchmarks may require some time to agree on and may be data intensive, the long-term costs of the system would most certainly decrease.[71]

Supplementarity

To reiterate, it is not clear to what extent Annex I States are entitled to rely on the emission reductions created by CDM projects in order to reach their emissions targets. Providing a clearer definition of supplementarity will help to delineate the obligations of developed states domestically and it will therefore safeguard the ultimately required global transformation towards low carbon economies. As a result, it is important that this criterion becomes clearly incorporated into Article 12, with the COP/MOP being given the authority to provide guidelines and criteria for its quantification.

Double-counting

With regards to the proposed expanded CDM approach, particular attention may need to be paid to a clear definition of sectors so as to avoid double-counting.[72] This is due to the fact that individual project-based and sectoral CDM activities may run concurrently.[73] This may be avoided by requiring that individual projects are identified as falling within a particular sectoral activity or not. The relevant state's Designated National Authority (DNA) would be required to assess not only sustainable development criteria, but would also have to determine whether an individual project falls within a sectoral CDM project.[74] CERs will have to be divided accordingly between government initiated sectoral projects and individual activities.[75] Individual actors who wish to institute CDM projects would thus be required to undertake the additional step of consulting with the relevant DNA so as to prevent double-counting.

INSTITUTIONAL REFORM

The institutional framework of the Kyoto Protocol is currently made up of the COP/MOP, with the EB in a core role and with board-accredited Designated Operational Entities (DOEs), private entities chosen by the project participants, which validate the project itself, as well as the emission reductions of the project. There are also nationally appointed DNAs which function as project approvers for nationally determined criteria which, among others, include the sustainable development criteria. The EB accredits DOEs and it also registers projects based on DOE validations, and issues CERs and governs the CER registry. It furthermore exercises a quasi-judicial function by reviewing DOE assessments of the eligibility of a project before registration.[76] While the governance system and the processes to be followed in the CDM pipeline are elaborate, once again, there has been a plethora of criticism. As stated previously, this criticism is focused on various aspects, including institutional inefficiency, prohibitive costs, capacity constraints, a lack of resources and extensive delays.

First, at present the EB is not subject to the normal political and legal controls ordinarily applicable to a national regulatory agency and, as such, its decision-making practice has been criticised as inefficient, inconsistent and unpredictable.[77] Similarly, the EB has been criticised because members are not professionals or hired on a full-time basis, but rather tend to be government employees with a background in negotiations rather than market regulation.[78] As a result, changes to the EB should be centred on professionalisation and promoting the permanence of staff members. This would also simultaneously address the loss of institutional memory.

Second, criticism of the EB is also centred on the activities taking place within the system.[79] The double-checking of the DOE's responsibilities by the EB has tended to be a time-consuming activity and the bottom-up development of methodologies, requiring approval by the EB, has further intensified this time lag.[80] The problem is even further compounded by the EB's lack of resources, which has prevented it from meeting on a regular basis. As a result, a 'bottleneck' situation, which has barred the timely registration of projects, has been created.[81] Thus, a second aim for a reformed institutional structure should be to focus on increasing funding for the governance system and streamlining the CDM process.

Third, the relationship between the EB and DOEs has been criticised. In particular, there are concerns regarding the independence of these DOEs from project participants.[82] To counteract these concerns, the EB has been involved in double-checking the work of DOEs, which, as already stated, has contributed to the time lag in the registration process. The proposal presented here is, therefore, also geared towards a de-coupling of DOEs and the project participants.

Fourth, amendments to the governance structure and processes of the CDM must also reflect the scaling-up of the CDM to the sectoral approach and must focus on assisting DNAs in building capacity and expertise in assessing the sustainability of CDM projects.[83]

Implementing reforms

In order to address these challenges the following amendments to the CDM governance system are proposed:

A central EB should be maintained so as to continue to oversee project-based CDM activities. In addition, sectoral EBs should be established with members being drawn from the central EB, as well as from experts in each of the relevant sectors for which sectoral CDM activities are envisaged.[84] In following much the same approach as the central EB, the sectoral EBs should be responsible for dealing with the intricate concerns associated with implementing sectoral CDM projects, such as additionality and baseline concerns.[85] Sectoral EBs and the central EB would also establish methodologies for application within the various sectors to overcome concerns surrounding the bottom-up development of methodologies. This would make it easier for DOEs to validate projects and easier for the EB to assess the work of the DOEs. It is furthermore proposed that the EBs should develop these methodologies in conjunction with a Business Advisory Committee which would allow the EB to draw on the expertise available in the private market. The EBs will also identify activities which may be considered to be per se additional, subject to approval by the COP/MOP.[86]

Additional, mandatory funding from Annex I States should be required as a necessary contribution in order to increase the staff of the EB, to create sectoral EBs, and to contribute towards the establishment and maintenance of the overall institutional framework by ensuring greater permanence of staff members.[87]

The EBs should concentrate on monitoring the independence and impartiality of DOEs, as well as whether DOEs have adequately followed the validation protocol.[88] To ensure that the work done by DOEs continues to meet standards of environmental integrity, the EB should conduct periodical reviews of DOE

activities. It is recommended further that project developers should have a right of appeal against the rejection of projects from DOE decisions and that DOEs should, in future, be appointed by EBs, rather than by the project participants themselves to prevent any conflict of interest by DOE staff.

Under the proposed CDM model, the role of DNAs would remain much the same. However, some reforms in this respect will be necessary to assist those states, many of which are African states, which do not yet have DNAs, or only have inexperienced DNAs. In order to facilitate capacity-building, training and education at the DNA level, capacity-building facilitators should implement training programmes. Thus, an acceptable and standardised level of work will be promoted and maintained and the concerns around approval of unsustainable projects may be averted.[89]

It may be arguable that the introduction of additional bodies such as sectoral EBs and the advisory committee to the present framework will create unnecessary complexity within the structure. There is, however, a marked trend in international law towards more complex institutions which is, to some extent, justified by the need to address the ever-increasing complexity of environmental law problems and the society it aims to govern. The CDM is a complex and nuanced mechanism which requires the consideration of many factors and interests. It is hoped that the changes suggested here will facilitate this, and may even do so in a way that substantially streamlines the validation and compliance process.

REFORM OF THE ADAPTATION FUND

No proposed amendment of the CDM would be complete without a review of the Adaptation Fund (AF), the precious child of the CDM, financed by a two per cent levy upon all CDM transactions.[90] The fund is, in effect, a private sector tax and has proven to be unique amongst climate-change funds because of the scale of its revenues. Indeed, the revenue generated from the CDM levy until 2012 alone is projected to be between US$160 million and US$950 million, while the funding presently given to, or pledged by donor countries to, the other two climate-change funds created by the UNFCCC, is only around US$170 million.[91] It will thus provide a vital source for adaptation funding.

In order to adequately manage and disburse the AF funds, the following suggestions are made on improving the governance structure of the AF, as well as the scope of its funding activities:

The Global Environmental Facility and governance of the Adaptation Fund

The structure and governance of the AF need to be reviewed, currently they are not adequately addressing the needs of adaptation in developing countries. First, most funding from the Global Environmental Facility (GEF) for adaptation has taken place only to the point of enabling activities known as Stage I and II activities, such as vulnerability and adaptation studies to support national communications.[92] Stage III adaptation activities, activities that facilitate adequate adaptation, including insurance and other adaptation measures as envisaged by Article 4(1)(b) and Article 4(4),[93] have not been funded by the GEF in the climate change focal area, other than on a pilot basis.[94]

Second, the funding has primarily been directed towards larger developing countries that are best able to penetrate the GEF bureaucracy to access funding.[95] Furthermore, access to AF funding has proven to be prohibitive for developing countries because of the difficulty in proving 'incremental costs' and 'global environmental benefits' in the context of adaptation.[96]

Third, it appears that, despite there being 'direct authority' of the COP/MOP over the GEF's management of the AF, as opposed to mere 'guidance', this has not had any substantial effect on the structure of authority within the GEF.[97] Additionally, despite voting within the GEF now being subject to 'one country, one vote', it is still possible that divergent interests may affect the vote. As a result, predominately financial or Official Development Assistance concerns continue to take precedence over environmental concerns.[98]

It is unlikely that the GEF or any other host institution would accept the COP/MOP as a full replacement for the GEF assembly or its respective decision-making body.[99] Furthermore, it would be unwise to remove the financial and development expertise offered by the GEF from a decision-making body.[100] It appears, however, that there is a need to ensure that the theoretical authority granted to the COP/MOP is translated into reality. An ideal amendment would thus be to integrate COP/MOP interests into the executive decisions of the AF by delegating a number of interest group representatives from the COP/MOP to participate in the decision-making process. In order to do so, a new COP/MOP Adaptation Fund Committee (AFC) should be created to represent these interests.[101]

Under this new structure, an Adaptation Fund Executive Council (AFEC) would serve as the governing body of the AF. This body would be representative

of two separate bodies acting together. The first would be the AFC which, upon determination of the COP/MOP, would either be made up of Kyoto Protocol Parties chosen to represent certain COP/MOP constituencies, or of individuals chosen for their expertise which would represent the COP/MOP as a whole with a decision-making status equal to all other members, if any, of the AFEC. The second body would be created by the host institution executive body which would act jointly with the AFC. They would thus meet and take decisions jointly as the AFEC.

In order to safeguard against 'backroom deals' by the representatives of powerful countries beyond the control of the weaker constituents, it is also proposed that initiatives and referenda for members of the COP/MOP be introduced.[102] COP/MOP parties will thus have both the right to vote on AF issues as well as the right to table motions for the AFEC and to force a ballot whether or not they are members of the AFEC.[103]

Extending the range of the Adaptation Fund

To address the lack of funding for adaptation while at the same time recognising the difficulty in realising national financial commitments, it is recommended that the future AF be expanded. This could be achieved by broadening the scope of the two per cent levy so as to apply it to the other two flexible mechanisms, i.e. Joint Implementation and Emissions Trading. Further methods of enhancing funding for adaptation could also include increased funding from public expenditures and development bank loans and tax incentives that would attract more foreign direct investment in terms of capital, technology and skills, and which would enhance domestic abilities to mitigate and adapt to climate change.

The additional funds that would be available to the AF, if the funding sources were to be expanded, could be used not only to fund adaptation activities, but also to address capacity-constraint issues. This could be done by financing developing countries that are unable to fund the creation of their framework sustainable development policy under the protocol as well as to support sustainable development projects that fall outside of the CDM. It would also serve as a resource to finance capacity-building facilitators. As a way of encouraging sustainable development policies and measures (SDPAMs) outside of the CDM, the funds could also give preferential access to those countries who have demonstrated efforts to implement SDPAMS.

CONCLUSION

Institutional capacity and expanded opportunities are the bottom line for implementing the CDM in Africa. The proposals made in this chapter were therefore focused on improving capacity and expanding the CDM to provide this opportunity for the African continent. However, given the need for emboldened action on climate change and the many other issues that have hampered the realisation of the goals of the CDM, this contribution has also aimed to provide suggestions with the view to improving and streamlining the CDM process and institutional structures, and has sought to address funding constraints and problems arising out of the nature of the CDM as a market mechanism.

Regardless of whether any of the proposals made in this chapter would influence the structure of a post-Kyoto framework or merely open policymakers, legislators, or negotiators' eyes to new solutions and perspectives, our ultimate goal remains to find a comprehensive solution to the climate crisis. Given the statistics and scientific information on climate change and the potentially devastating threats it poses to humanity, to the very survival of our species and that of many other species sharing the ecological space with us, the urgency with which such a solution must be crafted calls for innovative and courageous new ideas. In this endeavour, the role of Africa cannot be overlooked. It is our sincere hope that some of the suggestions made herein will find their way into the future protocol and that they may go a long way towards crafting a protocol for sustainable development in Africa and, ultimately, secure the sustainability of humanity's impact on the planet.

NOTES

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Protocol has already had a much larger impact on climate change mitigation than the Kyoto Protocol is likely to achieve.

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20 Intensity levels would mean measuring emissions as a per centage (instead of an absolute amount) of below an anticipated 'business as usual' baseline.

21 Action targets would require reductions equal to an agreed per centage of emissions of actual rather than projected emissions. The reduction requirement is based on actual rather than projected emissions.

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67 It is recognised that developing countries thus far have been emphatic about having the sovereign determination over what constitutes sustainable development. However, it is submitted that the risk to environmental integrity of the process is too great to allow these sovereignty concerns to take precedence. To some extent perhaps a compromise could be reached by providing for a collaborative process whereunder the EB's would determine together with discussions with parties as to how these guidelines would apply and perhaps be tailored to meet the needs of individual states. Sustainable development could be defined along the following broad criteria: income generation, environmental sustainability, employment generation, capacity building and technological development. C Figueres, Sectoral CDM: opening the yet unrealized goal of sustainable development, 10–11, and A Cosbey et al, Realizing the development dividend: making the CDM work for developing countries phase 1 Report, 15, set out a possible list of criteria that could be used to assess sustainability.

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8 The clean development mechanism and forestry projects in Cameroon

The case of forestry projects in Cameroon

Christoper F Tamasang

ABSTRACT

This chapter examines the potential which the Clean Development Mechanism (CDM) offers for the reduction of carbon dioxide emissions in Africa. In doing so, the paper investigates the CDM's conditionality drawn from the provisions of the Kyoto Protocol itself, literature on the subject, and certain decisions of the Conference of the Parties (COP) to the protocol. This conditionality is examined within the context of African forest projects in general, and Cameroon forest projects in particular. The chapter concludes that there are a number of legal concerns under the protocol which require review if the objectives of the CDM are to be achieved, and proposes that a better option to climate change governance mechanism would consist of complementing project development with litigation.

INTRODUCTION

One of the most serious environmental and development challenges of this millennium is undoubtedly a change in the climate systems of the world.

Consequently, climate change has suddenly vaulted to the top of the global agenda. This is traceable to global initiatives intended to address the climate change phenomenon, its causes and adverse effects on common concerns of humankind. One such leading global agreement is the United Nations Framework Convention on Climate Change (UNFCCC) signed in 1992 as one of the outcomes of the Rio Conference on Environment and Development. To ensure the observance and enforcement of the UNFCCC, the international community converged in Kyoto and, with the exception of some major industrialised world powers, adopted the Kyoto Protocol.

The principal focus of the Kyoto Protocol is climate change. Climate change refers to the potential response of the earth's climate system to altered concentrations of greenhouse gases (GHGs) in the atmosphere.[1] There is consensus among scientists that the balance of evidence suggests that there is a discernible human influence on global climate change.[2] The principal anthropogenic GHG responsible for climate change is carbon dioxide (CO_2) from fossil-fuel based economies and deforestation from developing countries, including African countries.[3] The result is that these and other emissions pose a threat to humankind and environmental resources in equal measure. The Kyoto Protocol attempts to address the global overall emission of GHGs through a number of provisions on mitigation. This is, *inter alia*, through the Clean Development Mechanism (CDM) which is one of the three flexible mechanisms under that protocol.[4] The protocol, through its CDM, makes provision for investment by developed countries and their industrial legal entities in projects related to carbon emission reduction and carbon sequestration in developing countries, which would include Africa.[5] While these projects will enable developed countries (the so-called Annex 1 countries) to meet Kyoto emission reduction and quantified emission limitation targets, they should contribute to sustainable development in developing countries (so-called non-Annex 1 countries).[6]

The CDM, therefore, possesses some potential for climate change mitigation in Africa. Referring to African forestry projects in general, and Cameroon forestry projects in particular, this chapter commences with an investigation into legal conditionality or requirements under the Kyoto Protocol for the CDM mechanism, and attempts to assess the extent to which African forestry projects in general, and Cameroon forestry projects in particular, could play a role in the CDM context. The chapter then proceeds to examine the challenges to the attainment of the CDM conditionality provisions, and explores some

opportunities and benefits that may arise from an effective implementation of the CDM conditionality. The chapter suggests that, to reap such benefits, the continent must harness some legal responses that may enhance progress in the direction of the implementation of CDM forestry projects.

THE CLEAN DEVELOPMENT MECHANISM REQUIREMENTS OR CONDITIONALITY

The CDM and the other flexible mechanisms are market-based mechanisms that allow countries to buy and sell allowances of carbon credits created through emission reduction projects. Prior to the issuance of certified emission reductions by the CDM Executive Board, CDM projects must meet a certain number of conditions. These conditions or requirements are contained in the protocol itself,[7] in subsequent Decisions[8] arrived at during the Conference and Meeting of Parties and in some analytical and critical climate change literature on modalities and procedure.[9] The current CDM requirements may be subsumed under the following headings: eligibility or fitness, additionality or added value, acceptability, externalities and certification. In fact, these are the conditions under which all projects qualify as CDM projects in developing countries. It is these conditions that are examined seriatim in the sections below by drawing examples from forestry projects in Africa and Cameroon.

CLEAN DEVELOPMENT MECHANISM REQUIREMENTS FOR FORESTRY PROJECTS

Eligibility or fitness

Two dimensions of issues relating to land eligible for CDM projects in Africa are discernible, namely: the suitability of the forest within the definition of 'forest' provided by the host country as required by the Conference of the Parties,[10] and the type of forestry activity.[11]

The suitability of the forest

With regard to the suitability of the forest, the Conference of the Parties, through their Decisions (11/CP.7 and 19/CP.9), require countries to define and choose ranges for national threshold values of crown cover, tree height and

minimum land area. It is further required that these values be determined and communicated to the executive board of CDM by the Designated National Authority (DNA) of the host country. The Forestry Law[12] of Cameroon, for instance, defines forest as: '[A]ny land covered by vegetation with a predominance of trees, shrubs and other species capable of providing products other than agricultural produce.'[13] In spite of the fact that the conception of this definition by the Cameroonian forestry legislator came at a time when negotiations leading to the Kyoto Protocol were only just commencing, it must be noted that today this definition does not consider issues like crown cover, tree height and minimum land area as required by the CDM fitness criterion. In addition, the requirement of choosing single values each for crown cover calls for empirical and mathematical formulae entailing meticulous data analysis of CO_2 sequestration potential of various forest types for African countries.[14] This complicates the definition of 'forest' within the CDM rules and forces many countries[15] out of the eligibility requirement. To meet this arm of the eligibility requirement, Cameroon is therefore still required to clarify and communicate the definition of 'forest' to the executive board of the CDM.

Type of forestry activity

The second dimension of the eligibility criterion turns on the type of forestry activity. For this, the categories are closed, at least for the first commitment period of the Kyoto Protocol. They include afforestation and reforestation (A/R) activities.[16] These activities have been considered the dominant mitigation options[17] by the Kyoto Regime. Afforestation under the CDM rules would mean planting trees on land that has been below all the threshold values, including crown cover, tree height and minimum land area of the host country's definition, for a period of at least 50 years.[18] Reforestation by the same rules entails planting on land that has been below the threshold value since 31 December 1989.[19]

Some authors have forcefully argued that afforestation and reforestation projects (or sink projects) make sense in Africa in the light of the sometimes severe land degradation that occurs, and because of the heavy dependence on wood resources for people's livelihoods.[20] While this argument may be tenable, it is unfortunate that many African countries have not or are unlikely to regard the argument in a similar light. Perhaps, for purposes of meeting the CDM eligibility requirement, these countries must rethink their position. For this to happen, however, countries must also surrender heavy reliance on external funding for A/R projects. Fortunately, the Conference of the Parties, in Decision No 14/CP.10 and Decision No 19/CP.9, have simplified the modalities to what is now known as small-scale afforestation and reforestation projects intended to facilitate implementation. For these projects to qualify, therefore, the host country needs to approve that the project developers are low-income communities or individuals. This is a clear indication that the CDM requirements are framed basically for micro-level projects which, of course, is a potential which should be exploited by African countries.

Most forestry projects operating in African countries in the recent past have been structured around community participation in forest management for sustainability,[21] resulting from various national laws on procedure of acquisition and management. In fact, the community forestry project in Cameroon may to an extent be identified with the CDM project, as it is acquired and managed by village communities living on less than half a dollar a day and who are involved in small A/R projects in their compartment programs within their community forestry management plan as required by law.[22] The government has, however, not clearly determined the criteria that would define such a community as required by Decision 14/CP.10. It simply states that a community should be a village community neighbouring the forest.[23] Again, within the context of the Decision above, individuals involved in private forestry projects envisaged by the Cameroon Forestry Law[24] could also qualify under this CDM conditionality. They are, in addition, people living on less than half a dollar a day. In any case, for such small-scale A/R to qualify for CDM, they must result in net GHG removal by sinks of less than eight kilotonnes of CO_2 per year during the crediting period.

Additionality or added value

Under this head, emission reduction or sequestration must be 'additional' to any that would occur in the absence of the proposed projects in accordance with the CDM modalities and procedure.[25] Considered otherwise, additionality means that projects must result in a net storage of carbon and thus a net removal of carbon from the atmosphere.[26] Additionality may take various dimensions. Programme additionality, for instance, may imply that emissions reduction is additional to emissions stipulated by law in the host country. Additionality may also be investment in nature, whereas a project might justify added value

by showing that the creation of carbon offsets will entail cost that would not be incurred in the 'business as usual' opportunity. However, this may not be considered as a requirement *per se*. Finally, financial additionality requires that funding for the implementation of projects must not come from overseas development or funds from environmental assistance.

Throughout Africa, and in Cameroon in particular, legal issues that are likely to influence additionality as a CDM requirement could be articulated around land tenure policies, forest resource rights, and risk management regulations.

Land tenure policies

Land tenure reforms in most African countries after independence have led to much confusion. In Cameroon, for example, land tenure legislation[27] provides that land belongs to the state. Yet in terms of customary law, local communities own land and the generalised nature of ownership in this respect is that of collective land ownership. The result is that, as the government grants titles as evidence of ownership, the local traditional chiefs, who today in Cameroon wield political powers in addition to their natural ritual powers, may also establish elements of sovereignty over land ownership and management. A natural result is that some people may hide behind the state ownership provision to access and enjoy land at the local level, thereby ignoring the authority of local chiefs. Some authors have argued that this kind of confusion arising from national and local level overlaps may not favour carbon project uptake and management.[28]

Forest resources rights and risk management regulations

To meet the additionality requirement, rights to forest products must be clearly defined by law. If communities can clearly determine their entitlements or benefits to carbon, this will encourage proper investment and commitment to increase carbon sinks and sequestration. Generally, African forestry projects involving communities have hardly stipulated clear and precise provisions on benefits to local communities from forest management. In Cameroon, for example, the forest does not *stricto sensu* belong to the communities, but communities are entitled to forest products resulting from their activities as provided for by the 1994 Forestry Law. The latter law also provides that forest products of all kinds resulting from the management of community forests shall belong solely to the village communities concerned.[29]

A *prima facie* reading of this provision gives one the impression that even carbon sequestration belongs to the communities involved in A/R projects. Unfortunately, the same law provides that forest products comprise mainly wood and non-wood products as well as wildlife and fishery resources derived from the forest.[30] The law further lists certain forest products, and concludes by stating that the list of special forest products shall be fixed, as and when necessary, by the competent ministry.[31] This may be problematic since the list of special products is not closed and can be extended at the discretion of the minister concerned; it implies that carbon services could be included into the list of special products. Should this happen in the community forest or CDM projects, communities would be frustrated. Consequently, it is unlikely that they would risk investment for carbon sequestration, more so because they are unlikely to bring an action against the state in any court in such circumstances, as this would be substantially and procedurally very difficult.[32] Worse still, the minister reserves a right to suspend or terminate the community's forest management agreement.[33] The investment risk is accordingly multiplied in this case. A crucial question, then, is what becomes of the certified emission process in any of the cases above? The foregoing analysis notwithstanding, it can be submitted that, in any event, the provisions of the law are so clear, i.e. 'forest products of all kind' that a subsequent ministerial decision should not prevail over the law. This suggestion is predicated on the fact that, according to the hierarchy of legal norms, such a ministerial decision would not override the provisions of the law.

CDM projects involve investment by developed countries or their legal entities in projects in developing countries. However, a lot of caution needs to be exercised in terms of resource risk minimisation. Forest fires have always been the principal cause of African forest destruction and pose several risks to potential CDM projects.[34] Forest fires are often caused by communities as they use them as a clearing technique for subsistence agriculture, provoking fresh grass growth for cattle, and hunting, especially in the mountainous forest regions of Africa.[35] As a matter of fact, community crops and forests are usually extensively destroyed by fire. Consequently, there is need for harmonised policies and strategies[36] to address problems caused by fire because, if not, a difference in fire-fighting techniques would have far-reaching implications for carbon forestry projects, as this may discourage investors' confidence in carbon forestry in the host country.

Acceptability

For carbon emission reduction projects in developing countries to qualify as CDM projects, a number of criteria must be fulfilled. They include sustainable development, consistency and conformity with international legal instruments. There must also be an evaluation of the A/R CDM projects in connection with risks associated with the use of potentially invasive alien species or genetically modified organisms (GMOs). These criteria are considered below.

Sustainable development considerations

The Kyoto Protocol is firm on the sustainable development criterion.[37] The Conference of the Parties[38] also reiterates the fulfilment of this criterion for projects to be acceptable under the CDM. In this respect, therefore, African countries in general, and Cameroon in particular, must have clearly articulated criteria for sustainable development if the objective is to have forestry projects fall under the CDM regime. Of course, the fulfilment of this criterion may not be easy given the sustainable development *problematique* debate which pitches the concept as a goal, an objective; a process against rules, principles, procedures, and an emerging umbrella of environmental and related rights.[39] Furthermore, sustainable development considerations have posed numerous problems, and some writers have taken the view that it is a paradox as it requires bringing together irreconcilable ecocentric and anthropocentric principles.[40]

This notwithstanding, Cameroon has defined sustainable development criteria for project assessment under the CDM.[41] Unfortunately, these criteria have not yet been tested on any carbon forestry project. Therefore, the challenges in this respect that projects that are approved actually contribute to sustainable development, are significant. It has been argued that the indicators are not sufficiently tight and, in some cases, are even redundant.[42] Drawing examples from some community forestry projects, the community forestry legal framework stipulates some requirements that are intended to enhance sustainable management of forests. This would include a demonstration that all villagers participate in decision-making to create a community forest; that inventories are carried out; management plans are produced; forest boundaries are clearly demarcated; and benefit-sharing mechanisms are clearly set out.

Although in Cameroon all approved community forests today could be said to have fulfilled these conditions, more than half of the communities are not

respecting their management plans, especially those in the southern part of the country, where timber is the main forest product and attracts many timber exploiters for immediate financial gains.[43] How, then, will sustainable development be enhanced in these circumstances? It is proposed that, within a small-scale of CDM projects with simplified procedures, carbon funds could be more beneficial and could enhance a scenario where carbon forestry projects would replace illegal logging and the so-called 'sale of standing volume' as the former contributes to sustainable development in the country. In sum, proper mitigation of climate change through carbon forestry projects offsets and sustainable development considerations are mutually reinforcing.[44]

Consistency and conformity with international law

Projects vying to qualify as CDM projects within the ambit of the acceptability requirement must be consistent and comply with other international legal instruments. This would entail that African forestry projects in general, and Cameroon forestry projects in particular, must clearly demonstrate that they are not repugnant to the spirit of other international agreements and guidelines pursuing similar or related objectives. Therefore, any forestry project should demonstrate consistency and conformity with, for example, Agenda 21. Cameroon, like many other African countries, has signed and/or ratified most of these international natural resource management agreements and must therefore consider the provisions of the international law regime when crafting CDM forestry projects.

Regulatory framework for potentially invasive species and GMOs

Forestry projects that use invasive or potentially invasive species and GMOs are at risk of being successfully executed. For instance, the *daisies* have been identified as invasive species with enormous threat to forest margins, commercial forest plantations and others in the Southern part of Africa[45]. To ensure that this kind of risk is assessed and sufficiently controlled by countries undertaking forestry projects, the CDM cautions that such countries should provide regulatory frameworks which address such risks. Fortunately, some countries of the Southern African region, South Africa, for example, has legislation on the control, cultivation and trade of invasive species[46]. However, non-registration of a forestry project, for instance, will not be justified in the absence of regulations for potentially invasive species and GMOs, especially where there is little risk

for this affecting the project. It may nevertheless be important for sustainable management of ecosystems as a whole.[47]

In the case of Cameroon, there is no clear regulatory framework for such a cautionary approach, but a casual and somewhat indirect reference is made in Decree No 95-531-PM of 23 August 1995 as per the following phrase: '[T]he conditions organising the prevention and control of diseases and insects threatening forest plantations and species shall be determined by order of the Minister in charge of forestry.'[48] Unfortunately, as is the case with other incorrectly drafted and postponing provisions of this nature in forestry legislation, such a ministerial order is still awaited.

Externalities

The following sections examine two phases of externalities, namely impact assessment and leakage.

Impact assessment

For forestry projects to meet this requirement there must be a clear demonstration of a strategy to deal with impacts or effects that are likely to ensue from project implementation. Such impacts may be positive or negative in an economic, sociocultural and environmental sense. In fact, a majority of African countries have now crafted impact assessment policies for project initiation and implementation. In the case of Cameroon, there exists an arsenal of legislative instruments[49] for impact assessment of projects. It means, therefore, that in the case of CDM projects, the DNA would only approve forestry projects that take impact analysis into consideration. Cameroon, like many African countries, is most likely to meet this arm of externalities since it has various impact assessment policies and laws already in place.

Leakage

It is increasingly acknowledged that leakage is an important aspect of externalities in CDM projects. Leakage is the unplanned emission that may occur outside the frontiers of a project as a consequence of activities within the project. In forestry projects, for example, a conservation measure intended to increase carbon reservoirs or sinks within the forest may lead communities depending on such a forest to recover lost opportunities by increasing pressure on neighbouring forests. Consequently, the carbon sinks or reservoirs envisaged within the project may be offset by carbon emissions in the adjoining forest.[50] Ordinarily, leakage should not invalidate a project unless, of course, it clearly emerges that projections of emissions are sufficiently substantial to negate estimated carbon offsets. This notwithstanding, project analysis should show how such eventualities will be minimised.

Certification

Certification is the last stage before emission reduction certification is issued by the CDM executive board. It deals with the review and approval of project procedure. Prior to this, the CDM rules require that the measurements, reality or concreteness of the project and its long term characteristics be verified independently by a designated operational entity (DOE), a third party accredited by the CDM executive board. The CDM project phase must pass three tests. These are discussed below.

The validation stage

This stage involves the process of independent evaluation of the proposed project as evidenced in the project designed document and as required by the CDM. The end result of this stage is the registration of the project which is the formal acceptance by the executive board of the validated project.[51] In fact, registration is the prerequisite for verification, certification and issuance of certified emission reductions relating to the project activity.

The verification stage

This is a crucial and complicated stage as it entails an independent review process of monitoring reduction or sequestration that has occurred since the registration of the project activity. It has to be done within a timeline and after project implementation has started. The objective is to actually assess the extent to which carbon offsets have been attained.

Certification stage

The certification stage is where the DOE gives a written confirmation of the emission reduction or sequestration achieved by the project during a specific period. The outcome is the issuance of certified emission reduction. Thus, to meet the CDM

requirement of certification under the Kyoto Protocol, all African countries must go through the review and approval procedures. In Cameroon, for instance, the review and approval procedures for CDM projects are contained in a Ministerial Decision.[52] The review and approval procedures are done by the DNA, i.e. *Comite National MDP Cameroun*. The ministry has reviewed and approved more than 300 community forestry applications based on the regulatory framework,[53] although, in some instances, with difficulty.[54] As the government is currently reviewing and updating the community forestry regulatory framework, this may eventually facilitate review and approval processes, and the DNA could learn some lessons to eventually use in reviewing and approving CDM forestry projects.

TRENDS, CHALLENGES AND OPPORTUNITIES RELATED TO THE ATTAINMENT OF CDM REQUIREMENTS IN AFRICAN FORESTRY PROJECTS

Trends

The Kyoto Protocol, through its CDM, offers potential for the development of carbon forestry projects in Africa. Unfortunately, the CDM's potential for carbon forestry development sometimes appears too difficult for African countries to realise. This view has also been taken by other writers stating that trends in African participation in CDM projects are especially grim.[55] This may explain why, to date, only one of about 30 CDM forestry projects has been approved.[56] There is concern that Africa may lose out on opportunities. However, there are quite a number of CDM energy projects in Africa. The crucial question is: why are carbon projects not being mounted in Africa and in Cameroon despite the potential from CDM? Put another way, what are the opportunities for and constraints or challenges facing effective uptake of CDM forestry projects in Cameroon?

Challenges

Non-consideration of local realities

The African continent, particularly Cameroon, is characterised by various indigenous and traditional realities. These realities range from knowledge institutions, customs, forest types and policy frameworks, to name but a few. The challenge is greater for Africa when we adopt a uniform solution to the world's problems, for instance the modalities for CDM forestry projects. Therefore, indigenous and traditional knowledge institutions of the people, the forest types, and the type of national policy orientation are tremendous challenges which ought to have been addressed in the Kyoto Protocol and should be addressed in future agreements.

Community forestry reforms

As already demonstrated above, there is a paucity of CDM forestry projects in Africa and in Cameroon. Why is this so? Perhaps there is a need to encourage community forestry projects through legal and institutional frameworks at national level that simplify the procedures, application, registration and approval.[57] There is a need to re-orientate community forestry applications towards those that prioritise afforestation and reforestation programmes because the technology to grow trees in such programmes is simple and therefore facilitates access to the resource.[58] In fact, emphasis on community forestry projects is explained by the fact that the CDM is basically a bottom-up process,[59] i.e. initiated and implemented at the local community level.

Nongovernmental organisation involvement

NGOs have been involved in various forest projects involving local people in African countries. They are inevitable partners in this process, providing expertise and, in some cases, financial assistance to local people.[60] However, their involvement has always lacked legal legitimacy, especially in Cameroon forestry projects, where legislation does not spell out the terms of their responsibilities. Therefore, to tap the CDM potential, better NGO involvement in carbon forestry project requires a legal tone which of course also would be contingent on the government's political will to facilitate a strong partnership between NGOs and local communities.

Capacity building

The designation and uptake of CDM projects requires finances, skills and data on forests. A major challenge for African countries in general and Cameroon in particular, is to build the capacity of persons to research and reinforce skills necessary for the process. Fortunately, various efforts are already underway in Cameroon in this respect, for example, the increased involvement of government

in capacity-building programs for the initiation of CDM project and mobilisation of funds through the Special Forestry Development Fund.

Creation of the Designated National Authority (DNA)

The DNA required by the Kyoto Protocol is the national structure in charge of CDM activities at national level which should ensure a link between the host country and the CDM process at the international level. It is still a constraint in CDM projects, as many African countries have not yet established these structures. Stehr,[61] for example, reports that only 26 African countries have DNAs. This may be a significant constraint in efforts to fully realise the CDM potential.

Benefits

CDM forestry projects could import the following advantageous and beneficial results.

Carbon forestry benefit rights

A clear definition of ownership and access rights to land and forest resources will trigger interest of communities in initiating and implementing CDM projects. Local communities will be curious to ascertain their benefits from involvement in carbon forestry projects, whether under the current community forestry project, its review, or again in an entirely new CDM dispensation. This issue revolves around the question on how the emerging paradigm-payment for environmental services (PES) would be used to compensate land and resource users contributing to environmental services.[62] Once communities are guaranteed of their carbon rights and how the same would be equitably distributed, this would arguably constitute an incentive for long-term investment in carbon sequestration projects such as CDM forestry projects.

Sustainable development benefits

Besides the mandatory provisions on sustainable development enumerated in Article 12 (2) of the Kyoto Protocol, CDM projects, if properly implemented, should lead to sustainable livelihoods and the socioeconomic development of the host country. Local communities are aptly placed to realise the ideals of sustainable development since they are actively involved in social, economic and

conservation activities. Moreover, CDM projects which are properly executed should increase the chances of achieving these objectives.

LEGAL RESPONSES AND PROGRESS MECHANISMS

Given the trends and challenges of CDM forestry projects in Africa discussed above, what then would be the appropriate legal responses and progress mechanisms to address, especially, the challenges associated with the CDM and forestry projects?

The appropriate response to the Kyoto regime for African countries would be to create an enabling environment for CDM project initiation and continuance in their respective countries. It is true that there are various CDM projects across Africa,[63] but few forestry projects, which are important as they have high capacity to reduce CO_2 emissions. What this means is that African countries should embed the Kyoto CDM-related provisions at the national level through a deliberate policy approach which is proactive in nature. This will entail a holistic approach involving but not limited to: creation of a DNA, provision of financial assistance to design CDM forestry projects; clarification of sustainable development criteria; clarification and communication to the executive board of the CDM of the definition of forest; and enhancing integrated land-use planning.

At regional level, one important response and progress mechanism would be the creation of a continental network that could constitute *inter alia*, a think tank with the sole mission of identifying and cataloguing difficulties encountered in initiation and implementation of CDM projects in general, and forestry projects in particular, so that they could be presented to the Conference of the Parties. There are likely to be some particularities, as the continent is diverse. There would, however, also be numerous commonalities. It is expected that similar developments will be discussed *en bloc*[64] at future climate change meetings aimed at redesigning a post-2012 legal framework that encapsulates all these concerns.

At the global level, the Conference of the Parties may also have to review a number of issues. Under the Kyoto Protocol, only afforestation and reforestation projects are eligible for the CDM forestry projects. This is an extremely limited view. The reason is that tropical deforestation accounts for 20–25 per cent of annual global CO_2 emissions.[65] The Kyoto Protocol ignores these statistics, which is evident in its exclusion from eligibility of tropical forest conservation

and prevention of deforestation as an action for mitigating climate change. The bulk of African forest is of a tropical nature and is found in Central Africa and in countries such as Cameroon.[66] These tropical forests are, however, disappearing at an alarming rate. There is need for compliance and enforcement mechanisms as these tropical forests are important not only for climate change mitigation but for various other ecological reasons.[67] It has, for example, been demonstrated that reducing tropical deforestation can make substantial contributions to CO_2 emission reduction.[68] For the above reasons, forest conservation should be included in the Kyoto Protocol and future mechanisms. It should accordingly be one of the primary issues for inclusion in a post-2012 legal framework.[69]

Another important consideration would also be for the post-2012 regime to provide opportunities for financial support that would enable low income countries, such as Cameroon, to meet the financial additionality criterion for CDM forestry projects.

One principal problem which has been identified as a challenge to the CDM is the lack of participation of African delegates in climate change negotiations. The Kyoto Protocol bears testimony to this fact.[70] A broader representation and active participation will enable delegates to sell African local realities and provide a place for these in final binding documents.[71] Such a broad-spectrum approach and active participation may also facilitate the crafting of commitments that are environmentally effective, cost-effective, equitable and institutionally feasible.[72]

CONCLUSION

This chapter has principally focused on the potential which international binding agreements have in respect to governing climate change at the local level. It has been demonstrated that the Kyoto Protocol, as an international legal governance instrument, has, *inter alia*, provided CDM mechanisms that enhance partnerships between Annex 1 and non-Annex 1 countries as defined under the protocol. The initiation and management of CDM forestry projects in Africa in general, and in Cameroon in particular, is low compared to Asia and Latin America. Some constraints or challenges in this respect have been explored in this chapter and the question now is whether the CDM is the panacea for addressing climate change challenges. In other words, what other governance mechanisms could be employed to add to CDM forestry projects in Africa?

The promotion and enforcement of human rights has emerged as one governance mechanism for addressing climate change systems in different countries across the world. Another is climate change litigation. Climate change litigation is now increasingly based on the grounds that the negative impact of climate change, usually from poor governance, affects human rights.[73] African countries, Cameroon inclusive, are caught up in the tenuous web of poor governance and it seems that litigation may provide an answer to this challenge. Of course, the basic question remains that of *locus standi*. Therefore, Cameroon and many African countries must soften *locus standi* requirements to allow climate change litigation in this regard.[74] Potential plaintiffs would include individuals, groups, environment and social responsibility groups (NGOs), governments, foresters and biofuel producers in the case of significant land-use changes.[75] The motivating factors to the litigation mechanism of addressing climate change are based on increasing scientific certainty, emerging legal precedent and growing public awareness of climate change, its causes and impacts.

Cumulatively, these and the other proposals suggested above, may work in tandem to ameliorate the current dire situation caused by climate change in Africa.

NOTES

1 See D Hunter, J Salzman and D Zaelke, *International environmental law and policy*, New York: Foundation Press, 1998, 69.

2 See IPCC Report, IPCC-XX/Doc.1, 2000.

3 P Sands, *Principles of international environmental law* (2nd ed), Cambridge: Cambridge University Press, 2003, 358.

4 The other two mechanisms are Emission Trading and Joint Implementation.

5 For more, see Art. 12 (1–10) of the Kyoto Protocol.

6 See in particular, Art. 12(2) of the protocol.

7 See for instance, Art. 3(3) and (4), 6 and 12.

8 Such decisions include mainly Decision 11/CP.7- FCCC/CP2001/13/Add.1 on Land Use, Land Use Change and Forestry; Decision 14/CP.10-FCCC7CP2001/13/Add.2 on Small Scale Afforestation and reforestation projects; Decision 17/CP.7-FCCC/CP2001/13/Add.2 para 7 on Modalities and Procedures for the CDM as defined in Art. 12 of the protocol, Decision 19/CP.9, FCCC/CP2003/6/Add.2 on Modalities and procedure for smallscale afforestation and

reforestation projects, and the Marrakech Accords. The latter are a package of measures that enable the Kyoto Protocol to start operations and contain 262 pages and 39 decisions. They were formally adopted by the COP/MOP1in Montreal in December 2005, providing the much-needed framework of Guidelines, Modalities and Rules for moving forward with the implementation of the protocol.

9 See, generally, P V Desanker, The Kyoto Protocol and CDM in Africa. A good idea but … http://www.fao.org/docrep/009/a0413e/a0413E05.htm; Sedjo et al, Renting carbon offsets: the question of permanence, [http:/www.weathervane.rff.org/pdffiles/roger3.pdf]

10 See, in particular, Decision 11/CP.7 Annex on Definitions, modalities, rules and guidelines relating to land use, land use change and forestry activities under the Kyoto Protocol, 58, and Decision 19/CP.9, Annex on Modalities and procedure for afforestation and reforestation project activities under the Clean Development Mechanisms, 16.

11 See Art. 3.3 of the Kyoto Protocol.

12 Law No 94/01 of 20 January 1994, called 'the new forestry law'.

13 See Forestry Law, s.2

14 Cameroon, for instance, is comprised of six agro-ecological zones that span from the dense, humid tropical forests in the southern parts, through the savannah type vegetation in the middle, to the Sahelian type vegetation in the northern parts. It is partly for this reason that the country has been termed 'Africa in miniature'.

15 See, generally, L V Verschot et al, Implications of country-level decision on the specifications of crown cover in the definition of forests for land area eligible for afforestation and reforestation in the CDM, Joanneaum research, Graz, Austria, 2005.

16 See FCCC/CP/2003/6/Add.1, Decision 19/CP.9 on Modalities and procedures for afforestation and reforestation project activities under the CDM.

17 See, G J Nabuurs, O Masera, K Andrasko et al, Forestry, in B Metz, O R Davidson, P R Bosch et al (eds), *Climate change 2007: mitigation, contribution of Working Group III to the Fourth Assessment Report of the IPCC*, Cambridge and New York: Cambridge University Press and York Press, 2007, 565–66.

18 See in particular, s 1(b) of the annex to Decision 11/CP.7

19 See s 1 (c) annex to Decision 11/CP.7

20 See Nabuurs, G P, Forestry, See also P.V. Desanker., The Kyoto protocol and CDM in Africa.

21 See, generally, C F. Tamasang, Community forest management entities as effective tools for local-level participation under Cameroonian law: a case study of *Kilum/Ijim* mountain forest (Unpublished Ph.D. dissertation, Faculty of Laws and Political Science, University of Yaounde II), 2008.

22 See Decree No 95-531-PM of 23 August 1995 to determine the conditions of implementation of Forestry Regulations, s. 29 (2)(b).

23 It implies that any other entity that acquires and manages the forest other than the local communities will not qualify for CDM. In Cameroon, there are what we call disguised community forest projects where wealthy elites have funded community forestry projects under the name of a community and reaping the benefits of exploitation but without the community having been the initiators nor have any benefits in terms of carbon rights as the forest is immediately exploited for commercial ends.

24 See s 39.

25 See in particular paragraphs 43-52.

26 For details, see Decision 19/CP.9, paragraphs 18-22.

27 See generally the 1974 Land Tenure Ordinances, Ordinances No 74/1, 74/2, 74/3, July 6 1974 on land tenure and state lands as modified by Ordinance No 77/1 and 77/2, January 10, 1977.

28 Notably P. A. Minang, H. Th. A. Bressers, M.M. Skutch et al, National forest policy as a platform for biosphere carbon management: the case of community forestry in Cameroon, *Environmental Science and Policy* 10(3), (2007), .204-218.

29 See s. 37(5).

30 See s. 9(1)

31 See s. 9(2)

32 See Tamasang, Community forest management entities, 321–324

33 See Tamasang, Community forest management entities, 228

34 Ibid.

35 Ibid.

36 See Decree No 95-531-PM, ss 6–8 on the role of ministry of forestry staff to determine modalities for safe and control fire, and ministry of territorial administration and decentralisation to issue permits to start fires after consultation with local forestry staff.

37 See in particular, articles 2.1 and 12.2.

38 See Decision No 19/CP.9

39 For more on the sustainable development, see C F Tamasang, Sustainable development: some reflections with regard to the new constitutional dispensation in Cameroon, *The African Law Review*, 5(1) (2008), 145–165.

40 See H Barton, Sustainable communities: the potential for eco-neighbourhoods, London: Earthscan Publication, 2000, 7. But see the argument and position taken by C F Tamasang, Community forest management entities, 7–8

41 For details, see Annex 1 of Decision No 00008/MINEP/CAB of January 2006 which spells out 11 criteria with 26 indicators overall. An interesting thing to note is that the criteria all span through the three pillars of sustainable development (social, economic and environmental pillars) although not equally distributed.

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46 See the Conservation of Agricultural Resources Act, Act 43, 1983 as amended in 2001.

47 See, generally, the Ecosystem Assessment Report (2005).

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49 See the 1995 Forestry Decree prescribing impact assessment, Art. 110(1); Decree No 2005-0577-PM of 23 February 2005 laying down modalities for realising impact assessment, and Arrêté No 0070/MINEP du 22 Avril 2005 laying down the different categories of operation requiring impact assessment.

50 K M Chomitz, Baseline leakage and measurement issues: how do forestry and energy projects compare?, *Climate Policy*, 2 (2002), 35–49

51 See, in particular, Part G, paragraphs 11of the annex to Decision 19/CP.9

52 See Ministerial Decision No 0008/IMINEP/CAB of January 2006, Annex 2.

53 The Manual of procedure and norms for the attribution and management of community forests

54 See Tamasang, Community forest management entities, 174–187.

55 See Desanker, The Kyoto Protocol and CDM in Africa, 2.

56 P A Minang, Implementing global environmental policy at local level: community carbon forestry perspectives in Cameroon, Unpublished PhD thesis, University of Tuente, Maastricht, 2007, 4–5.

57 For more on this, see Tamasang, Community forest management entities, 371 et seq.

58 See Desenker, The Kyoto Protocol and CDM in Africa.

59 See H J Stehr, The clean development mechanism: evolving to meet climate and development challenges, in *Climate Action*, London: Sustainable Development International and UNEP, 2007, 109.

60 See, generally, F Ekoko, Balancing politics, economics, and conservation: the case of the Cameroon forestry law reforms, *Development and Change,* 2000.

61 H J Stehr, The Clean Development Mechanism, 110.

62 Other environmental services from which payment may be expected to compensate land users for environmental services and which give market reasons for actors to consider such services in decision-making processes include water protection, biodiversity protection, and beauty and esthetical view. An additional reason for PES relates to environmental justice, e.g. industrialised polluting countries make compensation to non-polluting countries for the impacts of their pollution-polluter pay principle.

63 Solar thermal plant in Botswana; hydro in Congo; natural gas cogeneration in Egypt; landfill gas to electricity, palm oil biomass, and aerobic digestion in Ghana; hydro CCGT in Mozambique; and solar water heaters, and industrial energy efficiency landfill gas to electricity in South Africa. For more, see B Kinkead, Undertaking CDM projects in Africa – challenges, trends and opportunities, DNA forum, Addis Ababa: Eco-securities, 2007.

64 See, generally, D Kaniaru, International environmental negotiation blocs, *International Environmental law-making and Diplomacy Review*, University of Joensuu – UNEP Course series 4, University of Joensuu, (2006), 3–15.

65 IPCC report (2000).

66 See generally C F Tamasang, Legislation for sustainable forest management in the Central African sub-region: what prospects for effective implementation, paper presented at the 4th Colloquium of IUCN Academy of Environmental law, NY, (2006), forthcoming, New York: Edward Elgar Publishers.

67 Tamasang, Legislation for sustainable forest management, 13.

68 M Santilli, P Moutinho, S Schwartzmans, S Nepstad et al, Tropical deforestation and Kyoto Protocol, *Climate Change*, 71(3) (2005), 274.

69 P Moutinho, M Santilli, S Schwartzmans, L Rodrigues, Why ignore tropical deforestation? A proposal for including forest conservation in the Kyoto Protocol, http://www.fao.org/docrep/009/a0413e/oa413EO5.htm

70 See D Hunter, J Salzman and D Zaelke, International environment law and policy, 645–648.

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9 Regulatory Mechanisms for Implementing Renewable Energy Projects in Uganda

Emmanuel Kasimbazi

ABSTRACT

The purpose of this chapter is to review the national regulatory mechanisms for implementing renewable energy Clean Development Mechanism (CDM) projects in Uganda. It assesses the potential and the challenges of the regulatory framework. It is divided into seven sections. The first section provides the introduction. The second section examines Uganda's renewable energy resources. The third section provides an overview of the concept of CDM, while the fourth section identifies the CDM projects implemented in Uganda under the renewable energy resources sub-sector. The fifth section includes a review of the national policy and legal framework regulating the CDM projects in the renewable energy sub-sector. It is argued in this chapter that the success of CDM projects in the renewable energy sub-sector largely depends on the existence of an adequate regulatory framework. An examination of Uganda's policy and legal framework reveals that, to a large extent, it is adequate to implement renewable energy CDM projects. However, there are other non-legal limitations that have an impact on the effective operation of the regulatory framework. Some of these limitations are identified in the sixth section, in

which it is proposed that if these limitations are not addressed, the developed regulatory framework and the initiated CDM projects are likely to fail to achieve their objective. To address these limitations, section seven sets out recommendations which may assist in overcoming current deficiencies in this respect, to the appropriate authorities.

INTRODUCTION

The energy sector in Uganda relies on various renewable and nonrenewable energy resources. Renewable energy resources are those resources that are replenished continuously by natural processes.[1] These include, among others, solar energy, hydropower, biomass, wind and geothermal power. Uganda has developed some of these resources under the framework of the Clean Development Mechanism (CDM). However, the success of these projects depends on the existence of an effective regulatory framework for their sustainability.

The purpose of this chapter is to review the national regulatory mechanisms for implementing renewable energy CDM projects in Uganda. To this end, the central research question addressed in this chapter is: how effective is Uganda's regulatory framework for CDM projects in the renewable energy sub-sector? To answer this question, the chapter provides a brief outline of the background to Uganda's renewable energy resources and the CDM projects implemented under this sub-sector. It then reviews Uganda's policy and legal framework with special emphasis on its efficacy in regulating renewable CDM projects, and its key limitations. The chapter, finally, proposes recommendations to address these limitations.

POTENTIAL FOR RENEWABLE ENERGY RESOURCES IN UGANDA

Uganda is richly endowed with a variety of renewable energy resources which include plentiful woody and nonwoody biomass, solar, wind, geothermal power, and hydrological resources. Presently, with the exception of biomass, only a meagre fraction of the country's renewable energy potential is exploited. It is estimated that other renewable sources of energy, excluding large hydropower resources, contribute less than two per cent of Uganda's total energy consumption.[2]

Biomass (firewood, charcoal and crop residues) plays a significant role in Uganda's energy supply. It constitutes over 90 per cent of total energy consumption in the country. It provides almost all the energy used to meet the basic needs of cooking and water heating in rural and most urban households and institutions.[3] Biomass is the main source of energy for rural industries. Trading in biomass energy, especially charcoal, contributes to the economy in terms of rural income, tax revenue and employment. It saves foreign exchange, employs 20 000 people and generates UShs 36 billion (approximately US$20 million) per year in rural income.[4] Fuel wood requirements have, however, contributed to the degradation of forests as wood reserves are being depleted at a rapid rate in many regions. Charcoal consumption also increases at a rate close to that of the urban population (six per cent per annum).[5] This places additional pressure on forest resources in Uganda.

Uganda is also endowed with an abundance of sunshine, providing solar radiation of about 4–5 kWh/m^2/day. This level of insolation is quite favourable for all solar technology applications. Solar energy applications in Uganda include solar photovoltaic (PV), water heating, cooling and crop drying. PV systems are generally required for applications where modest power needs exist in areas that are not served by the national power grid. These provide power for lighting, telecommunications, vaccine and blood refrigeration, and for operating radio and television services in such areas. PV technology has also proven to be successful in providing energy services to inaccessible areas such as islands and mountainous areas where the national power grid cannot be expected to extend its services in the foreseeable future.

Further, Uganda has the potential for wind energy with a speed of about 3 m/s. In flat areas, especially around Lake Victoria and the Karamoja region, as well as in hilly areas, the speed even reaches 6 m/s and above.[6] These conditions are considered adequate to support wind technology applications in the country. It must, however, be noted that these wind speeds have been recorded at low heights for the sole purpose of predicting weather. No measurements have been taken at appropriate heights (over 10 m) for wind turbine design.[7]

Although geothermal energy exploitation has not been established in Uganda, there is evidence that the resource exists. Potential geothermal resources are estimated at about 450 MW in the Ugandan Rift Valley System. Apart from basic studies on the geological and geo-chemical characteristics of

several thermal anomalies, no detailed studies have been carried out to establish the economic potential of this resource.[8]

All these renewable energy resources need to be developed in order to achieve economic development and environmental sustainability. Renewable energy resources are viable options for Uganda for the following reasons. First, the increasing cost of fossil fuels renders the latter too expensive for Uganda. Experts show that if the world continues to consume energy at the current rate, nonrenewable sources will be exhausted in the near future.[9] Oil is expected to last for only 40 years.[10] Natural gas will be available for the next 70 years and coal may be available for the next 280 years.[11] Second, emissions from coal and fossil fuels are responsible for global warming and climate change.[12]

Renewable energy resources are more environmentally friendly and proper emphasis should be put on developing these resources and avoiding the challenges associated with nonrenewable energy resources. However, since Uganda has limited financial capacity to develop these resources, the benefits could be achieved if it participates fully in the CDM that will enhance technological transfer and financial assistance from developed countries.

IMPLEMENTATION OF CDM PROJECTS IN THE RENEWABLE ENERGY SUB-SECTOR

The CDM is one of the flexible mechanisms provided by the Kyoto Protocol to assist developing countries in benefiting from the climate law framework.[13] It is an important element in international climate policy because it provides a cost-effective means of complying with the requirements of the Kyoto Protocol. Defined in Article 12 of the Kyoto Protocol, the CDM provides for Annex I Parties to implement project activities that reduce emission of greenhouse gases (GHGs) in non-Annex I Parties, in return for certified emission reductions (CERs).[14] The CERs generated by such project activities can be used by Annex I Parties to help meet their own emissions targets under the protocol. It is therefore mutually-beneficial. Article 12 also stresses that CDM projects should assist the developing country host parties (non-Annex I Parties) in achieving sustainable development and in contributing to the ultimate objective of the United Nations Framework Convention on Climate Change (UNFCCC).[15]

CDM, therefore, is not only an innovative mechanism that builds a bridge over the 'North/ South' gap in the Kyoto scheme, it also brings together private economic interests and public climate policy by helping to channel private sector investment towards climate-friendly projects that otherwise might not be realised.[16] A CDM project attracts substantial transfers in financial and technological services to developing countries while promoting climate protection.[17] However, it is important to note that the technology thus transferred must be environmentally safe and sound.[18]

A CDM project must result in real, measurable and long-term benefits related to the mitigation of climate change, and it must contribute to reductions in emission that are additional to any that could occur in the absence of the certified project activity.[19] Such projects may be implemented under the renewable energy resources sub-sector.

Uganda is a party to both the UNFCCC and the Kyoto Protocol.[20] It therefore has an obligation as a non-Annex I party to cooperate with Annex I countries in the implementation of CDM projects. Uganda has undertaken a number of CDM projects under the renewable energy resources sub-sector. This section discusses some of these projects.

Uganda is pioneering the West Nile Electrification Project (WNEP). The project is part of the Ugandan government's Energy for Rural Transformation (ERT) Scheme, which is supported by the World Bank and various bilateral partners.[21] Engineers working on the WNEP have constructed a 3,5 MW hydropower plant on the banks of the White Nile (a tributary of the main river Nile) which flows from Lake Victoria.[22] It is envisaged that the project will cut demand for diesel and thermal power as well as kerosene and paraffin. It will also avoid transport emissions from fuel trucks.[23] It is hoped that this will mitigate climate change in terms of emission reduction.

Bakojja New Wood Country Forest Plantation Co. Ltd. is currently implementing the Industrial Wood Plantation of Pine and Mixed Hardwood Species Project located in Kagoma parish, Buwekula, Mubende District. The total investment in this project is US$4 062 486 (equity: US$888 570) and the total expected volume of credits is 104 000 in 25 years and 206 500 in 50 years.

Another project is the Mityana Fruit Forest Initiative located in Ssekanyonyi parish, Mityana, Mubende District. This project involves growing fruit trees that will contribute to economic development and environmental sustainability. The

total investment in this project is US$3 000 000 and the total expected volume of credits is 44 000 in 25 years and 58 000 in 50 years.

The Solar PV-based Rural Electrification Project aims to abate/reduce accumulation of carbon dioxide in the atmosphere. It is administered from Kampala City, with upcountry branch outlets at: Arua, Mbale, Bushenyi, Soroti, Masaka, Lira and Rukungiri. The total investment in this project is US$2 800 000 and the total expected volume of credits is 320 000 in 20 years.

Most significantly, the Kampala Landfill to Energy Project is based at a landfill located 10 km from Kampala, Uganda. The objective of this project is to capture the landfill gas currently being emitted from the Kampala City landfill, thereby reducing the risk of methane combustion to nearby squatters, and to utilise the methane to generate electricity which can then be used to supply the grid.[24] The electricity will also be able to provide the city with an additional source of revenue for a facility that is currently a net liability. The total investment in this project is US$1 890 000 and the total expected volume of credits for a period of 14 years is 690 270.

Another reforestation project being implemented is the UWA-Face Project in the Mount Elgon National Park and the Kibale National Park. The UWA-Face Project is a joint venture between Uganda National Parks and the Face Foundation of Holland. Under the above project, Face Foundation is funding a substantial part of the project and, in return, it obtains carbon dioxide sequestration and offset in the contract areas of Mount Elgon and Kibale National Parks during a period of 99 years (1994–2093).[25] The emissions from 27,000 hectares of regenerated forest in Kibale and Mount Elgon national parks amount to 1,500,000 tonnes of carbon dioxide worth US$45 million. Further, the emissions from 7,100 hectares in Bukabaleba forests and the adjoining Norwegian-managed forest amount to four million tons of carbon dioxide worth about US$12 million.[26] Under this project, the Face Foundation owns the carbon dioxide credits, while the trees and all other proceeds belong to UWA.

Other CDM projects in the renewable energy resources sub-sector include the Busoga Kingdom Forestry Project, located in Jinja Eastern Uganda and administered by the Ecological Christian Organisation. This project has attracted €6,6 million and the total expected volume of credits is 350 000 in 20 years. Another is Micro-hydropower for Rural Electrification project, administered in Sironko district, Eastern Uganda. This project has attracted total

investment of US$1 153 227 and the total expected volume of credits is 6 500 in 20 years.

THE REGULATORY FRAMEWORK FOR CLEAN DEVELOPMENT MECHANISM UNDER THE RENEWABLE ENERGY SUB-SECTOR

The energy sector has more significant environmental impact than most other economic sectors. Hence, energy investments must be subjected to a regulatory framework that ensures sustainable development. A sustainable energy regulatory framework is one which integrates economic, social and environmental objectives in a way that improves the wellbeing of the current generation whilst safeguarding the wellbeing of future generations.[27] Since participation in CDM projects is voluntary,[28] it is up to individual countries to create policy and legal frameworks depending on whether they consider such CDM projects to be beneficial. It can, on the other hand, be argued that designing an effective policy and legal framework for the implementation of CDM is mandatory once the country undertakes the CDM projects. This is so because the UNFCCC requires state parties to undertake policy and legislative measures for the mitigation of climate change.[29] Uganda, as a country undertaking CDM projects in the renewable energy resources sub-sector, has developed a fairly comprehensive legal and policy framework for the regulation of these projects. The following sections analyse these policies and laws.

Review of the policy framework regulating renewable energy Clean Development Mechanism projects

The Energy Policy for Uganda[30]

This policy provides the government's vision for increased and improved modern energy supply for sustainable economic development as well as improving the quality of lives of the Ugandan population. The goal of this policy is to meet the energy needs of Uganda's population for social and economic development in an environmentally sustainable manner.[31] In relation to the renewable energy sub-sector, its objective is to develop the use of renewable energy resources for both small and large-scale applications.[32]

The policy identifies key sub-sector issues for new and renewable sources of energy as including: inefficient production and use of biomass energy that results in adverse effects on the environment and the health of biomass energy users, especially in rural households; underdeveloped markets in Renewable Energy Technologies (RETs) equipment and services because of high initial investment costs and lack of financial capacity to cover the initial investment; lack of mechanisms to monitor standards and ensure quality control of RETs; and inadequate available data on the potential of indigenous renewable energy sources.[33]

The policy suggests a number of strategies to rectify these problems. These include: supporting the dissemination of biomass and other RETs to increase their positive impact on the energy balance and the environment; ensuring that RET producers and importers ascribe to certified performance and technical standards; supporting efforts to develop biomass resources in agreement with the Uganda Forestry Policy and the National Forest Plan; facilitating adequate financing schemes for RETs by establishing sustainable financing mechanisms to make them more accessible; and promoting geothermal energy development and exploration.[34]

These strategies, if correctly implemented, should facilitate the implementation of CDM projects in the renewable energy resources sub-sector. One limitation with this policy is that, whereas it seeks to promote investment in the renewable energy resources sub-sector that is more environmentally friendly, it also seeks to promote petroleum exploration. Although this is conducive to the economic development of Uganda, there are serious environmental consequences associated with petroleum exploration and the positive role played by CDM projects may be neutralised by these developments.

The Renewable Energy Policy for Uganda[35]

The overall goal of this policy is to increase the use of modern renewable energy, from the current four per cent, to 61 per cent of the total energy consumption by the year 2017.[36] In order to achieve the policy goal, government undertakes to develop, implement, maintain and continuously improve the legal and institutional framework that responds to the prevailing conditions in order to maintain interest in renewable energy investments; establish an appropriate financing and fiscal policy framework that will attract more investments in RETs; and promote research and development, technology transfer, international cooperation and adoption of standards in RETs.[37]

The policy establishes a number of strategies to achieve its objectives. Under the strategy of legal and institutional framework, government undertakes to maintain and improve the responsiveness of the legal and institutional framework to facilitate renewable energy investments. This is to be achieved through publishing a Standardised Power Purchase Agreement with feed-in tariffs for renewable energy generation projects of up to 20 MW installed capacity; creating legislation and regulations to promote the use of renewable energy and RETs in all sectors, especially by incorporating solar water heating in building plans, and energy farming to produce bio-fuels; developing appropriate regulations for grid connections, and wheeling of electricity generated from renewable energy; creating both Renewable Energy and Energy Efficiency and Conservation Departments at the Ministry of Energy and Mineral Development; and attracting qualified personnel into the sector with the view to supporting renewable energy investments.[38]

The government also undertakes to raise public awareness of the benefits and opportunities of renewable energy technologies. This is to be done by continuously acquiring data on renewable energy resources' availability; developing capacity to process and retrieve this data by establishing an energy data bank; developing and promoting knowledge and exchange of information on renewable energy to all stakeholders; and incorporating renewable energy technology into the primary, secondary and tertiary curriculum. These steps are fundamental to the success of CDM projects in the renewable energy resources sub-sector. However, despite the targeted time for implementation being 2007,[39] most of these have not been implemented. The primary curriculum has also not been reviewed to incorporate RET. Moreover, the energy data bank has not yet been established.

The Uganda Forestry Policy[40]

The objective of this policy is to establish an integrated forest sector that achieves sustainable increases in the economic, social and environmental benefits from forests and trees for the people of Uganda. The policy recognises that the private sector plays a major role in developing and managing commercial forest plantations. This may either be through large-scale industrial plantations on government-owned or private land, or through small-scale plantations on farms. The role of government in this regard is to support and regulate this development. It is required to put in place a regulatory framework which will

control illegal practices, monitor best practice, measure environmental and social impacts, and collect dues.[41] The government is also required to create a positive investment climate to encourage private investment in commercial forest plantations.

Strategies for the implementation of these commitments include: strengthening legal agreements between government and private investors for use of the forest reserves; promoting innovative financing mechanisms, such as a forestry fund, and fiscal incentives in order to encourage investment and ensure sustainable sources of operational and re-investment funds; and reviewing the Investment Code Act[42] to better accommodate large industrial forest plantation developments. The policy also strives to encourage small to medium-scale commercial plantation development; develop standards of best practice for commercial plantations; and develop improved seed sources and planting stock and promote their commercial production and distribution.[43] Although some of these strategies have been implemented, such as developing improved seeds, others have not. The Investment Code Act, for instance, has not yet been reviewed.

Under the sixth policy statement, the policy requires promotion of tree-growing on farms in all farming systems, and innovative mechanisms for the delivery of forestry extension and advisory services to be developed to increase farm incomes, alleviate pressures on natural forests and improve food security.[44] The policy recognises that there are important opportunities for tree farming on private land, for firewood, poles, non-wood products, fruit trees and even timber. This may be in the form of woodlots, agro-forestry, silvi-pasture, management of natural trees on farms, or small-scale commercialisation.[45] The government is required to provide extension and advisory services that support farmers, communities, organisations and entrepreneurs in the conservation and sustainable management of forests and in the development of farm forestry.

Strategies for the implementation of this policy statement include: strengthening the organisation of farmers for better communication and collaboration in the development of farm forestry; disseminating farm forestry advice through decentralised, farmer-driven service delivery mechanisms; developing the capacity of Non-Governmental Organisations (NGOs), Community Based Organisations (CBOs) and private contractors, as well as government agencies, to provide farm forestry advice and training; and supporting the private sector to establish and manage commercial tree nurseries to support farm forestry; and support the development of high quality tree seed and planting stock.

In policy statement No. 11 recognises that innovative mechanisms for the supply of high-quality tree seed and improved planting stock need to be developed.[46] The Ministry of Water, Lands and Environment is required to promote the development of adequate supplies of high-quality tree seeds and improved planting stock to meet the needs of small-scale farmers and large-scale commercial tree growers.[47] The ministry responsible for forestry affairs is also required to promote seed procurement, tree improvement and genetic resource conservation. The government further has to build capacity for research and development in these areas.

The policy recognises that the private sector has a major role to play in the collection and distribution of tree seeds and planting stock. The government must therefore help to build capacity in the private sector to enable effective seed supply and marketing, and develop mechanisms to ensure high standards and quality control. It also has to identify, establish and manage seed sources for priority tree species; produce, market and promote the use of high quality tree seed; and build capacity in the private sector for tree nursery management.[48]

The policy also recognises that support from development partners is needed for forest sector development and requires the government to fully participate in the implementation of international agreements such as the UNFCCC.[49] It also recognises that further sources of funding for sector development will be actively pursued, including carbon credits or international funds, to support biodiversity conservation.[50]

The National Water Policy[51]

This policy promotes a new integrated approach to managing water resources in ways that are sustainable and most beneficial to the people of Uganda.[52] This new approach is based on the continuing recognition of the social value of water, while simultaneously affording much more attention to its economic value.[53] The basis on which this policy was developed is the Water Action Plan (1995),[54] which entailed a review of water resources management issues and which provided a basis for subsequent water policy and legislation.[55]

This policy requires the government to promote hydropower generation by supporting efforts to attain self-reliance in energy production and promoting cooperation for optimal development of hydropower for the benefit of the region.[56] Government is also required to promote the use of water resources for small decentralised power-generating systems in remote areas for rural

electrification, and to promote agreements between the various water users for the protection of the catchment areas.[57]

The policy identifies a number of strategies to achieve the above. These include, first, ensuring the rights of other users by regulation of water discharge.[58] This principle is often expressed as *sic utere tuo ut alienum non laedas*[59] and has received wide recognition today as a general principle of water use. Hydropower-generating companies, therefore, have an obligation to ensure that their activities do not adversely affect other water users. Second, social and environmental impacts should be minimised through environmental impact assessment (EIA).[60] EIA is a process of examining, analysing and assessing proposed activities in order to minimise the potential for environmental damage. It is therefore a procedure for evaluating the likely impact of a proposed activity on the environment.[61] In relation to CDM projects in the renewable energy sub-sector, EIA plays three main roles. First, authorities must fully identify and consider the environmental effects of proposed project. Second, alternatives that avoid or mitigate the environmental effects should be identified; and third, the citizens affected by the proposed activity are afforded an opportunity to understand the proposed project or policy and to express their views (objections) to decision makers in advance.

Other strategies under the policy include the creation of storage capacity and regulation of reservoirs to mitigate fluctuations from seasonal and annual variations; and ensuring availability of reliable hydrological data for hydropower development.

The National Environment Management Policy (NEMP)[62]

The National Environment Management Policy is an output of the National Environment Action Plan (NEAP)[63] process and contains important principles for implementation of CDM projects under the renewable energy sub-sector. The overall goal of the NEMP is to establish sustainable social and economic development which maintains or enhances environmental quality and resource productivity on a long-term basis that meets the needs of the present generation without compromising the ability of future generations to meet their own needs.[64] The policy recognises that Uganda's forests provide a wide range of environmental services and values, such as the amelioration of climate change effects and stabilisation of soils, which are critical to national development.[65] It also recognises that private forestry should be encouraged by appropriate incentives, extension services, marketing assistance and increased security of land and tree tenure.[66] Private forestry is important in encouraging private individuals and civil society organisations to participate in the implementation of CDM projects under the forestry sector.

The policy also has relevant strategies for the implementation of the CDM in the forestry sector. It calls, for example, for economic incentives and the necessary legal framework and technology to encourage and facilitate rural communities, wood-fuel using industries and institutions, and the private sector, to be self-sufficient in forest product requirements.[67] The economic incentives under the policy may include financial support from CDM-supporting countries.[68]

In relation to energy, the objective of the policy is to meet national energy needs through increased use of hydropower, improved efficiency of energy use, increased use of alternative energy sources, increased production of (plantation and on-farm) trees and promotion of exploration and production of fossil fuels.[69] To achieve this objective, the policy lays down a number of strategies. These include: developing a comprehensive energy policy which adequately addresses issues related to shortages and inefficient use of fuel wood; focusing on extension programs on rural tree planting and reforestation; encouraging the private sector to generate and distribute hydroelectricity by removing the monopoly in generating, transmitting and distributing electricity by the Uganda Electricity Board (UEB); and encouraging industries/institutions using furnace oil to switch to hydro energy.[70]

Cumulatively, these strategies are relevant in the implementation of CDM projects in the renewable energy sub-sector. For example, the strategy to encourage industries using furnaces to switch to hydro energy reduces the emission of carbons which cause climate change. This is in line with the spirit and objectives of the UNFCCC and the CDM. Encouraging private sector participation in hydropower generation and transmission is fundamental in attracting investments under the framework of CDM. It seems, accordingly, that the monopoly of the UEB on energy resources has been broken.

Review of the legal framework regulating renewable energy Clean Development Mechanism projects

The Constitution of the Republic of Uganda[71]

The constitution is the supreme law of Uganda and contains important provisions for the regulation of CDM projects. Under the National Objectives and Directive

Principles of State Policy, the state is required to protect important natural resources, including land, water, fauna and flora on behalf of the people of Uganda.[72] The state is also required to promote and implement energy policies that will ensure that people's basic needs and those of the environment.[73] This constitutional requirement makes it incumbent upon government to formulate an energy policy that will not only sustain the impressive economic growth of the last decade, but will also ensure widespread access to affordable modern energy services with the view to improving the living standards of all Ugandans.[74] Such an energy policy may, notably, also target the development of renewable energy resources.

The constitution also provides that every person in Uganda has a right to a healthy and clean environment[75] and a duty to create and protect a clean and healthy environment.[76] In order to protect the right to a clean and healthy environment, it is important to abandon activities that cause environmental degradation, such as burning of fossil fuels, in favour of activities that promote environmental conservation and economic development, which may include aforestation under the CDM framework.

A particularly important provision in the constitution as to the property rights of the CDM projects, is Article 26, which guarantees the right of every person to own property. Where the person is compulsorily deprived of his or her property, he or she is entitled to prompt payment of fair and adequate compensation, prior to the taking of possession or acquisition of the property. This provision is important for CDM projects because the investors and implementers of CDM projects are assured that they have ownership of materials and they have a remedy if they are compulsorily deprived of the same.

The National Environment Act[77]

The National Environment Act (NEA) is the framework law for environmental management in Uganda. Under the act, the National Environment Management Authority (NEMA) was created with the responsibility of supervising and coordinating activities related to environmental management.[78] Under the act, NEMA, in collaboration with relevant lead agencies,[79] is empowered to issue guidelines and measures relating to management and conservation of lakes and rivers, lakeshores and riverbanks, forests, woodlots, ozone layer protection, waste management, and issues related to toxic and hazardous chemicals.[80]

The Act prohibits using, erecting, reconstructing, or placing any structure or part of any structure in, on, under, or over the bed of a river. It also prohibits

diverting or blocking any river from its normal course. These activities can only be carried out with the authorisation of NEMA.[81] Hydropower-generation establishments in Uganda which involve most of these activities must therefore seek authorisation from NEMA before commencing any activity.

The Act establishes district environment committees.[82] Each of these, in its district environment action plan, is required to specify which of the areas identified shall be targeted for aforestation or reforestation. The environment committee is also required to take measures, through encouraging voluntary self-help in the community, to plant trees and other vegetation in any areas specified that are within the limits of its jurisdiction and not subject to any personal interest in land.[83] The Act also requires NEMA, in consultation with the National Forestry Authority (NFA), to issue guidelines and prescribe measures for the management of all forests in Uganda. The guidelines and measures issued or prescribed must take into account forests in protected areas, including forest reserves, national parks and game reserves; and forests on lands subject to interests held by private persons.[84] All forests must be managed in accordance with the principle of sustainable development.[85] It further requires NEMA, in consultation with the lead agency, to promote the use of renewable sources of energy by promoting research in appropriate renewable sources of energy; and creating incentives for the promotion of renewable sources of energy.[86] Such incentives include promotion of measures for the conservation of nonrenewable sources of energy; and taking measures to encourage the planting of trees and woodlots by individual land users, institutions and community groups.[87]

The National Forestry and Tree Planting Act[88]

This Act provides for the conservation, sustainable management and development of forests for the benefit of the people of Uganda. It establishes the NFA, whose function it is to manage all the Central Forest Reserves.[89] Under the act, a person may register with the District Land Board a plantation forest situated on land owned under the Land Act,[90] or a forest or land in respect of which a licence is granted under the National Forestry and Tree Planting Act.[91] The forest produce in a plantation forest registered under these circumstances belongs to the owner of the plantation and may be used in any manner that the owner may determine. However, the forest produce must be harvested in accordance with the management plan and regulations made under the act.[92]

The minister, NFA or a local government, are empowered to provide technical services to local communities, organisations, cultural or traditional institutions and other persons involved in the development of private forests.[93] Assistance may include providing information, training and advice on the management of forests; the establishment and maintenance of nurseries and other facilities necessary for seeds and plants; providing material or financial assistance; and the promotion of seed production, agro-forestry and tree growing, and, in particular, the growing of fruit species.[94]

The Act also requires the minister or a district council to issue directions for the planting and growing of trees. The directions may provide for the area to which the directions apply; the persons, or classes of persons, to undertake the tree planting; the frequency of tree planting; the specifications of the tree planting to be undertaken; and the days on which tree planting is mandatory.[95] Section 40 of the Act establishes the Tree Fund. The fund is used to promote tree planting and growing at national and local levels; and to support tree-planting and growing efforts of a noncommercial nature which are to the public's benefit. The fund could, for example, be used to finance tree-planting activities forming part of CDM.

The Water Act[96]

One of the objectives of this Act is to allow for the orderly development and use of water resources for purposes other than domestic use, such as the generation of hydroelectric or geothermal energy, in ways which minimise harmful effects to the environment. The Act vests all rights to investigate, control, protect and manage water in the government.[97] The Act establishes the Water Policy Committee.[98] This committee assists the minister in the coordination of hydrological and hydro-geological investigations and further coordinates the preparation, implementation and amendment of the water action plan.[99]

Section 18 of the Act requires a person who wishes to construct or operate any works to apply for a permit to do so. These works cover hydropower generation projects. CDM hydropower projects, therefore, need to be permitted before they are commenced. The authority may grant the permit on conditions which may require the payment of fees or charges. However, the authority may exempt a public authority or a class of persons or works from applying for permits.[100] The weakness in this provision is that there is no criterion prescribed to be followed by the authority in deciding whether to exempt a class of works. The section also affords the authority discretionary powers which may be exercised arbitrarily.

A holder of a permit is required not to cause or allow any water to be polluted; and further to prevent damage to the source from which water is taken or to which water is discharged after use. He/ she must also take precautions to ensure that no activities on the land where water is used result in the accumulation of any substance which may render water less fit for the purpose for which it may reasonably be used.[101]

The Land Act[102]

The Land Act provides for the ownership and management of land in Uganda. It provides for four different types of land tenure, namely, customary,[103] leasehold,[104] *mailo*[105] and freehold.[106] It also provides for the procedure relating to applying for a grant of any of the tenures. Under the act, non-citizens of Uganda may only be granted leases not exceeding 99 years.[107] This implies that non-citizen companies investing in renewable energy resources can only obtain this type of lease for 99 years. If they wish to obtain a lease for a longer period, they need to make Uganda citizens majority shareholders in the companies for them to be a citizen company.[108]

The Act also provides that the construction of electricity transmission and distribution lines, construction of dams and hydropower plants, are public works and any person authorised to execute public works on any land may enter into mutual agreement with an occupier or owner of the land in accordance with the act.[109] The developer of a CDM energy project should therefore seek to enter into mutual agreement with the occupier or owner of the land.

Section 42 empowers the government or a local government to acquire land in accordance with articles 26 and 237(2) of the constitution. These constitutional provisions require adequate compensation to be paid to the owner of the land so acquired and the acquisition must be carried out in accordance with the procedure laid down in the Land Acquisition Act.[110] The land so acquired may then be used for CDM renewable energy projects, such as hydroelectricity generation projects.

The Act also requires the government or a local government to protect and hold in trust for the people of Uganda natural lakes, rivers and forest reserves. The government or a local government cannot lease out or otherwise alienate

any of these natural resources. It may, however, grant concessions, licences or permits in this respect.

The Local Government Act[111]

This Act consolidates and streamlines the existing law on local governments in line with the constitution to give effect to the decentralisation and devolution of functions, powers and services. The Act provides that it is the responsibility of the local government to protect and preserve the resources from abuse, pollution and degradation, and to manage the resources for sustainable development within the district.[112]

The district council is the highest political authority in the district.[113] It has both legislative and executive powers to be exercised in accordance with the Constitution and Local Government Act. Lower local government councils are created under the district. These councils have legislative powers. The district councils have powers to enact district laws (ordinances), while urban, sub-county divisions, or village councils may, in relation to their specified powers and functions, make by-laws consistent with national statutes and the constitution.[114] Through this method, the district and other lower local councils are to effectively control and manage their natural resources and environment within their local areas of jurisdiction.

CHALLENGES FOR THE IMPLEMENTATION OF CLEAN DEVELOPMENT MECHANISM PROJECTS IN THE RENEWABLE ENERGY RESOURCES SUB-SECTOR

An examination of the regulatory framework for CDM projects in Uganda reveals that it is fairly adequate. The ability of the policy and legal framework to address issues of plantation forests, hydropower generation, solar energy development institutional development, and, more importantly, private sector participation, is crucial for the success of CDM projects. Private sector participation in CDM projects is particularly important because it breaks the monopoly of government entities and their bureaucracy, promotes competition and, ultimately, improves quality service delivery.

This commendation not withstanding, there are some limitations that stem from the policy and legal framework. First, there are some instances of inconsistencies as to the objectives of a particular policy. The Energy Policy, for example, seeks to promote investment in the renewable energy resources sub-sector that is more environmentally friendly, but at the same time it seeks to promote petroleum exploration with its associated GHG emissions. Second, generally speaking, there has been a failure to meet most of the policy objectives within the stipulated time, as highlighted in some instances above. This can perhaps be attributed to factors beyond the control of the policymakers and legislators, and may include some of the factors listed below.

First, as sequestered carbon is relatively a new 'commodity' introduced by the Kyoto Protocol and enjoys some unique characteristics, complex legal issues arise when defining the property rights it creates, and in drafting carbon sequestration sales contracts. It is not easy to approve, monitor and verify carbon credits earned by the financing companies under clear and transparent rules given the limited technical knowledge available in Uganda. There are also contractual concerns that arise. Participating in CDM projects requires signing international contracts. These contracts require expert negotiation by people exposed to international contracts, commercial law and CDM legal issues with which most Ugandans, arguably, are not familiar.

Second, there is inadequate funding for CDM projects. Uganda mainly relies on donor funding to implement CDM projects. Whereas the Kyoto Protocol envisages that financial support for CDM projects is to be provided by developed country parties, supplementation of these financial resources by Uganda would give momentum to the projects. However, Uganda has limited funds with which to do this and this adversely affects its ability to strategically position itself to attract more CDM investment.

Third, Uganda lacks a strong national institutional framework to implement CDM projects under the renewable energy sub-sector. There are failures at different institutional and policy levels for environmental management and implementation of these projects. National institutions lack financial facilitation and skilled manpower for effective execution of their mandate. The administration at district and local environment committee levels also lack adequate manpower and resources to implement and monitor CDM projects.

Other challenges include: limited implementation of the laws owing to limited manpower and financial capacities; lack of political will and corruption; limited participation by the people at the grassroots level; and limited capacity of the private sector to fully participate in CDM activities due to lack of awareness concerning its economic benefits.

CONCLUSION AND RECOMMENDATIONS

Uganda is endowed with an abundance of renewable energy resources. These could be effectively utilised by participating in the CDM. This is necessary for mainly two reasons: first, Uganda lacks adequate resources to implement such projects on its own; and second, renewable energy sources are more environmentally friendly. Uganda has undertaken a number of projects in the renewable energy resources sub-sector with considerable success. It has also developed a fairly comprehensive legal framework for regulation of the same. There are, however, a number of challenges that inhibit Uganda's efforts in this direction and these have been identified above. These challenges need to be adequately addressed if CDM projects are to be successful.

This chapter proposes the following recommendations to address these challenges:

The government would be well-advised to step up capacity-building efforts in all governmental bodies that are involved in CDM implementation. CDM is a highly technical field that can only be understood and appreciated by individuals with specialised knowledge and skills. To fully achieve this, the Department of Meteorology, NEMA, NFA, the Ministry of Energy, and the proposed National Climate Change Secretariat, should be targeted. Workshops and specialised training should be offered to personnel in these departments with the view to building capacity. The manpower development in these institutions should be accompanied by financial incentives in terms of improved remuneration to motivate the staff in execution of the mandate of the institutions. Efforts by government aimed at the establishment of the National Climate Change Secretariat that will be Uganda's Designated National Authority (DNA) should be stepped up and the establishment of this authority concluded as soon as possible to facilitate the participation of Uganda in CDM.

The National Forestry and Tree Planting Act establishes the Tree Fund to finance tree planting. This fund only caters for forestry resources, thereby excluding other renewable energy resources. The government should establish a CDM fund to specifically provide financial assistance to all CDM project activities in the renewable energy sub-sector. In view of Uganda's low financial capabilities, it is suggested that Uganda should lobby developed countries to contribute towards this CDM fund through financial bodies established under the Kyoto Protocol, such as the Global Environment Facility (GEF), the Special Climate Change Fund and the Least Developed Countries Fund.

The government should also embark on sensitising the public to the necessity and advantages of using renewable energy resources as an alternative to nonrenewable energy resources. This could be done through seminars aimed at teaching the stakeholders of these projects. These efforts must be complemented by subsidisation of renewable energy technologies with the view to rendering these accessible to the public in order to implement the lessons learnt from the sensitisation process.

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7 Ibid.

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33 Ibid, 31.

34 Ibid, 52.

35 The Renewable Energy Policy for Uganda, *supra* note 1.

36 Ibid, 1, 54.

37 Ibid, 57.

38 Ibid, 58.

39 Ibid, 60.

40 The Republic of Uganda, Ministry of Water, Lands and Environment, The Uganda Forestry Policy, 2001.

41 Ibid, 17.

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45 Ibid.

46 Ibid, 22.

47 Ibid.

48 Ibid, 23.

49 Ibid, 28.

50 Ibid.

51 The Republic of Uganda, Ministry of Water, Lands and Environment, National Water Policy, 1999.

52 Ibid, 1.

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56 Ibid, 29.

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59 This Latin phrase means that whereas a person has a right to use his/her resources, such exploitation should not harm another person. It represents the concept of good neighbourliness.

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70 Ibid.

71 The Constitution of the Republic of Uganda, 1995.

72 Ibid, Principle XIII.

73 Ibid, Principle XXVII, (iii).

74 The Energy Policy for Uganda, *supra* note 2, 3.

75 The Constitution of the Republic of Uganda, 1995, Art. 39.

76 Ibid, Art. 17(1)(j).

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78 Ibid, sections 4–5.

79 Environmental lead agencies in Uganda include the National Forestry Authority (NFA), the Directorate of Water Resources Development (DWRD), the Wetlands Inspection Division and the Uganda Wildlife Authority (UWA).

80 The National Environment Act, *supra* note 77, Part VII.

81 Ibid, section 34.

82 Ibid, section 14.

83 Ibid, section 39.

84 Ibid, section 45(1)–(2).

85 Ibid, section 45(3).

86 Ibid, section 46(1).

87 Ibid, section 46(2).

88 The National Forestry and Tree Planting Act 2003 (Act 8 of 2003).

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90 The Land Act 2000 (Chapter 227, Laws of Uganda, 2000).

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92 Ibid, section 22(2).

93 Ibid, section 26(1).

94 Ibid, section 26(2).

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96 The Water Act 2000 (Chapter 152, Laws of Uganda, 2000).

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98 Ibid, section 9.

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102 The Land Act, *supra,* note 90.

103 Customary tenure is defined in section 3(1) of the Land Act to mean a form of tenure applicable to a specific area of land and a specific description or class of persons; subject to section 27 of the Land Act, governed by rules generally accepted as binding and authoritative by the class of persons to which it applies; applicable to any persons acquiring land in that area in accordance with those rules; subject to section 27 of the Land Act, characterised by local customary regulation; applying local customary regulation and management to individual and household ownership, use and occupation of, and transactions in, land; providing for communal ownership and use of land; in which parcels of land may be recognised as subdivisions belonging to a person, a family or a traditional institution; and which is owned in perpetuity.

104 A leasehold tenure is defined in section 3(5) of the Land Act as a form of tenure created either by contract or by operation of law; the terms and conditions of which may be regulated by law to the exclusion of any contractual agreement reached between the parties; under which one person, namely the landlord or lessor, grants or is deemed to have granted another person, namely the tenant or lessee, exclusive possession of land usually but not necessarily for a period defined, directly or indirectly, by reference to a specific date of commencement and a specific date of ending; usually but not necessarily in return for a rent which may be for a capital sum known as a premium or for both a rent and a premium but may be in return for services or may be free of any required return; and under which both the landlord and the tenant may, subject to the terms and conditions of the lease and having due regard for the interests of the other party, exercise such of the powers of a freehold owner as are appropriate and possible given the specific nature of a leasehold tenure.

105 A mailo tenure under section 3(4) is a form of tenure deriving its legality from the constitution and its incidents from the written law which involves the holding of registered land in perpetuity; permits the separation of ownership of land from the ownership of developments on land made by a lawful or bona fide occupant; and enables the holder, subject to the customary and statutory rights of those persons lawful or bona fide in occupation of the land at the time that the tenure was created and their successors in title, to exercise all the powers of ownership of the

owner of land held of a freehold title set out in sections 3(2) and 3(3) of the Land Act and subject to the same possibility of conditions, restrictions and limitations, positive or negative in their application, as are referred to in those subsections.

106 Freehold tenure is defined under section 3(2) of the Land Act as a form of tenure deriving its legality from the constitution and its incidents from the written law which involves the holding of registered land in perpetuity or for a period less than perpetuity which may be fixed by a condition; and enables the holder to exercise, subject to the law, full powers of ownership of land.

107 The Land Act, *supra* note 90, section 40.

108 See Ibid, section 40(7)(b), defining a non-citizen corporation as a corporate body in which the controlling interest lies with non-citizens.

109 Ibid, section 73.

110 The Land Acquisition Act 2000 (Chapter 226, Laws of Uganda, 2000).

111 The Local Governments Act 2000 (Chapter 243, Laws of Uganda, 2000).

112 Ibid, second schedule.

113 Ibid, section 9.

114 Ibid, sections 38–43.

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Part 5

Human rights approaches to climate change mitigation and adaption

10 Climate change and the international human rights framework in Africa

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ABSTRACT

While there is a vibrant global discourse on climate change and the serious threats it poses to both the environment and humanity, there is little in this discourse focusing on how climate change will adversely affect fundamental human rights of present and future generations. There is even less discourse on how the fundamental rights of the most vulnerable people of Africa will be affected by climate change. Little or no attention is being paid to the need to integrate human rights into the climate change mitigation and adaptation policies and strategies being implemented in various African countries. It is the contention of this chapter that in order for African countries to effectively respond to the challenges of climate change and its impact on the fundamental rights of their peoples, they must integrate basic human rights standards and norms as contained in the international human rights framework in their mitigation and adaptation policies and strategies. The chapter argues that until and unless fundamental human rights are integrated into Africa's efforts to mitigate and/or adapt to climate change, any efforts undertaken to respond to the impacts of climate change will only result in minor successes.

INTRODUCTION

Africa's major economic sectors are vulnerable to current climate sensitivity, with considerable resultant economic impacts. This vulnerability is exacerbated by existing development challenges such as: endemic poverty; complex governance and institutional dimensions; limited access to capital, including markets, infrastructure and technology; ecosystem degradation; and complex natural and human disasters and conflicts.[1] These have, in turn, contributed to Africa's weak adaptive capacity, increasing the continent's vulnerability to projected climate change.[2]

Africa is characterised by institutional and policy frameworks that are in some instances insufficient to deal with environmental degradation and disaster risk. Public service delivery is hampered by a poor legal and policy environment in some sectors which provide critical obstacles to economic performance. While it is agreed that a range of factors, including wealth, technology, education, information, skills, infrastructure, access to resources, and various psychological factors and management capabilities can modify and affect adaptive capacity, it is also now universally recognised that adaptation is shown to be more successful and sustainable when linked to effective governance systems, civil and political rights and literacy.[3]

This chapter argues that, in order for African countries to effectively deal with the problem of climate change, they must have in place governance systems that ensure the rule of law, the protection, preservation and promotion of basic civil and political rights, and access to information and public participation. In the absence of these key ingredients, most strategies relating to adaptation to, and mitigation of, climate change in Africa will result in little or minimal impacts, and will, as a consequence, not culminate in the desired results.

This chapter proposes that the international human rights framework provides an effective and practical framework from within which Africa can respond to the various impacts of climate change. The international human rights framework provides an effective regime within which to design mitigating and adaptation strategies with the view to enhancing the adaptive capacities of African countries in dealing with the challenges presented by climate change. This is so because the various impacts of climate change on Africa all affect fundamental human rights.

Premised on this proposal, the chapter commences with an exposition of the nexus between climate change and human rights. It examines the international context within which the nexus between climate change and human rights has emerged, with particular emphasis on the adoption of the United Nations Human Rights Commission Resolution on Human Rights and Climate Change. It highlights some of the basic human rights that will be negatively impacted by climate change in Africa. The chapter then focuses on how the impacts of climate change in Africa can be mitigated and adapted to through the integration of international human rights norms and standards. The international human rights norms and standards that are proposed for inclusion into the mitigation and adaptation policies and strategies in Africa primarily include those contained in the 1996 International Covenant on Civil and Political Rights and the International Covenant on Economic Social and Cultural Rights, both of which derive from the Universal Declaration on Human Rights. The chapter concludes with some key observations on the importance of the need for African governments to integrate international human rights norms and standards into their climate change mitigation and adaptation strategies.

THE NEXUS BETWEEN CLIMATE CHANGE AND HUMAN RIGHTS

It is now an undisputed fact that climate change is already affecting a wide range of internationally protected human rights, such as the right to health, the right to water, the right to food, the right to shelter and property, and even the right to life.[4] It is therefore clear that there is a nexus between climate change and human rights. However, this nexus is neither simple nor uncontested. It is not simple because the impacts of climate change on human rights are causal as well as reinforcing of other already existing stressors for Africa, such as complex governance systems, endemic poverty, and limited financial and technical resources at national levels. Because of these already prevalent stressors, it is therefore not surprising that the vast majority of the population on the African continent will likely be less well-equipped to understand and prepare for the impacts of climate change. Also, the impacts of climate change will most likely be most severely felt by the majority of resource-poor countries and communities in Africa because resource scarcity affects the capacity of governments as well as individuals to respond and adapt to climate change. Moreover, it has

been argued that climate change has always focused on the human impacts, i.e. the impacts on coastal communities, drought-prone areas, human health, and human welfare more generally. What, if anything, does a human rights-approach add to the understanding of the issues and choices involved?[5]

It is postulated that climate change mitigation and adaptation involve complex tradeoffs between different values, and that focusing on particular individuals or cases or on particular human rights can obscure these tradeoffs, making sensible policy-making difficult. For Africa, the nexus between climate change and human rights raises even further challenges because Africa is not known to be a bastion for the protection and promotion of human rights. Therefore, to propose the international human rights regime as a framework for responding to the challenges of climate change in Africa seems to be superficial.[6] This scepticism is not without basis and can be attributed to several factors. The study of climate change, begun among meteorologists, became entrenched in the physical sciences, and has only gradually reached the humanities and social sciences.[7] The basic orientation has remained pre-eminently, though not solely, economic. Climate change negotiations have centred on consensus-driven and welfare-based solutions; approaches that have historically thrived independently of and parallel to human rights. [8]

For this reason, the nexus between climate change and human rights has remained obfuscated and has been viewed with reservations on several fronts. The primary reason for these reservations is the fact that the rights at issue in the climate change debate are difficult to enforce. It has been argued that the impacts of climate change are mostly against those rights which are traditionally difficult to enforce under international law, and social and economic rights. Moreover, even those rights that are strong and more easily enforceable, such as the rights to life and property, might be difficult to enforce because it might be difficult to directly attribute their violation exclusively to climate change. In addition, it is generally difficult to establish extra territoriality under human rights law, and the challenges are bound to be more complex for climate change.

Under human rights law, an individual's government has the primary responsibility of acting to protect the rights of its citizens. In the case of climate change, however, especially for Africa, the responsibility for the impacts of climate change leading to some of the worst human rights violations arguably lie not with the African governments, but with developed countries which are primarily responsible for causing global warming.[9]

Further still, it is difficult to establish local accountability in climate change. It is well-established that although Africa has contributed the least to emission of green house gases which lead to global warming, it is most likely to suffer the worst effects of climate change; the human consequences of which will be worsened by Africa's low adaptive capacity. Resource scarcity underpins the notion of progressive realisation of rights in international law.[10] Climate change is bound to make the progressive realisation of human rights in Africa even more difficult as it will affect the capacity of several African governments to deliver on their international commitments as they stretch their limited resources even more to deal with the impacts of climate change. Moreover, emergency conditions such as those that will be brought about by climate change including, for example, droughts, floods, famine, mass migration and wars, limit the application of human right laws. Human rights, traditionally conceived as a bulwark against expansive state discretion, become less relevant as legal tools at such times of emergency.[11]

Finally, the conflict between the rights of the perpetrators of global warming and the victims, especially those in Africa, may create a conflict that may not easily lend itself to being resolved under the international human rights framework. Economic actors contributing to climate change are also rights holders who are entitled to the right to property and quiet enjoyment of their possessions, in a similar way as the victims of climate change are entitled to a clean and healthy environment and such other rights that will be impacted by climate change.[12] This conflict of rights does not lend itself well to responding to the impacts of climate change, especially in the Africa context

These and other factors demonstrate the complexity of the nexus between climate change and human rights. It is important, however, to note that most of these reservations on this sensitive nexus are excessively legalistic and do not capture the spirit of international law which in fact aims to deal both with the formal and substantive aspects of human rights. This dichotomy in approach is captured in international law which recognises both the hard rule of law formalism and the soft-law policy-oriented approach of the United Nations Framework Convention on Climate Change (UNFCC). [13]

The ethical language of equity and common but differentiated responsibility of the UNFCC captures this spirit and abodes very well with the moral character and universalism of the Universal Declaration on Human Rights and other international human rights covenants. The availability of both hard-law and

soft-law options for the purpose of responding to the impacts of climate change is not mutually exclusive, which makes it possible to use the international human rights regime to effectively respond to the impacts of climate change in Africa without necessarily invoking the hard-letter law. The proposals made in this chapter are put forward in that spirit and are intended to inform African governments' policy response to the impacts of climate change.

Despite this complex and often-contested relevance of and connection between climate change and human rights, there is a growing consensus at the global level that climate change cannot continue to be addressed in total exclusion of the internationally established and recognised international human rights framework. This is demonstrated by the United Nations Human Rights Commission (UNHRC) which, in its Resolution 7/23 on Human Rights and Climate Change,[14] expressed concern over the fact that climate change poses far-reaching threats to people and communities around the world, and has implications for the full enjoyment of human rights. The Human Rights Council noted that human beings are at the centre of concerns for sustainable development and that the right to development must be fulfilled so as to equitably meet the development and environmental needs of present and future generations.[15] The Council Resolution is significant because it represents the first global recognition within the UN framework of the interconnectedness between the worlds of climate change and human rights. The resolution reaffirms that human rights obligations and commitments have the potential to inform and strengthen international and national policy-making in the area of climate change, by promoting coherence, legitimacy and sustainable outcomes. [16]

The nexus between climate change and human rights was further elaborated by Mary Robinson, former United Nations Commissioner for Human Rights, who noted that:

> …over the three decades since the signing of the Stockholm Declaration in 1972, the impact of environmental factors on human rights has become better understood. We now understand that respect for human rights is at the core of sustainable development, human rights and human security could not be clearer. Human rights are our shared international language and framework, and human rights instruments give our multilateral system its means of putting into practice our shared values.[17] International Human rights law expands the obligations which states have assumed under the Framework Convention on Climate Change to reduce green house gas emissions and mitigate the effects of climate change.[18]

States have a positive obligation under international law to protect individuals against threats posed to human rights by climate change, regardless of the cause. The most effective means of facilitating this is to adopt a human rights-based approach to policy and legislative responses to climate change; an approach that is normatively based on international human rights standards and that is practically directed at promoting and protecting human rights.[19]

Dealing with the impacts of climate change within the international human rights regime also introduces an accountability framework that is an essential element of the promotion and protection of human rights by holding governments accountable. This is so because governments are the duty bearers accountable for reducing the vulnerability of their citizens to the impacts of climate change and assisting them in adapting to this change.[20]

A focus on human rights also means that the views of those who will be disproportionately affected by climate change, i.e the poor, the vulnerable and the marginalised, are taken into account in responses devised to address the causes and consequences of climate change.[21] It is widely acknowledged that social and economic vulnerability greatly increases the risk of suffering from the impacts of climate change. Disenfranchised members of society often lack the information and/or resources to make informed decisions for adapting to or otherwise avoiding future damages. They are also less likely to have a sustained voice in, or influence over, policymaking and so, in times of crisis, the vulnerability of marginalised groups can increase dramatically. A human rights-focus can direct attention to people who are otherwise likely to be ignored or who are unheard. Where communities are living in precarious conditions, as is the case in many countries in Africa, posing human rights questions may help locate some of the hazards (for example, desertification, water salination, and a rise sea level) posed by climate change.[22] Further still, in an environment where poverty in many communities in Africa is still linked to discrimination, be it ethnic, racial or religious, an analysis sensitive to the dynamics that drive exclusion is likely to foresee these future trends and vulnerabilities more clearly.[23]

The utility of using international human rights standards to respond to the impacts of climate change is, however, not limited to introducing accountability and providing opportunities for public participation in decisions relating to

climate change mitigation and adaptation. The international human rights regime also provides an opportunity for human rights discourse to contribute to the impact scenarios presented by the Inter-governmental Panel on Climate Change (IPCC) by focusing them on the more practical aspects of who precisely will suffer what and why they will suffer. Human rights standards will, in this instance, help provide thresholds of minimum acceptability and will help guide mitigation and adaptation policies to be framed or evaluated by referencing them to internationally acceptable human rights thresholds. A focus on affected communities and individuals in addition to environmental damage will provide policy makers within governments in Africa with an opportunity of designing climate change mitigation and adaptation policies that respond to the specific rights of the people that will be violated by the impacts of climate change.[24]

Further still, the international human rights standards, as presented in the international human rights regime, provide for several procedural rights, many of which have been adopted in international environmental law and which could help those most affected by climate change to influence policies that affect them. It could also assist policy-makers in understanding and considering public needs in this respect.[25] Procedural rights, such as the right to access to information and public participation, are particularly important for adaptation which will only be effective if communities in Africa have access to the correct information in order for them to respond appropriately and timely to the impacts of climate change.

THE IMPACT OF CLIMATE CHANGE ON HUMAN RIGHTS IN AFRICA

The Fourth Assessment Report of the IPCC[26] paints a grave picture of the impact of climate change on human rights in Africa. Though not couched in human rights terms, it is clear from the different scenarios given and the projected impacts of climate change in Africa that human rights will be the first causalities of this global environmental phenomenon. For a continent already grappling with the challenges of promoting and protecting human rights, climate change threatens to make the already difficult task of promoting and protecting human rights in Africa a herculean one.

The following sections examine the impacts of climate change on some specific key human rights in Africa. The discussion is based on the projections of the Fourth Assessment Report of the IPCC.

The right to life

Article 3 of the Universal Declaration on Human Rights (UDHR)[27] provides that everyone has a right to life, liberty and security of person. This right is reiterated in Article 6 (1) of the International Covenant on Civil and Political Rights (ICCPR)[28] which states that everyone human being has the inherent right to life. This right shall be protected by law. No one shall be arbitrarily deprived of his/her life. The right is further articulated in Article 6 of the Convention on the Rights of the Child (CRC).[29] In its General Comment on the right to life,[30] the UNHRC warned against interpreting the right to life in a narrow or restrictive manner. It stated that this right requires states to take positive measures and that it would be desirable for state parties to take possible measures to reduce infant mortality and to increase life expectancy.[31]

The right to life, as recognised and articulated under international human rights law above, is threatened in Africa due the impacts of climate change. The Fourth Assessment Report of the IPCC[32] reveals several impacts of climate change that are bound to affect the right to life. These include: increased water stress; increased incidences of malaria; inundation of small African islands and coastal areas; increased food shortages and famines; and increased desertification and flooding. It is clear that the very existence of millions of Africans is under threat as a result of climate change and that the right to life in Africa is even more precarious now than ever before. The number of people projected to die from the impacts of climate change is expected to be in the millions. This ranges from children dying because of the increased incidents of malaria, and both adults and children dying from starvation and lack of access to water, and catastrophic events such as the floods in Mozambique or the famines in the Horn of Eastern Africa. There is no doubt that the very sanctity of life is under threat in Africa because of the impacts of climate change.

It is reported that more than 220 000 people died as a result of natural catastrophes in 2008, making it the 'deadliest' year since 2004, the year of the Indian Ocean tsunami.[33] The year 2008 was also the tenth-warmest year since the beginning of routine temperature records. This means that 12 of the warmest years ever recorded occurred in the past 12 years.[34] Kovats and Haines[35] report that global climate change caused by the inexorable build up of greenhouse gases (GHGs) in the earth's atmosphere, is already disrupting ecosystems and causing about 15 000 additional deaths per year. The authors also project that,

unless climate change is reversed, the public health burden of climate change is likely to almost double by 2020.[36] Climate change has already started to disrupt the capacity of several states in Africa to generate wealth, to decrease the gross national product and to hinder their ability to give effect to basic human rights.[37] There is little doubt, therefore, that the right to life is in peril in Africa because of the impacts of climate change.

The right to water

The UN formally declared the right to water on 26 November 2002. It noted that the right to water was indispensable to leading a life of human dignity and, further, that the right was a prerequisite for the realisation of other human rights. Through its General Comment No. 15, the Committee on Economic, Social and Cultural Rights of the United Nation's Economic and Social Council stated that 'the human right to water entitles everyone to sufficient, safe, acceptable,[38] physically accessible[39] and affordable[40] water for personal and domestic use'. General Comment No. 15 provided the first-ever implicit reference to the right to water and the responsibilities that governments have in delivering clean water and adequate sanitation for all.[41]

The right to water is established within internationally guaranteed human rights standards which ensure the fundamental freedoms and dignity of individuals and communities. These internationally guaranteed human rights standards provide for the relationship between the individual and the state and the governmental obligation to respect,[42] protect[43] and fulfil the right.[44] The UDHR lays the foundation for the international human rights framework within which the right to water is located. Article 25 of the declaration provides that everyone has a right to a standard of living adequate for the health and wellbeing of him/ herself and his/ her family. Article 12 of the International Covenant on Economic, Social and Cultural Rights provides for 'the right of everyone to enjoyment of the highest attainable standard of physical and mental health'. This provision was reaffirmed in Article 24 of the Convention on the Rights of the Child, which guarantees children the highest attainable standard of health, which requires states to take appropriate measures to combat disease and malnutrition within the framework of primary healthcare, including the provision of clean drinking water.

The right to water places an obligation on all state parties to ensure that the minimum essential level of the right is realised. This minimum level includes

ensuring people's access to sufficient water to prevent dehydration and disease. Other immediate obligations include nondiscrimination and respect for and the protection of the existing enjoyment of rights.[45]

It is clear from the normative description of the right to water, that African governments will be faced with an uphill task in meeting their internationally binding obligations of providing water to their citizens. This is so because, even in the absence of climate change, present population trends and patterns of water use indicate that more African countries will exceed the limits of their economically usable land-based water resources before 2025.[46] For the full range of scenarios relating to the impacts of climate change in Africa, it is projected that climate change and variability have the potential to impose additional pressures on water availability, water accessibility and water demand.[47] It is estimated, in some assessments, that the population at risk of increased water stress in Africa as a result of climate change is projected to be 75–250 million and 350–600 million people by 2020 and 2050 respectively.[48]

Detailed assessments in, for example, northern Africa indicate that, based on temperature increases of 1 to 4 degrees celsius because of climate change, the Ouergha watershed in Morocco is likely to undergo negative changes for the period 2000–2020. The IPCC also projects severe water stress in southern Africa, the east-west band separating Senegal from Sudan, and the dry Sahara of West Central Africa. The Okavango River is also projected to be negatively impacted by climate change.[49] Cumulatively, this scientific evidence from the IPCC indicates that protecting and promoting the right to water as provided for under international human rights law is going to be severely affected by the impacts of climate change in Africa.

The right to food

The right to food is entrenched in international human rights law through Article 11 of the ICESCR, which requires state parties to recognise the right of everyone to an adequate standard of living for him/ herself and his/ her family, including adequate food, clothing and housing, and the continuous improvement of living conditions. Article 11(2) of the ICESCR recognises that more urgent steps need to be taken to ensure the fundamental right to freedom from hunger and malnutrition. The United Nations Special Rapporteur on the right to food has defined the right in the following terms:

The right to adequate food is a human right, inherent on all people, to have regular, permanent and unrestricted access, either directly or by means of financial purchase, to quantitatively and qualitatively adequate and sufficient food corresponding to the cultural traditions of people to which the consumer belongs, and which ensures a physical and mental, individual and collective fulfilling and dignified life free of fear.[50]

The right to food was defined in General Comment No. 12 of the Committee on Economic, Social and Cultural Rights[51] as the right of every man, woman and child, alone and in community with others, to have physical and economic access at all times to adequate food or means for its procurement in ways consistent with human dignity. According to the general comment, the right to food implies three obligations: the obligation to respect[52], protect[53] and to fulfil the right.[54] Article 2(1) of the ICESCR further requires states to take steps to the maximum of their available resources to progressively achieve the full realisation of the right to adequate food. Article 2(2) enjoins states to ensure that the right to food will be exercised without discrimination and that whenever an individual or group is unable to enjoy the right to food by means at their disposal, states will have the obligation to fulfil the right directly. [55]

The right to food will arguably be the most impacted on by climate change in Africa because of the projected variations of rainfall patterns and decline in precipitation which are already being experienced in many countries in sub-Saharan Africa. Increased temperatures, reduction in water for irrigation, as well as desertification and land degradation, will affect food production in an already largely underfed continent and lead to gross violations of the right to food in many countries which are already struggling to feed their starving populations.

The IPCC estimates that by 2100, parts of the Sahara Desert area are likely to emerge as the most vulnerable, showing likely agricultural loses of between two and seven per cent of gross domestic product (GDP).[56] Western and Central Africa are also projected to experience impacts ranging from two to four per cent in agricultural losses. Northern and southern Africa, on the other hand, are projected to have agricultural losses of 0,4 to 1,3 per cent. Further assessments based on various scenarios also suggest that the Sahel and the Great Lakes region and parts of East Africa will be negatively affected because of possible changes in seasonality of rainfall. [57]

The IPCC further expects a significant decline in suitable rain-fed land and production potential for cereals because of climate change. Wheat production

is expected to all but disappear from Africa.[58] South Africa will experience a notable reduction in maize production under possible increase of ENSO conditions. It also expects arid and semi-arid land in Africa to increase by five to eight per cent or six to 90 million hectares.[59] Further projections include increased erosion and deficiencies in yields from rain-fed agriculture of up to 50 per cent during the 2000–2020 period and reduction in crop growth. It is reported, for example, that in Egypt, climate change could decrease national production of rice by 11 per cent and up to 28 per cent for soybeans by 2050, compared to their production under current climate conditions.[60]

All these projected impacts on agriculture and food production in human rights terms simply mean that the integrity of the right to food is at stake and that many African countries will not be able to meet their international obligations to meet the food requirements of their people because of climate change. The food crisis in Africa will be exacerbated by the fact that it will not only be food crop production that will be affected, but also fisheries and livestock. With the rise in annual global temperatures to the order of 1,5 to 2 degrees Celsius, fisheries in North West Africa and the East African Lakes are shown to be impacted.[61] In coastal regions that have major lagoons or lake systems, changes in freshwater flows and a greater intrusion of salt water into lagoons will affect the species that are the basis of inland fisheries or aquaculture. In South Africa, for example, fisheries could be affected by changes in estuaries, coral reefs and 'upwelling'; with those that are dependent on the first two ecosystems being the most vulnerable.[62]

Regarding livestock as a major contributor to food security to millions of pastoralist communities in Africa, the IPCC estimates that the impact of climate change on livestock farming in Africa showed that a warming of 2,5 degrees Celsius would likely decrease the income of large livestock farms by 22 per cent or US$13 billion and a warming of five degrees Celsius would probably reduce income by as much as 35 per cent or US$20 billion.[63]

Clearly, the impact of climate change on the right to food in Africa will be severe because it is set to affect not only cereal production, but also fisheries and livestock production. In particular, because climate change will also affect the incomes of many African countries whose DGPs still heavily depend on agriculture, the right to food will even be more challenging to protect and promote. Article 11 of the ICESCR provides for the basic principle obligation to take steps to progressively achieve the full realisation of the right to adequate food. This

imposes an obligation to move as expeditiously as possible towards the goal. The right to adequate food thus requires the adoption of measures which, at the national level, might better shield vulnerable segments of the population from the impact of climate change. The Committee on Economic, Social and Cultural Rights has insisted on the need for states to work towards the adoption of national strategies to ensure food and nutritional security for all, based on human rights principles that define the objectives and the formulation of policies and corresponding benchmarks. If Africa is to avoid further human tragedies resulting from food shortages, African governments that will be most affected by the impacts of climate change would be well-advised to consider the projected impacts of climate change in their food policies and strategies from a a rights-based perspective

The right to health

The right to health is one of the most commonly acknowledged rights that will be impacted by climate change in Africa. Article 25 of the UDHR states that everyone has the right to a standard of living adequate for the health and well-being of him/ herself and his/ her family. Article 12(a) of the ICESCR recognises the right of everyone to the enjoyment of the highest standard of physical and mental health. Article 24 of the Convention on the Rights of the Child also stipulates that state parties must ensure that every child enjoys the highest attainable standard of health.

Climate change will affect the right to health in Africa because of projected increases in the incidences of malaria and the infestation of previously malaria-free zones with malaria, as well outbreaks of other epidemics.[64] The IPCC reports that the previously malaria-free highland areas in Ethiopia, Kenya, Rwanda and Burundi could experience modest incursions of malaria by 2050.[65] It is further projected that, by this time, areas currently with low malaria transmission in central Somalia and the Angolan highlands, could also become highly susceptible to malaria. As the rate of malaria transmission increases in the highlands, the likelihood of epidemics could also increase, due to the lack of protective genetic modifications in the newly affected populations.[66]

The right to health is one of the key rights that African governments are struggling to deal with, and the projected impacts resulting from climate change are only bound to make it harder for African governments to meet their

obligation of promoting and protecting the health of their citizens. Malaria is one of the greatest health challenges facing sub-Saharan Africa, along with HIV/AIDS. The 2008 World Health Organisation (WHO) World Malaria Report[67] states that there were 247 million malaria cases recorded over the world; 86 per cent of which were in Africa. It reports further that there were 881 000 deaths reported worldwide as a result of malaria, 90 per cent of which were in Africa. An estimated 85 per cent of the deaths in Africa occur among children under the age of five.[68] This grim situation is bound to be exacerbated by the impact of climate change, which will result in new and increased cases occurring in hitherto nonmalaria sites. The health problem in Africa is further aggravated by the HIV/AIDS pandemic which is reported to kill an estimated 1,5 million people annually in Africa, resulting in an estimated 11 million orphans.[69]

Clearly, climate change is set to further constrain the capacity of African governments to deliver the right to health to their people. While international law does not prescribe how the right to health should be realised in individual countries, the Committee on Economic, Social and Cultural Rights underlines that states should, at a minimum, adopt national strategies, based on human rights principles which define the objectives of those strategies, to ensure that all enjoy the right to health. Setting indicators and benchmarks will be decisive in the formulation and implementation of such a strategy. Because the right to health must be progressively fulfilled, what is expected of a state will vary over time. States need a device to monitor and measure the variable dimensions of the right to health. Indicators, especially when disaggregated, provide useful information on how the right to health is realised in a particular country. In line with these guidelines, African countries need to factor climate change into their national health strategies, as well as any indicator frameworks that will have been developed to ensure that there is continued progressive realisation of the right to health, especially amidst the onslaught of climate change.[70]

The Committee on Economic, Social and Cultural Rights has also stressed that states have a 'core minimum obligation' to ensure the satisfaction of minimum essential levels of each of the rights under the ICESCR, including the right to health. While these essential levels are to some extent resource-dependent, they should be given priority by states in their efforts to realise the rights under the covenant. In accordance with the general spirit of international human rights law, state obligations in relation to the right to health include the obligation to respect, protect and fulfil the right. This obligation cannot be

derogated from, even in the face of the challenges presented by the impacts of climate change.

MITIGATING AND ADAPTING TO THE IMPACTS OF CLIMATE CHANGE THROUGH THE INTERNATIONAL HUMAN RIGHTS FRAMEWORK

Introduction

The term 'international human rights framework' as used in this chapter refers to the core set of rights proclaimed under international law, primarily under the 1996 International Covenant on Civil and Political Rights (ICCPR) and the International Covenant on Economic, Social and cultural Rights (ICESCR), both of which derive from the 1948 Universal Declaration on Human Rights (UDHR). The ICCPR and ICESCR are both legally binding international human rights instruments. They are supplemented by other binding treaties that protect the rights of children, migrant workers, people with disability, and other instruments that prohibit torture, as well as racial and gender discrimination.[71] The human rights laid out in the ICCPR and ICESR are generally referred to as civil or political, on the one hand, and economic, social and cultural rights on the other hand. The former include the rights to life, liberty, property, freedom of expression and assembly, political participation, a fair trial, privacy and home life, and protection from torture. The latter include the rights to work, education, social security, enjoyment of the highest standard of physical and mental health, and the right to adequate food, clothing, housing and the continuous improvement in living conditions.[72]

The international human rights framework therefore deals with a wide range of issues that are relevant to climate change. Such issues include the projected impacts of climate change on agricultural production which will affect the right to food as covered under Article 11 of the ICESCR and General Comment No. 12;[73] the impact on proliferation of malaria on the African continent as covered under the right to the highest attainable standard of health covered under Article 12 of the ICESCR; impacts on access to water and increasing droughts and desertification which will affect the right to water as covered under Articles 11 and 12 of the ICESCR and General Comment No. 15.[74] By referring to the impacts of climate change as human rights issues, they are elevated from being

mere needs that require a welfare or humanitarian response, to rights that must be fulfilled within a body of internationally recognised norms. They are therefore afforded international legal legitimacy. Under international law, the duty to fulfil these rights lies with states. Therefore, every African state that has ratified these binding international instruments, has the duty to respect, protect and fulfil those rights that will be adversely affected by climate change. While the ICESCR calls for wealthier states to provide assistance to other states to fulfil social and economic rights, there is no legally binding obligation upon them to do so.

The responsibility of states to protect and fulfil the human rights that will be affected by climate change is, however, and fortunately so, supported by a binding obligation under the UNFCCC which obliges wealthier states to provide 'new and additional' financial resources to developing countries to meet the agreed full incremental costs of complying with their climate change commitments and to cover the agreed full costs of their reporting obligations.[75] It is important to note, however, that by referring to incremental costs, the new and additional funding gets skewed more towards mitigation and not adaptation, the latter being of more urgent relevance to Africa. This notwithstanding, the provision for financial support falls squarely within the general principle of common but differentiated responsibilities as articulated in Article 3 of the UNFCC, which originates from the 1972 Stockholm Declaration, through to the World Summit on Sustainable Development in 2002. It is also included in the 1992 Rio Declaration[76] where it is articulated in Principle 7 that:

> States shall cooperate … to conserve, protect and restore the health and integrity of the earth's ecosystem. In view of the different contributions to global environmental degradation, States have common but differentiated responsibilities. The developed countries acknowledge the responsibility that they bear in the international pursuit of sustainable development in view of the pressures their societies place on the global environment and of the technologies and financial resources they command.

By recognising the role that developed countries have played in degrading the global environment, the principle of common but differentiated responsibilities attempts to address the rights issues relating to responsibility and accountability for the global commons. It also, without placing legal culpability on developed

countries, creates the basis for a rights framework within which to respond to the impacts of climate change by requiring developed countries to support developing countries in addressing the impacts of climate change.

Responding to the impacts of climate change through a human rights-approach as presented in the international human rights regime is a practical and effective way of bringing about the desired change. The following section demonstrates how the human rights principles and norms enshrined in the international human rights framework can be used to determine the appropriate development paths that can be taken by African countries in relation to the available mitigation and adaptation policy options, thereby enhancing the effectiveness of their response to the impacts of climate change.

The effectiveness of human rights will mostly derive from underpinning the mitigation and adaptation policy options available to African governments with the internationally accepted human rights thresholds established for each of the human rights that will, or might be, negatively impacted by climate change. It will also derive from underpinning any mitigation or adaptation options pursued by African countries with socioeconomic cost benefit analyses and assessments that address the potential human-rights impacts of the available mitigating and adaptation options.

Mitigation

Mitigation within the climate change discourse refers to those actions and policies intended to prevent global warming from causing dangerous anthropogenic interference with the climate as required by the UNFCCC. The Fourth Assessment Report of the IPCC estimated GHG emission levels in the atmosphere at 455 parts per million of carbon dioxide equivalent (pmm CO2e), almost double the preindustrial levels.[77] Current concentrations will lead to further warming even if all new emissions were ceased immediately. It is, however, expected that high emission levels will continue in the short to medium term. Keeping emission levels at 450 pmm CO2e presents an immense challenge for the mitigation efforts of the global community. This is so because overshooting the current estimated emissions will be catastrophic and is bound to destroy lives and livelihoods, especially in vulnerable communities in Africa and other small island states. It is therefore important for Africa to actively engage in

climate change mitigation efforts, even though it contributes the least to global GHG emissions.[78]

GHG emissions can be reduced by setting global targets under the ongoing negotiations under the Kyoto Protocol, by building noncarbon-intensive energy production and transportation platforms, and by reducing the rate of deforestation.79 For Africa, the major area of focus in an attempt to contribute to the global effort to mitigate climate change has been through reducing deforestation. Forests are important in reducing GHGs in the atmosphere because they act as carbon sinks, absorbing carbon dioxide.

In integrating international human rights standards and norms into its efforts to contribute to the global climate change mitigation efforts, Africa must take into account several issues. Actively implementing mitigation policies means that African countries need to seriously consider the fact that they are going to need to redirect their productive capacities and access to resources in a fundamental way. This will have two broad consequences: it will mean reducing dependence upon fossil fuels – the most reliable and cost effective fuel source available to most African governments. It will also mean limiting the development policy options available to African governments. This entails serious and grave decisions that need to be made by African governments, and will require governments to make choices within internationally established human rights standards and norms which will facilitate the process of informed decision-making in terms of setting priorities and strategies for the development paths of various nations for a long time to come.

The gravity of the consequences of climate change mitigation was recognised by the IPCC which noted that:

> … development paths underpin the baseline and stabilisation emissions scenarios and are used to estimate emissions, climate change and associated climate change impacts. For a development path to be sustainable over a long period, wealth, resources and opportunity must be shared so that all citizens have access to minimum standards of security, human rights and social benefits, such as food, health, education, shelter and opportunity for self development.[80]

In recognising the importance of minimum standards of security, human rights and social benefits, the IPCC underscores the importance of integrating human

rights into mitigation choices, especially in Africa.[81] Human rights considerations must guide the path towards carbon stabilisation, thus providing the path to development for African countries even as they engage in the global efforts to mitigate GHG emissions.

As a consequence, international human rights standards can be brought into the discourse of GHG mitigation through the right to development. The right to development was first recognised by the United Nations General Assembly in 1986. The 1986 Declaration of the Right to Development stated that the human person is the central subject of development,[82] making the right to development the axis around which all other rights revolve. The right to development affirms the link between human rights and development, and provides that growth must be viewed as a means to an end, not an end in itself, and that economic progress can, as a matter of policy, be managed towards the goal of achieving human rights.[83]

The right to development provides a possible framework for dealing with the difficult choices that need to be made in the effort to mitigate climate change. Echoing the current development paradigm, the right to development emphasises that sustainable development depends on a three-way relationship between individuals, the state and the international community.[84] Reframing the rights issues relating to GHG mitigation within this three-way relationship, shifts the focus from the acrimonious blame game and liability to principles of due diligence, accountability, social impact measurements and indicators of effective cooperation[85] between the developed and developing countries. Such principles could be applied with the objective of measuring the human rights impacts of international assistance across a range of economic activities geared towards climate change mitigation. These same principles could be used by African governments to provide guidance on mitigation options as they strive to contribute to the global mitigation of GHGs.

This will facilitate the process of informed policy-making decisions by African governments, based on assessments undertaken within the internationally recognised human rights framework, as opposed to undertaking mitigation options because they are what is provided by the developing countries. The realisation and fulfilment of basic human rights depends on development capacity and this must also be taken into account by African governments in selecting mitigation options so that they do not lock themselves out of development and thus create a situation that will make the protection and promotion of the human rights of their citizens even more challenging than it already is.

Reduced Emissions from Deforestation and Degradation (REDD)

A useful illustration of how mitigation efforts must be examined clearly to ensure that the rights of citizens are not violated, is the Reduced Emissions from Deforestation and Degradation (REDD) programme that was agreed upon at the Conference of Parties in Bali in December 2007. Having established that deforestation and land-use degradation account for approximately 20 per cent of manmade GHG emissions, which places developing countries among the world's top emitters, there is a vigorous ongoing global initiative to promote reforestation, especially in developing countries.

This internationally orchestrated approach to climate change mitigation, however, has far-reaching consequences for millions of Africans whose livelihoods depend on forests. The World Bank estimates that 90 per cent of the 1,2 billion people living in extreme poverty around the world depend on forest resources for some part of their livelihood. In Africa, 40 million of these are to be found in the Democratic Republic of the Congo (DRC) alone.[86] It is common knowledge that there is a long history of abuse of the rights of indigenous people in connection with forest exploitation and/or conservation by governments. Is the REDD programme yet another occasion for forest-dwelling Africans and other forest dependent communities to be marginalised? These are questions that need to be asked because they put people at the centre of climate change mitigation and ensure that the fundamental human rights of all people are protected.

It is not appropriate within the human rights discourse for developed countries to meet their carbon emission targets by sequestering carbon in forests in Africa, while millions of people who depend on these forests are deprived of their livelihoods. These are some of the rights issues African governments must take into consideration in determining whether REDD is an appropriate strategy for climate change mitigation. For example, while the DRC situation is appropriate for the REDD programme because of its vast forests, it is also true that 40 million of its inhabitants depend on these forests. The question which arises as a consequence is namely: how, in the context of integrating human rights in climate change mitigation efforts, can a compromise be reached so that the rights of the communities that depend on forests are not sacrificed at the altar of carbon sequestration?

Biofuels

Biofuel production is another climate change mitigation option that has been presented to African countries. Biofuels have the potential to reduce the global

reliance on fossil fuels and several countries have already initiated massive biofuel substitution programmes[87] that involve cultivation and conversion of crops such as corn, sugar cane or palm oil into ethanol, for use as fuel rather than food. There remains, however, a lot that still needs to be done to integrate human rights standards and norms in the assessments directing government decisions to take this path of mitigation.

There is evidence to suggest that biofuel production has negative impacts on human rights, especially the right to food, because it increases world prices for staples such as corn and rice and rapidly forces very poor consumers out of the market.[88] In 2007, the Food and Agricultural Organisation (FAO) reported that 37 countries were facing a food crisis.[89] It reported that food security, and therefore the right to food, was being adversely affected by unprecedented hikes in basic food prices driven by historically low food stock, droughts and floods linked to climate change, high oil prices and the growing demand for biofuels.[90] In a report highlighting the impact of biofuel production on food security in Africa, it was reported in 2007 that the severe drought that affected at least 40 per cent of the population in Swaziland was thought to be climate change-related because at the time the country was experiencing a severe drought, 500 ha of land had been turned over to a private company (USA Distillers) for the production of *Jatropha* for biofuel export.[91]

Given the linkages that have already been made between the impacts of biofuel production and food security, the human rights issues that need to be addressed by African governments intending to pursue this option include whether the country will still have the capacity to feed its people and guarantee food integrity and the right to food, and the number of people likely to be affected by the cultivation and conversion of crops for biofuel production. What are the tradeoffs then to be achieved from converting crops for biofuel production, as opposed to the traditional food production use for which the land was already destined?

A cost benefit analysis, integrating international human rights standards and norms, needs to be undertaken before the policy decision relating to a countries' option to pursue or not to pursue biofuel production is implemented. This will enable countries to move beyond the traditional environmental impact assessments of biofuel production which neither reflect, nor put people at the centre of the project. It will also ensure an examination of the extent to which their fundamental human rights will be affected by individual biofuel production projects

and programmes. The assessments should also consider the other human rights impacts of biofuel production, since the right to food is not the only right that might be violated by biofuel production if it were inappropriately selected and implemented as a climate change mitigation option in any country.

Carbon trading

Finally, in relation to climate change mitigation, carbon trading is anticipated to be the most lucrative in terms of financial outcomes and has thus attracted significant attention at the international level. The emissions trading regime basically involves conversion of mandatory national emission reductions into tradable commodities. Under this regime, companies from Annex 1 States are not constrained to make cuts solely at home. Through the Clean Development Mechanism (CDM), companies reduce emissions fairly cheaply in developing countries and can then trade those reductions on the emissions market under Certified Emissions Reductions (CERs). By replacing dirtier technologies for cleaner ones, the CDM aims to lower carbon development paths in poorer countries.[92]

The rationale behind the regime is to facilitate the attainment of emission cuts as cheaply as possible by allowing those who are best placed to make cuts the freedom to do so, and permitting others for whom cuts are expensive to buy these instead. Accordingly, under this regime, companies are allowed to make emission cuts cheaply by selling their excesses to those for whom it is cheaper to buy these rights to emit than to achieve these reduced emissions.[93] The Stern Review explains that the ability to trade obligations across borders would improve efficiency by ensuring that deployment takes place where it is cheapest to do so. It further notes that the benefits from carbon emissions trading may be significant where there are major differences between countries in, for example, the availability of a natural resource, such as sunshine, or in lower labour or other costs.[94]

Clearly, the carbon emissions regime has great value and potential in contributing to mitigation of climate change. The issue to consider in African countries, however, is the extent to which it will benefit their countries and ensure that they continue to meet the basic and fundamental rights of their citizens. This is important because the current emissions trading system is focused on easing cuts for rich countries, and does not particularly reflect the deep cuts needed by developing countries to contribute to climate change mitigation even as they seek to keep on the path of development, remove their people from

the deep chasm of poverty, and promote, protect and fulfil their fundamental rights. With this understanding, it is important for African countries to critically review the carbon emissions trading system and its longer-term human rights implications; the extent to which it will impact their future development path and how this will, in turn, affect African counties' ability to meet the herculean tasks of fulfilling their citizens' basic human rights.

It is apparent from the manner in which the current emissions trading system is structured that many countries in Africa will not be able to rely on it to realise the kind of living standards that would ensure even basic rights guarantees for all. There are accordingly many social and development consequences related to the current carbon emissions system that need to be assessed within the international human rights framework to ensure that those rights which have been identified as facing the greatest threat from the impacts of climate change are protected.

Adaptation

The IPCC Assessment Report defines adaptation as adjustments in ecological, social or economic systems in response to actual or expected climatic stimuli and their effects or impacts.[95] Sit and Pilifosova[96] define adaptation as changes in processes, practices and structures to moderate potential damages or to benefit from opportunities associated with climate change. The International Council on Human Rights, more appropriately for present purposes, defines adaptation as actions taken to adjust lives and livelihoods to the new conditions brought about by warming temperature and associated climate changes.[97]

In recognition of the importance of adaptation to climate change, the Bali Action Plan[98] calls for enhanced action on adaptation, including international cooperation to support urgent implementation of adaptation actions, by way of, inter alia, thorough vulnerability assessments, prioritisation of actions, financial needs assessments, capacity-building and response strategies, and integration of adaptation actions into sectoral and national planning-specific projects and programmes. This would also include means to incentivise the implementation of adaptation actions and other ways to enable climate resilient development with the view to reducing vulnerability of all parties by taking into account the urgent and immediate needs of developing countries that are particularly vulnerable to the adverse effects of climate change, especially the least developed countries and small island developing states and countries in Africa affected by drought, desertification and floods. [99] There is accordingly recognition within the global discourse on climate change for the need to integrate and address human rights concerns in adaptation policies and programmes.

Adaptation can take various forms and the challenge for Africa lies in what would be the most appropriate adaptation modalities for it to pursue in order to ensure that it continues to pursue the path of fulfilling the basic human rights of its people. Unlike mitigation, there are no clear-cut and well defined adaptation paths that can be pursued by African countries. The adaptation responses required for each African country will depend on accurately identifying the risk posed by climate change for that country and then designing and/ or identifying the appropriate adaptation priorities. These priorities will vary from country to country and also within countries. What is important, therefore, in identifying the correct adaptation priority for each country, is integrating international human rights standards and norms that allow for the provision of information to the communities concerned on the adaptation options being pursued by their governments, and information on what would be required of them as citizens to effectively respond to these adaptation policies and strategies.

It will also require guaranteeing public participation in the decision-making processes leading to the adaptation policies and priorities that African governments seek to pursue in response to the impacts of climate change. Public participation is important because, once again, it will put people at the centre of the climate change discourse and allow African governments to respond to the needs of their citizens through an effective public participation framework. Public participation in decision-making on adaptation will also empower the African communities predicted to suffer the brunt of climate change to actively engage in ensuring the fulfilment of their basic rights.

However, in order for the African public to actively engage in the discourse on adaptation, it will require a high degree of education reaching well beyond the general rules on access to information. This is so because adapting to climate change will, in many instances, require a degree of literacy that can only be guaranteed by some level of public education. This degree of literacy will be necessary in order to effectively implement any adaptation policy and strategy that will have been adopted by African governments. A well-educated population is better equipped to recognise in advance the threats posed by a changing climate and to prepare itself for the consequences.[100]

At a more global level, African governments need to actively engage in the debate on funding for adaptation as required by the UNFCCC under the provisions on new and additional funding to poorer nations (described above). The debate on funding has been rather acrimonious, pitting developed countries against developing countries, with the latter blaming the former for not meeting their international obligations under the UNFCCC to provide financing to respond to the impacts of climate change. A more constructive way of bringing meaning to this debate, and encouraging the developed countries to meet their obligations to provide adaptation funding, is by approaching it within the context of the international human rights regime, breaking down the adaptation funding requirements into key practical questions and considerations that can be addressed. These may include identifying those at risk, and what can be done to support them; identifying existing local and international mechanisms that could deal with the practical and legal complexities of, for example, people whose lives are threatened and may need to live their homes as de facto refuges; and identifying how to improve the existing mechanisms and frameworks at national level to respond to the impacts of climate change.[101]

These simple, yet practical, considerations will bring the acrimonious adaptation funding debate from its current abstract and often technical and nonpeople-centred nature, to a more practical, people-centred debate that will allow for practical interventions to commence at national level. By not focusing on why the adaptation funding has not yet arrived and who has not yet met their cut in the global commitments, and rather focusing on specific responses and needs of specific people already experiencing the impacts of climate change, it is expected that there will be an incentive (if not moral imperative) on the part of developed countries to respond to the effects of climate change. This would be in contrast to the current complex multilateral approach currently being pursued at the international level, which is considered to be devoid of a human face or any human rights considerations.

While this will not solve the long-term adaptation challenges, which are more complex, it will provide the impetus that is required to deal with the already ongoing impacts of climate change occurring on the African continent. Immediate responses are already needed in countries like Mozambique, which has experienced unprecedented flooding; Rwanda, where there are growing incidences of malaria in hitherto nonmalaria areas; Ethiopia and Kenya, where there are unprecedented droughts, causing massive food shortages; and the

Sahel region, where there are increased incidences of mass migration by ecological refugees fleeing a land than can no longer sustain them, even with the most creative adaptation strategies.

CONCLUSION

This chapter has examined how the international human rights framework can be used to respond to the impacts of climate change, chiefly by integrating human rights principles in mitigation and adaptation policy options. The findings reveal that there are several benefits to be derived from integrating human rights principles in mitigation and adaptation policies in Africa. These may include increased public participation (and therefore greater responsiveness to government policies on climate change) and more efficient utilisation of the increasingly scarce resources by African governments as they wrestle with the challenge of climate change.

The Stern Review[102] points out that climate change will affect basic elements of life for people around the world, and could possibly hinder growth and development. It further notes that global warming could result in hundreds of millions of people suffering from hunger, malnutrition, water shortages, floods, droughts, heat stress, diseases triggered by extreme weather events, loss of livelihood and permanent displacement.[103] Climate change therefore poses a real threat to a wide range of universally recognised fundamental human entitlements and rights, such as the rights to life, food, adequate housing, health and water.

In tackling climate change, governments in Africa must bear in mind that they have not only moral but also legal obligations to protect and promote the basic human rights enshrined in the Universal Declaration of Human Rights[104] and the more general body of internal human rights law. The United Nations Charter[105] firmly establishes that human rights, security and development constitute the three essential pillars of the UN's action. This has been reaffirmed in the Millennium Declaration and the World Summit on Sustainable Development Outcomes. As Africa struggles to deal with the impacts of climate change, it must put human beings at the centre of any policies and strategies for responding to these challenges.[106]

Efforts to mitigate and adapt to climate change undertaken within the international human rights framework will also help cushion the impact of

climate change on the most vulnerable individuals and groups in society. Most of the policies and interventions relating to climate change have so far focused on development and implementation of mitigation and adaptation strategies. Integrating human rights when addressing climate change challenges will bring human beings back to the centre of the discussion and enrich efforts in addressing climate change in Africa. This would be in keeping with an anthropocentric approach to environmental governance generally.

As climate change will affect the enjoyment of human rights, safeguarding of these rights should be a key consideration in efforts to address the impact of climate change. International human rights law imposes several obligations that are relevant to addressing human vulnerabilities to climate change, on states. These include the obligation to provide: better housing, located away from hazardous zones; improved access to sanitation, safe drinking water and heath care; access to adequate food; effective participation in planning and decision making and accountability; as well as access to information and justice.[107]

Governments in Africa will find it increasingly difficult to meet these obligations as resources are exhausted by demands to meet the environmental challenges and risks posed by climate change. In order for African governments not to renege on their international commitments to promote and protect fundamental human rights, they would be well advised to integrate these rights into strategic thinking about mitigation and adaptation to climate change for optimal investment of resources in the long run.

NOTES

1 M Boko, A Nian, C Nyong, A Vogel, M Githeko, B Medany, R Osman-Elasha, Tabo and P Yanda, *Climate change 2007: impacts, adaptation and vulnerability*, contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, M L Parry, O F Canziani, J P Palutikof, P J van der Linden and C E Hanson (eds), Cambridge: Cambridge University Press, 433–467.

2 Ibid.

3 Ibid, 441.

4 See the Human Rights Council decision on Human Rights and Climate Change A/62/276 adopted at its 41st meeting on 28 March 2008, annex 1.

5 The International Council on Human Rights, Climate change and human rights: a rough guide, 2008, 4.

6 Opinio Juris, Blog archive, Human rights and climate change, http://opiniojuris.org (accessed 1 April 2009).

7 The International Council on Human Rights, Climate change and human rights, 4.

8 Ibid.

9 Ibid.

10 The notion of progressive realisation of rights within the international human rights regime is based on the understanding that countries have different capacities to ensure the full implementation and realisation of basic fundamental rights. Accordingly, countries are expected to, within the means, ensure progressive realisation of these rights based on the minimum standards set out in the various international human rights standards. For example, article 2(1) of the International Covenant on Economic, Social and Cultural Rights requires states to take steps to the maximum of their available resources to achieve progressively the full realisation of the right to adequate food.

11 The International Council on Human Rights, Climate change and human rights, 5.

12 Ibid.

13 31 ILM 849 (1992).

14 Adopted at the 41st Meeting of the Human Rights Council on 28 March 2008.

15 Ibid.

16 Opinio Juris, Blog archive, Human rights and climate change.

17 Mary Robinson, Climate change and justice, Barbara Ward Lecture, Chatham House, London, 11 December 2006.

18 Ibid.

19 Australian Human Rights Commission, Human Rights and Climate Change, 2008, 2.

20 Ibid.

21 Ibid.

22 Ibid, 8.

23 Ibid.

24 Ibid.

25 Ibid, 8.

26 Parry et al, *Climate change 2007*, 433–467.

27 GA.res.217A (111) UN Doc. A/810.

28 International Covenant on Civil and Political Rights, UNGA.res.2200 (XXI) (Annex), 16 December 1966 (999 UNTS 171 and EMuT 966:93).

29 GA res.44/25 of 20 November 1985.

30 See General Comment No.6: The Right to Life (Article 6): 30/4/82, CCPR General Comment 6 and General Comment 14: Nuclear Weapons and the Right to Life (Article 6)/; 09/11/84, CCPR General Comment 14.

31 Ibid, 3.

32 Parry et al, *Climate change 2007*, 433–467.

33 Megan Rowling, Disaster-heavy 2008 raises pressure for climate pact, insurance, Reuters AlertNet, 5 January 2009, [www.Alertnet.org.db/an_art/20316/2009/005-174834-1.html](accessed 14 April 2009).

34 Ibid.

35 R S Kovats and Haines, Global climate change and health, recent findings and future steps (editorial), *Canadian Medial Association Journal*, 172(4) (2005), 501–502.

36 Ibid.

37 Denise Garcia, The climate security divide: bridging human and national security in Africa, *African Human Security Review*, 17(3) (2008), 3.

38 The provision of safe and acceptable water for personal and domestic use means that, in practice, water must be safe for drinking and household uses. Drinking-water should be free from microbes and parasites and chemical and radiological hazards that constitute a threat to a person's health. It must also be acceptable in terms of colour and odour so that individuals will choose this water rather than polluted alternatives that may look attractive. The WHO's guidelines for drinking-water quality provide the basis for the development of national standards that, properly implemented, will ensure the safety of drinking water.

39 Physical accessibility of water in this regard requires everyone to have safe and easy access to adequate facilities and services so that clean drinking water is secured and useable.

40 Ensuring the affordability of water requires that services match what people can pay. Matching people's ability and willingness to pay implies the need for a demand-driven approach. It may require offering a range of levels of service and technologies through mechanisms such as pricing policy and tariff regulation.

41 Prior to this, the United Nations Committee on Economic, Social and Cultural Rights had adopted a General Comment in 2000 on the right to health, the normative interpretation of which included factors that determine good health, such as access to safe drinking water and adequate sanitation.

42 Respect in this regard requires the state to refrain from interfering, directly or indirectly, with the enjoyment of the right to water.

43 The obligation to protect requires the government to prevent third parties, such as corporations, from interfering in any way with the enjoyment of the right to water.

44 The obligation to fulfill requires the government to adopt the necessary measures to achieve the full realisation of the right to water.

45 World Health Organisation, The right to water, 2003, 9.

46 Parry et al, *Climate change 2007*, 433–467, 444–446.

47 Ibid.

48 Ibid.

49 Ibid.

50 Australian Human Rights Commission op.cit, 4.

51 UNGA Res. 2200 (xxi) (Annex), 16 December 1996, (993 UNTS 3 and EMuT 966:94).

52 The obligation to respect existing access to adequate food requires states not to take any measures that result in preventing such access.

53 The obligation to protect requires measures by the state to ensure that enterprises or individuals do not deprive individuals of their access to food.

54 The obligation to fulfill or facilitate requires the state to proactively engage in activities intended to strengthen people's access to and utilisation of resources and means to ensure their livelihood. This includes good security.

55 Article 3 of the Covenant on Economic Social and Cultural Rights.

56 Parry et al, *Climate change 2007*, 433–467, 444, 447.

57 Ibid.

58 Ibid, 448.

59 Ibid, 448.

60 Ibid. It is important to note however that not all climate and climate variability will be negative as agriculture and the growing seasons in certain areas, for example, parts of the Ethiopian Highlands and parts of southern Africa such as Mozambique, may lengthen.

61 Parry et al, *Climate change* 2007, 433–467, 448.

62 Ibid, 448.

63 Ibid.

64 Ibid, 446.

65 Ibid.

66 Ibid.

67 At http/:www.who.int/malaria/wmr2008/MAL2008.chap3-EN.pdf

68 Ibid.

69 Rowling, Disaster-heavy 2008 raises pressure for climate pact, insurance.

70 See generally General Comment No. 14 (2000) on the right to health adopted by the Committee on Economic, Social and Cultural Rights.

71 International Council on Human Rights op.cit, 12.

72 Ibid.

73 UN Docs. E/C.12/1999/5.

74 UN Docs. E/C.12/2004/4.

75 Lavanya Rajamani, *Differential treatment in international environmental law*, Oxford: Oxford University Press, 2006, 1008–1009.

76 A/CONF.151/26 (Vol.1), 12 August 1992.

77 International Council on Human Rights op.cit, 12.

78 Ibid.

79 Ibid.

80 IPCC AR4, WG111, 696.

81 See Millennium Development Goals: climate change as a cross cutting issue in IPCC AR4, WG111, 458.

82 Article 2(1) Declaration of the Right to Development.

83 Margot E Salomon, Towards a just institutional order: a commentary on the first session of the UN Task Force on the Right to Development, Netherlands Quarterly of Human Rights 3 (2005), 412, 427–428.

84 Ibid.

85 Ibid.

86 World Bank, A revised forest strategy for the World Bank Group, Washington: World Bank, 2002.

87 For example, both the European Union and the United Sates have approved increases in biofuel production, raising energy sources by 10 per cent by 2020 in the EU, and to 132 billion liters by 2017 in the US. The effect has been to encourage farmers to switch from food to biofuel production.

88 Online at www.fao.org/newsroom/en/news/2007/1000733/index.html (accessed 14 April 2009).

89 Ibid.

90 Ibid.

91 Siwa Msangi, Biofuel revolution threatens food security for the poor, Biofuel News, 6 December 2007, SciDevNet. It is important to note that the government in Swaziland blamed the rising food prices on global production rather than biofuel production.

92 International Human Rights Council on Human Rights, Climate change and human rights, 37. This guide also notes that the carbon trading emissions regime also has other objectives which include spurring technological innovation, particularly among institutions and states for whom it will be particularly expensive to achieve future targets. Research into and development of cleaner technologies ought, in principle, to become a better investment for companies than repeatedly buying and using rights to emit. Carbon emissions trading is also intended to put a price on carbon, which is generally acknowledged as vital if the social cost of producing GHG emissions is to be internationalised by companies and other users. In the interest of efficiency, the optimal carbon price should be global – carbon emissions should cost the same everywhere. The clean development mechanism is a step towards creating such a global system.

93 Ibid, 36.

94 Nicholas Stern, *Stern Review of the Economics of Climate Change*, HM Treasury Office of Climate Change, 2006, Part VI, Chapter 24, 529.

95 Parry et al, *Climate change 2007*, 433–467.

96 B Smit and O Pilifosova, Adaptation to climate change in the context of sustainable development and equity, *Climate change 2001: impacts, adaptation and vulnerability, Contribution of Working Group II of the Third Assessment Report of the Intergovernmental Panel on Climate Change*, 2001, 877–912.

97 The International Council on Human Rights, op.cit, 21.

98 Advance unedited version; Decision -/CP.13.

99 Decision -/CP.13, Bali Action Plan (Advance unedited version) article 1(c)(i).

100 The International Council on Human Rights, op.cit, 27.

101 Ibid.

102 Stern, *Stern Review of the Economics of Climate Change*, Part V, Chapter 24, 529.

103 United Nations Statement for the Bali Climate Change Conference, 3–14 December 2007.

104 GA.Res. 217 A(111) UN.Doc. A/810

105 Charter of the United Nations, San Francisco, 26 June 1945 (I UNTS XVI; reprinted in EMuT 945:47).

106 Ibid.

107 Australian Human Rights Commission, Human rights and climate change, 2.

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11 Implications of climate change for the right to health in Uganda

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ABSTRACT

The health consequences of climate change include extreme weather events which may culminate in the spread of deadly infectious diseases such as malaria and cholera. Climate change may adversely affect access to adequate housing, clean and safe water, sanitation and good nutrition, all of which have implications for the right to health. Yet Uganda is obliged, by its constitution and various human rights instruments, to progressively realise its people's right to health. Pursuant to its constitutional and international obligations, Uganda has, in partnership with the international community, undertaken measures to enhance public health. However, the gains made in the area of public health may be undermined by the negative impacts of climate change. Against the above background, this chapter interrogates the implications of climate change for the right to health in Uganda. The chapter argues that the obligation to fulfil human rights, such as the right to health, can significantly contribute to efforts to tackle the consequences of climate change. It concludes that for Uganda to fulfil its obligation to realise the right to health, it must devise and implement legislative and policy strategies to prevent the deleterious consequences

of climate change on human health. Uganda should request relevant technical and financial assistance to enable it to respond to the effects of climate change on public health and should pay particular attention to vulnerable members of society, such as women. Human rights principles such as access to information and public participation should inform the design, implementation, monitoring and evaluation of all policies and programmes on climate change.

INTRODUCTION

It is now recognised that climate change poses a serious threat to the environment. There is an increased understanding of the reality, causes and consequences of climate change. According to the Intergovernmental Panel on Climate Change (IPCC), global warming is unequivocal and is caused by human-induced greenhouse gases (GHGs).[1] The effects of climate change are already being felt by individuals and communities globally, especially in underdeveloped continents such as Africa. Climate change has an impact on migration and is a key challenge to global peace and security.[2] Climate change also poses real and significant threats to public health. The health consequences of climate change include extreme weather events which may culminate in the spread of deadly infectious diseases such as malaria and cholera. Climate change may also adversely affect access to adequate housing, clean and safe water, sanitation and adequate nutrition, all of which are necessary for the health and wellbeing of people.[3] Marginalised and vulnerable groups, such as rural women, small-scale farmers, and the poor, may disproportionately suffer the consequences of global warming. Thus, although the discourse on climate change has traditionally focused on the scientific and environmental impacts, it has now been broadened to encompass the human and social dimensions.

It should be noted that a close scrutiny of the data on climate change shows that the projected effects threaten the realisation of economic, social and cultural rights generally, and the right to health in particular. Yet, Uganda is obliged by the Constitution of the Republic of Uganda 1995 (hereinafter the constitution),[4] and various human rights instruments, such as the International Covenant on Economic, Social and Cultural Rights (ICESCR),[5] and the African Charter on Human and Peoples' Rights (ACHPR),[6] to ensure the realisation of its citizens' right to health. Pursuant to its constitutional and international obligations, Uganda has, in partnership with the international community, undertaken measures to enhance public health. The Ministry of Health has made considerable progress in the control and reduction of the disease burden. For example, there have been achievements in health promotion and education, and the promotion of child health through immunisation and the management and control of diarrhoea diseases such as cholera and dysentery. Progress has also been made in the management and control of water and insect-borne diseases such as typhoid and malaria.[7] However, these gains made in the area of public health may be undermined by the negative impacts of climate change.

Against the above background, this chapter investigates the implications of climate change for the right to health in Uganda. The chapter argues that the fulfilment of human rights, such as the right to health, can significantly contribute to efforts to tackle the consequences of climate change. The principal hypotheses of the chapter is that, for any mitigation and adaptation strategy[8] to succeed, policymakers and implementers must be guided by human rights standards to ensure that the health of the people, especially the marginalised, poor and vulnerable, is not compromised.

This chapter is divided into six parts. The first part provides an overview of the projected impact of climate change on public health. In the second part, the chapter revisits the interface between the environment and human rights. The third part maps out the normative content of the right to health and the attendant state obligations. The fourth part explores some of the strategies for tackling the problem of climate change in light of Uganda's environmental and human rights obligations. The fifth part contains concluding remarks.

CLIMATE CHANGE AND PUBLIC HEALTH: AN OVERVIEW

Climate change is a serious global environmental problem of the 21st century. Climate change is regulated by the United Nations Framework Convention on Climate Change (UNFCCC),[9] which establishes a general framework with a few specific or substantive obligations to curb climate change, and the Kyoto Protocol,[10] which establishes binding targets for the reduction of GHGs. The UNFCCC defines climate change as 'a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to climate variability observed over comparable time periods'.[11] The ultimate objective of the legal regime on climate change is to achieve 'stabilisation of greenhouse gas concentrations in the

atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system'[12] in order to 'allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner'.[13] The World Health Organisation (WHO) defines health as 'a State of complete physical, mental, and social well-being and not merely the absence of disease or infirmity'.[14] The WHO definition moves beyond the narrow biomedical and pathology-based perspective to encompass the broader societal dimensions and context of individual and population wellbeing. Public health measures emphasise the prevention of disease, disability and premature death.[15]

The question is: what is the projected impact of climate change on public health? As pointed out above, the UNFCCC highlights the impact of climate change on food production and economic development.[16] However, in recent years, there has been an increased understanding of the link between climate change and health. It is now recognised that climate change harms health; it affects the health status and wellbeing of individuals and populations. Climate change is a serious public health threat which will affect almost every underlying determinant of health, such as air, safe drinking water, adequate food and nutrition, adequate sanitation, shelter and a healthy environment.[17] Although the warming of the climate will be gradual, the effects of extreme weather events, such as storms, floods, droughts and heat waves, will be abrupt and acutely felt. For example, in 2003, at least 20 000 people in Western Europe died during a heat wave, which also affected the health of many other people.[18]

In the last three decades, warmer temperatures have also created more favourable conditions for mosquito populations. As a consequence, rising temperatures due to climate change will lead to wider transmission of malaria and other vector-borne diseases in Africa.[19] Many highland areas of East Africa, which have historically been classified as malaria free, are now experiencing the impact of the epidemic. For example, the present author hails from Kabale, a highland area in South Western Uganda, which experienced very few cases of malaria as he grew up in the 1960s – probably due to its cold weather. However, there are now warmer temperatures, mosquitoes are proliferating and cases of malaria are reported daily. It should be noted that floods in lowland areas also create breeding sites for mosquitoes.[20] Like in many other malaria-endemic countries, malaria is a leading cause of morbidity and mortality and has caused enormous human suffering, death and economic loss in Uganda. There are

approximately between 70 000 and 110 000 deaths yearly as a result of malaria, and 25–40 per cent of all outpatient visits and 9–14 per cent of inpatient deaths are malaria related.[21] There are between 11 per cent and 23 per cent of deaths among under-fives in medium and high malaria transmission areas respectively.[22] The most severe forms of malaria cause organ failure, delirium, impaired consciousness and generalised convulsions, followed by death.[23]

According to the IPCC, crop productivity is also projected to decrease, thereby increasing the risk of hunger and food insecurity in the poorer regions of the world, including Africa.[24] Weather extremes, such as drought and flooding, will negatively impact on water supplies.[25] Thus, climate change will exacerbate existing stresses on water resources and compound the problem of access to safe drinking water, which is one of the underlying determinants of health and a major cause of morbidity and mortality.[26]

It should be noted, however, that the health problems alluded to above cannot be solely attributed to climate change. Socioeconomic factors, including poverty, poor health services, environmental degradation, and population growth may aggravate the extent of climate-related problems.

THE INTERFACE BETWEEN ENVIRONMENT, HUMAN RIGHTS, AND CLIMATE CHANGE

Linking environment and human rights

In light of the projected impacts of climate change, which have implications for various facets of health, it becomes necessary to discuss the interface between the environment and human rights. Viewing data on climate change through a human rights lens, it becomes clear that the projected climate change related effects threaten the realisation of human rights such as the right to life, the right to safe and adequate water and food, the right to health and the right to adequate housing. The first question therefore is: what is the nexus between the environment and human rights?

The interdependence and interrelatedness of human rights and the environment was considered in 1972 at Stockholm, where it was declared that 'man has the fundamental right to freedom, equality and adequate conditions of life, in an environment of a quality that permits a life of dignity and well-being, and he [she] bears a solemn responsibility to protect and improve the environment

for present and future generations'.[27] The ICESCR mentions 'the improvement of all aspects of environmental and industrial hygiene' as one of the steps state parties should take towards the realisation of the right to health.[28] The Committee on Economic, Social and Cultural Rights (CESCR) interpreted this provision as comprising, *inter alia*, of:

> Preventive measures in respect of occupational accidents and diseases; the requirement to ensure an adequate supply of safe and portable water and basic sanitation; the prevention and reduction of the population's exposure to harmful substances such as radiation and harmful chemicals or other detrimental environmental conditions that directly or indirectly impact upon human health.[29]

State Parties to the ICESCR are also obliged to take measures to discourage 'the use of tobacco, drugs and other harmful substances'.[30] In the context of the right to water, the CESCR also talks of, *inter alia,* violations by state parties due to pollution and diminution of water resources affecting health.[31] The CECSR has also observed that the right to adequate food requires the adoption of 'appropriate economic, environmental and social policies'[32] and that the right to health extends to its underlying determinants, including a healthy environment.[33] The Convention on the Rights of the Child[34] requires state parties to take appropriate measures to combat disease and malnutrition 'through the provision of adequate nutritious foods and clean drinking water, taking into consideration the dangers and risks of environmental pollution'.[35] The African Charter on Human and Peoples' Rights (ACHPR) provides that 'all peoples shall have a right to a general satisfactory environment favourable to their development'.[36] This provision was considered by the African Commission in *Social Economic Rights Action Centre (SERAC) and the Centre for Economic Rights v. Nigeria*,[37] where the Nigerian government was found liable for violation of the right to health and a clean environment because of pollution of the soil, water, and air which harmed the health of the Ogoni people. The African Commission emphasised that the right to a clean and safe environment is critical to the enjoyment of other human rights. According to the commission, the Nigerian government had to take reasonable measures to prevent pollution and ecological degradation, to promote conservation and to secure ecologically sustainable development and use of natural resources. The Women's Protocol[38] to the ACHPR also provides that 'women shall have the right to live in a healthy and sustainable environment'[39] and the state parties shall 'ensure greater participation of women in the planning, management and the preservation of the environment …'[40]

The Special Rapporteur on the Prevention of Discrimination and Protection of Minorities also lists some of the rights with a bearing on environmental quality, including: a) the right to freedom from pollution, environmental degradation and activities which threaten life, health or livelihood; b) protection and preservation of the air, soil, water, flora and fauna, and healthy food and water; and c) a safe and healthy working environment.[41] The joint seminar on human rights and the environment, organised by the Office of the Human Rights Commission on Human Rights (OHCHR) and United Nations Environment Programme (UNEP) in 2002, also noted a growing recognition of the connection between human rights, environmental protection and sustainable development.[42] The OHCHR has noted that 'respect for human rights can contribute to sustainable development, including its environmental component',[43] and that 'environmental damage, including that caused by natural circumstances or disasters, can have potentially negative effects on the enjoyment of human rights and on a healthy life and a healthy environment'.[44] The OHCHR also pointed out that 'protection of the environment and sustainable development can also contribute to human well-being and potentially to the enjoyment of human rights'.[45]

At the domestic level, the Ugandan constitution contains provisions that are relevant for the discussion of the relationship between the environment and human rights. For example, the constitution enjoins the state to 'promote sustainable development and public awareness of the need to manage land, air and water resources for the present and future generations'.[46] The state is also obliged to 'take all possible measures to prevent or minimise damage and destruction to land, air and water resources resulting from pollution or other causes'.[47] The state is further enjoined to 'promote and implement energy policies that will ensure that peoples' basic needs and those of environmental preservation are met'.[48] The constitution also guarantees every Ugandan the right to a clean and healthy environment.[49]

Linking human rights and climate change

The above discussion illustrates the point that environmental protection and observance of human rights are interconnected and complementary in many

ways. What, then, is the link between global environmental problems such as climate change and human rights? Climate change effects aggravate the living conditions of people to a point where their basic human rights are threatened. There is now an emerging consensus that climate change generally has negative effects on the enjoyment of human rights and should thus be treated as a human rights issue.[50] Indeed, the Human Rights Council requested the OHCHR to conduct a detailed study of the relationship between climate change and human rights.[51] In its report, the OHCHR concluded that climate change has deleterious consequences for human rights and that the application of a human rights approach in preventing and responding to the effects of climate change serves to empower individuals and groups.[52] The International Council on Human Rights Policy[53] has also argued that human rights principles can guide climate change policy by focusing on human suffering and exposure to risk; that climate change responses can be made more effective if policy measures employ international human rights standards when assessing future impacts of climate change and of adaptation and mitigation strategies.[54] It should be noted that framing the problem of climate change from a human rights perspective may motivate political action. For example, politicians in the United States were reluctant to accept the seriousness of the ozone depletion problem until it was demonstrated that it had consequences for human health, such as skin cancer.[55] Thus, highlighting the consequences of climate change for the right to health will bring the problem more prominently in the public domain and is likely to galvanise demand for political action.[56] Viewing climate change from a human rights perspective will take the debate beyond the National Environmental Management Authority (NEMA) and the Meteorological Department to include non-environmental organisations (NGOs), such as the courts and human rights NGOs.

However, pursuing the problems/challenges associated with climate change through court action may prove problematic. It may be difficult to unravel the complex causal link between historical GHG emissions of a particular state with a specific climate change related event. It may even prove more difficult for poor countries such as Uganda to identify who to sue, how to prove the injury caused, and where to institute the suit, given that the effects of global warming are usually projections on future impacts. It is certainly necessary for international courts/ tribunals to recognise future injury and joint liability for climate change damage. However, irrespective of whether climate change effects can be construed as

human rights violations, human rights principles can guide developed countries' policies to cut GHG emissions and finance adaptation strategies in developing countries. The human rights perspective is critical in drawing attention to the importance of ensuring that policies and measures to tackle the negative impacts of climate change do not burden the human rights of individuals and populations, especially the poor and vulnerable. Like the precautionary principle in environmental law,[57] the human rights perspective stresses the need to avoid unnecessary delay in reacting to the threat of global warming.

THE NORMATIVE CONTENT OF THE RIGHT TO HEALTH

The right to health is recognised in various human rights instruments. The Universal Declaration of Human Rights (UDHR) affirms that everyone 'has the right to a standard of living adequate for the health of himself/ herself and of his/ her family, including food, clothing, housing and medical care and necessary social services'.[58] According to the ICESCR, state parties recognise 'the right of everyone to the enjoyment of the highest attainable standard of physical and mental health'.[59] To achieve the realisation of this right, the state parties should take steps for: a) the provision for the reduction of the stillbirth rate and of infant mortality, and for the healthy development of the child; b) the improvement of all aspects of environmental and industrial hygiene; c) prevention, treatment and control of epidemic, endemic, occupational and other diseases; and d) the creation of conditions which would assure to all medical services and medical attention in the event of sickness.[60] As the Committee on Economic, Social and Cultural Rights (CESCR) has indicated, these steps illustrate the point that the right to health embraces a wide range of socioeconomic factors which promote conditions in which people can lead a healthy life, and extend to the underlying determinants of health.[61] The CESCR has further observed that 'the right to health must be understood as a right to the enjoyment of a variety of facilities, goods and services and conditions necessary for the realisation of the highest attainable standard of health'.[62]

It should be noted that the ICESCR provides for progressive realisation of the right to health in accordance with the maximum level of available resources. However, the covenant imposes immediate obligations on state parties. State parties must guarantee that the right will be exercised without discrimination of any kind[63] and should take deliberate, concrete and targeted steps towards the

full realisation of the right to health.[64] The concept of progressive realisation should not be interpreted as depriving the state parties' obligations of meaningful content. state parties have a specific and continuing obligation to move as expeditiously and effectively as possible towards the full realisation of the right to health.[65] Retrogressive measures are not allowed except as a last resort.[66] State parties also have a core obligation to ensure the satisfaction of, at the very least, minimum essential levels of each of the rights in the covenant, including essential primary health care. [67] According to the CESCR, the core obligations include, ensuring: a) the right of access to health facilities, goods and services on a non-discriminatory basis, especially for vulnerable or marginalised groups; b) access to the minimum essential food which is nutritionally adequate and safe to ensure freedom from hunger to everyone; and c) equitable distribution of all health facilities, goods and services.[68] State parties should also provide essential drugs, as defined from time to time under the WHO Action Programme on Essential Drugs.[69] Other obligations concern reproductive, maternal and child health care, especially immunisation against the major infectious diseases occurring in the community; taking measures for the prevention, treatment and control of epidemic and endemic diseases; provision of education and access to information concerning the main health problems in the community, including methods of preventing and controlling them; and provision of appropriate training for health personnel, including education on health and human rights.[70]

State parties are obliged to respect, protect and fulfil the right to health. The obligation to respect requires states to refrain from interfering directly or indirectly with the enjoyment of the right to health. The obligation to protect requires states to take measures that prevent third parties from interfering with the realisation of that right. The obligation to fulfil requires states to adopt appropriate legislative, administrative, budgetary, judicial, promotional and other measures towards the full realisation of the right.[71] The obligation to fulfil also requires states to facilitate and provide components of the right to health to individuals or a group who may be unable, for reasons beyond their control, to realise the right themselves by means at their disposal.[72] Regarding international obligations, state parties are obliged to take steps, individually and through international assistance and cooperation, especially economic and technical, towards the realisation of the right to health.[73] State parties should respect the enjoyment of the right to health in other countries, and prevent third parties from violating the right in other countries.[74] State parties should also ensure

that the right to health is given due attention in international agreements. State parties also have a joint and individual responsibility to cooperate in providing disaster relief and humanitarian assistance in times of emergency, including assistance to refugees and internally displaced persons, [75] as a result for example of climate change.

It is important to point out that the Ugandan constitution does not expressly provide for the right to health but contains provisions, which have a strong bearing on the discussion of the implications of climate change for the right to health. The constitution provides that the state shall endeavour to ensure that all Ugandans enjoy access to health services, clean and safe water, work, shelter, and food security.[76] The state shall take all practical measures to ensure the provision of medical services to the population and take all practical measures to promote a good water management system at all levels.[77] The constitution also enjoins the state to 'institute an effective machinery for dealing with any hazard or disaster arising out of natural calamities or any situation resulting in general displacement of people or serious disruption of their life'.[78] The constitution also guarantees the right to a clean and healthy environment and the procedural right of access to information.[79] The constitution further has an inclusive clause which recognises other rights and freedoms not specifically mentioned in the Bill of Rights, such as the right to health.[80] It can also be argued that since the right to health is contained in human rights treaties which Uganda has ratified, it is bound to comply with the obligations contained therein.

STRATEGIES FOR ADDRESSING THE IMPACT OF CLIMATE CHANGE ON THE RIGHT TO HEALTH

The problem of climate change and its projected impact on health must be approached in a holistic and multidisciplinary fashion. Below, this chapter considers some of the strategies that may be employed to confront the consequences of climate change on the right to health.

Strengthening the state's capacity

It is common knowledge that the state has the primary responsibility to promote and protect human rights, including the right to health. A major implication of climate change for the right to health is to weaken the state's capacity to carry

out this responsibility. It is necessary to strengthen the state's capacity to meet its constitutional and international human rights obligations in respect of the right to health. The World Health Assembly has stated that solutions to the health impacts of climate change are a joint responsibility of all states and that developed countries should assist developing countries in assessing the implications of climate change for health and health systems in the country.[81] Developed countries should also assist developing countries in identifying appropriate and comprehensive strategies and measures for addressing these implications. The World Health Assembly also underlined the need to build capacity in the health sector to identify such implications.[82] Under the UNFCCC, developed country parties (Annex I countries) commit themselves to assisting developing country parties (Non-Annex I countries) in meeting the costs of adaptation to the adverse effects of climate change, and to pay special attention to the needs of least developed countries, such as Uganda, in funding and transfer of technology.[83] Annex I countries thus have an obligation to transfer environmentally benign, and affordable technologies to Uganda. They should provide adequate and sustainable financing for climate change programmes in the country. However, the financial assistance should not reduce, but rather be additional to, funding for poverty-alleviation strategies, such as basic health facilities, goods and services. More funding should be provided to the health sector whose financing is a paltry 8 per cent compared to the 15 per cent recommended at Abuja by the African Heads of State.[84] The Department of Meteorology, which is the focal agency on climate change, should also be adequately funded. The department is responsible for maintaining a well-developed weather and climate monitoring system.

Paying attention to vulnerable groups: the example of women

Another major implication of climate change for the right to health is the weakening of the capacity of vulnerable groups, such as rural women, to cope with the deleterious effects of climate change. The role played by women in sustainable development has been recognised in various documents.[85] Women are the main producers of food in most developing countries. In Uganda, over 70 per cent of women are engaged in agriculture.[86] Women should be involved in environmental decision-making at all levels, and a gender perspective should

be integrated in all policies and programmes for sustainable development. Adaptation efforts should systematically and effectively address gender-specific impacts of climate change, for example, in the areas of health, energy, water and food security. Women's inhibiting gender roles, limited access to resources and decision-making processes increase their vulnerability to the negative impacts of climate change. There is evidence that women are disproportionately affected and are more at risk during all phases of weather-related disasters.[87] Women are also susceptible to gender-based violence during natural disasters and migration. Technological developments should take into account women's specific priorities and needs and fully utilise their knowledge and expertise, including traditional health practices. Moreover, women should be consulted and should participate in the formulation, monitoring and evaluation of mitigation and adaptation strategies. A gender perspective should be integrated into health-related policies, planning, programmes and research in order to promote health for both women and men. Women should also be provided with facilities such as credit, agricultural extension services and healthcare services to enable them cope with the negative effects of climate change. Policymakers, however, should not view women simply as passive victims. For example, there is a need to build on rural women's coping and survival strategies in the face of the oppressive forces of globalisation and patriarchy.

Providing information on the health impacts of climate change

It is increasingly recognised that education and information play a crucial role in the promotion of the health of individuals and populations.[88] Consequently, the right of access to information is recognised by a number of both domestic and international environmental and human rights instruments. The constitution guarantees every citizen 'a right of access to information in the possession of the State or any other organ or agency of the State except where the release of the information is likely to prejudice the security or sovereignty of the State or interfere with the right to the privacy of another person'.[89] The National Environment Act also guarantees every person freedom of access to environmental information.[90] The Universal Declaration on Human Rights (UDHR) guarantees everyone the right to 'seek, receive and impart information and ideas through any media and regardless of frontiers'.[91] Under the UNFCCC, the

parties committed themselves to promote and facilitate access to information on climate change.[92] Full, accurate and up-to-date information is considered to be at the heart of sound environmental protection and sustainable development. Access to information enables citizens to participate meaningfully in decisions that directly affect their livelihood and allows them to monitor governmental and private sector activities. Access to information and awareness-raising are critical in efforts to address the impact of climate change. Early-warning information must be provided in a manner accessible to all sectors of society. People need to be educated about the whole issue of climate change, ranging from the cause, effects and mitigation, to adaptation measures. In short, people must be made aware of the projected impacts of climate change on their health.

Uganda should also cooperate with other African countries in the collection of national and regional data to monitor accurately the changes in social and climatic conditions which are likely to increase an outbreak of epidemics. The countries should exchange scientific, technical and other relevant information and data related to the prevention and control of communicable and vector-borne diseases, such as cholera and malaria.

CONCLUSION

Climate change poses a serious threat to almost all the underlying determinants of health. The projected effects of climate change threaten the realisation of economic, social and cultural rights generally, and the right to health in particular. Climate change is likely to compromise the availability of and accessibility to health facilities, goods and services, especially for vulnerable members of society. However, irrespective of the burden of climate change on the available resources, Uganda must perform its obligations in respect of the right to health of its citizens. Consequently, Uganda should request for and be provided with the necessary technical and financial assistance to enable it to respond to the effects of climate change on public health. International assistance should not only be expedient but also an environmental and human rights obligation.

The human rights perspective underlines the need to prioritise access to basic or minimum levels of socioeconomic rights, such as basic medical care and essential drugs. However, access may be limited by non-climatic factors such as poverty, discrimination and unequal power relationships. There is a need to address the underlying causes of inequality and discrimination, paying particular attention to the vulnerable and marginalised members of society. The state and civil society should educate people about the cause and effects of climate change on health and the available response measures. Further, human rights standards and principles should inform the design, implementation, monitoring and evaluation of all policies and programmes on climate change. The state should ensure public participation in measures for addressing climate change and its effects. In the last instance, Uganda should cooperate with other countries in the region in the collection and exchange of relevant data in this respect.

NOTES

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45 Ibid.

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47 Objective XXVII (ii) of the Constitution.

48 Objective XXVII (iii) of the Constitution.

49 Art. 39 of the Constitution. For a discussion of the main features of this right, see Ben Kiromba Twinomugisha, Some reflections on judicial protection of the right to a clean and healthy environment in Uganda, *Law, Environment and Development Journal* 3(3) (2007), 244.

50 See, for example, Sara Aminzadeh, A moral imperative: the human rights implications of climate change, *Hastings International and Comparative Law Journal* 30 (2007), 231.

51 Human Rights Council, Tenth Session, Item 2 of the provisional agenda, A/HRC/10/61, 15 January 2009.

52 Ibid.

53 International Council on Human Rights Policy, Climate change and human rights: a rough guide, 2008, http://www.comminit.com/en/node285227 (accessed 10 March 2009).

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55 On the debates surrounding the ozone depletion problem, see Ben Kiromba Twinomugisha, The evolution of the law relating to the protection of the ozone layer with particular reference

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56 Liza Heinzerling, op cit, p 10.

57 The precautionary principle was stated in the Rio Declaration principle 15 that, 'Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.' Art. 3 of the UNFCCC also incorporates this principle and states that the 'parties should take precautionary measures to anticipate, prevent or minimise the causes of climate change and mitigate its effects. Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing such measures, taking into account that policies and measures to deal with climate change should be cost-effective so as to ensure global benefits at the lowest possible cost.'

58 Art. 25 of the UDHR.

59 Art. 12(1) of the ICESCR. See also Art. 11(f) and 12 of the Convention on the Elimination of all Forms of Discrimination against Women 19 ILM 33 (1979); and Art. 16 the African Charter on Human and Peoples' Rights 21 ILM 58 (1982).

60 Art. 12(2)(a)–(d) of the ICESCR.

61 Para 4 of General Comment 14.

62 Para 9 of General Comment 14.

63 Art. 2(2) of the ICESCR.

64 Art. 2(1) of the ICESCR and General Comment No 3 of 1990.

65 Ibid.

66 Ibid.

67 Ibid.

68 Para 43.

69 Ibid.

70 Para 44(a)–(e).

71 Para 33.

72 Para 37.

73 Para 38.

74 Para 39.

75 Para 40.

76 Objective XIV of the Constitution.

77 Objective XX and XXII of the Constitution.

78 Objective XXIII of the Constitution.

79 Art. 39 and 41 of the Constitution.

80 Art. 45 of the Constitution.

81 WHA 61.19 of 24 May 2008.

82 Ibid.

83 Annex I countries may voluntarily invest in Clean Development Mechanism (CDM) projects in non-Annex I countries. CDM project activities can lead to the transfer of environmentally safe and sound technology and know-how. For a discussion of the prospects and challenges of CDM projects in Uganda, see Emmanuel Kasimbazi, In defence of posterity: challenges of implementing clean development mechanisms in Uganda, *Yearbook of International Environmental Law* 16 (2005), 285–310.

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89 Art. 41(1) of the Constitution. See also section 5 of the Access to Information Act 2005 (Act No 6 of 2005), Entebbe: Government Printer.

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92 Art. 6.

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