

# REALITY CHECK



## UGANDA'S ECONOMIC DEVELOPMENT

THE CHALLENGES AND OPPORTUNITIES OF  
CLIMATE CHANGE

Emmanuel Kasimbazi



Konrad  
Adenauer  
Stiftung



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*Emmanuel Kasimbazi*



The views expressed in this publication do not necessarily reflect the views of the Konrad-Adenauer-Stiftung but rather those of the author.

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ISBN: 978 9970 477 00 5

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## **ACKNOWLEDGEMENT**

I would like to extend my sincere gratitude to Konrad-Adenauer-Stiftung for providing financial support that enabled the preparation of this paper. I would also like to thank the staff of Konrad-Adenauer-Stiftung, Dr. Angelika Klein, the Country Representative, Mr. Yusuf Kiranda, the Programme Manager, Ms. Anna Hoffmann and Ms. Julia Zimmermann, who provided overall technical advice and guidance in the process of developing this publication.

Furthermore, I would also like to thank all the people consulted and those whom provided materials and valuable information that allowed me to cover much ground in a relatively short time.

*Dr. Emmanuel Kasimbazi*  
Author

# FOREWORD

Climate is a key determinant of the status of Uganda's natural resources, such as agriculture, forestry, water resources and wildlife, and therefore also a highly relevant factor for the country's economic development potential. The unpredictability of the climate, captured in the broadest sense in the concept of climate change, is increasingly considered as one of the greatest challenges facing the world's environment, society and economy today. It is increasingly regarded not only as an environmental or intergenerational sustainability issue, but also as an economic development concern. Thus, managing climate change is an essential step to be taken to enable inclusive economic growth, poverty reduction, and development in the long run.

Climate change in Uganda is manifesting itself through frequent extreme weather events such as drought, floods, landslides and storms. This is posing a serious threat to the country's natural resources and socio-economic development. The most dominant impact attributed to climate change in Uganda is the increased occurrence of droughts that severely harm the mostly rural and agriculturally dependent population. However, mitigation against practices that are detrimental to the environment is usually to economic disadvantages such as a reduction in short-term profits or specific costs being generated to introduce environmentally friendly practices. This short-term connection is often the reason why policies in the area of climate protection are only poorly implemented and lack the necessary political will to be realised. This short term view, however, fails to appreciate the fact that long- and even mid-term consequences make immediate action towards the integration of climate concerns in economic policies and practices much more worthwhile by creating increased

income in the long run and averting the complete depletion and loss of key natural resources.

The Konrad-Adenauer-Stiftung (KAS) recognises the impacts of climate change and the quest for sustainable growth as one of the most crucial challenges worldwide. As a political foundation, KAS supports the development of policies that aim at addressing these challenges and finding solutions in order to link the two factors in a fruitful and sustainable way.

This publication aims to provide the prerequisites for just that: an in-depth analysis of the complex connection between economic growth and the environment. By offering an extensive background and analysis of the current status of development, climate change, climate sensitive interventions and their impact in Uganda, a basis is formed for further debate and discussion. With this publication, we wish to enhance the public, academic and political discourse on the topic and thus hope to contribute to respective policies in Uganda.

*Dr. Angelika Klein,  
Country Representative,  
Konrad-Adenauer-Stiftung Uganda*

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## **LIST OF ACRONYMS**

AFCA	African Fine Coffees Association
BINP	Bwindi Impenetrable National Park
BOD	Biochemical Oxygen Demand
CCPC	Climate Change Policy Committee
CCU	Climate Change Unit
CDM	Clean Development Mechanism
CO <sub>2</sub>	Carbon dioxide

CWRC	Christian Reformed World Relief Committee
DFID	Department for International Development
DNA	Designated National Authority
DWRM	Directorate of Water Resource Management
EAC	East African Community
ENR SWG	Environment and Natural Resources Sector Working Group
ENRM	Environment and Natural Resource Management Policy
FAO	Food and Agriculture Organisation
GDP	Gross Domestic Product
GEF	Global Environment Facility
GHG	Green House Gases
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GoU	Government of Uganda
HEP	Hydro Electricity Power
IGAD	Intergovernmental Authority for Development
IPCC	Intergovernmental Panel on Climate Change
KFP	Kachung Forest Project
KP	Kyoto Protocol
MAAIF	Ministry of Agriculture, Animal Industry and Fisheries
MDGs	Millennium Development Goals
MoFPED	Ministry of Finance, Planning and Economic Development
MoLG	Ministry of Local Government

MW	MegaWatt
MWE	Ministry of Water and Environment
NAPA	National Adaptation Programme of Action
NDP	National Development Plan
NEMA	National Environmental Management Authority
NFA	National Forestry Authority
NGO	Non Governmental Organization
NPA	National Planning Authority
ODA	Official Development Assistance
PAGE	Policy Analysis of the Greenhouse Effect
PEAP	Poverty Eradication Action Plan
PES	Payment for Ecosystem Services Schemes
PFCC	Parliamentary Forum on Climate Change
REDD	Reduced Emissions from Deforestation and Forest Degradation
SCOUL	Sugar Corporation of Uganda Limited
TAAC	Territorial Approach to Climate Change
UBOS	Uganda Bureau of Standards
UCDA	Uganda Coffee Development Authority
UNCCC	United Nations Climate Change Convention
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development
USDA	United States Department of Agriculture

## OBJECTIVE AND STRUCTURE OF THIS PAPER

The main purpose of this paper is to analyse the linkage between climate change and economic development in Uganda. The paper explains how climate change and economic development are associated with each other, while focusing on the resulting challenges and opportunities that emerge from having a more integrated approach. This paper contains ten main chapters whose contents are described in Table 1 below:

CHAPTER	CONTENT
<b>Chapter 1</b>	Brief introduction on climate change, causes and impacts
<b>Chapter 2</b>	Synopsis of the geographic features and the economic situation in Uganda
<b>Chapter 3</b>	This chapter describes climatic conditions in the country, including illustrating the relevant climatic zones and patterns.
<b>Chapter 4</b>	An analysis of climate change variability in Uganda, and specifically provides instances of how climate has been changing in the recent years
<b>Chapter 5</b>	An exploration of the impact of climate change on the economic development of Uganda. The chapter closely examines climate change impacts on agricultural production, health and water sector, infrastructure, human settlement as well as energy and tourism sectors
<b>Chapter 6</b>	An analysis of national climate change strategies and policies in place, as well as their impact on economic development
<b>Chapter 7</b>	This chapter identifies national institutions that are involved in climate change activities and assesses their role in economic development

<b>Chapter 8</b>	An analysis of local climate change projects that are being implemented and interrogates how these contribute to economic development
<b>Chapter 9</b>	This chapter explores the challenges that affect the implementation of climate change strategies in Uganda
<b>Chapter 10</b>	Conclusions and recommendations on how climate change opportunities could be used to achieve sustainable economic development

*Table 1: Structure of the paper*

# 1. INTRODUCTION

Climate change has been defined in many different ways. The Intergovernmental Panel on Climate Change (IPCC) defines climate change as any change in climate over time, whether due to natural variability or as a result of human activity. This change in the state of the climate can be identified by variations in the mean and/ or the variability of its properties and that persist for an extended period of time, typically decades or longer.<sup>1</sup>This definition is different from the one used by the United Nations Framework Convention on Climate Change (UNFCCC), where climate change refers to a change of climate that is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and that is in addition to natural climate variability observed over comparable time periods<sup>2</sup>. However, it is equally vital to point out that there are many other major factors that bring about climate change such as solar output, tectonic movements and earth's orbit pattern.<sup>3</sup>

Scientists indicate that increased levels of carbon dioxide (CO<sub>2</sub>) and other polluting gases in our atmosphere (greenhouse gases-GHGs)<sup>4</sup> results from human activities and has contributed to climate change or global warming. Planet earth is surrounded by gases which keep the surface of the earth warm and able to sustain life. As greenhouse gases are emitted by burning fossil fuel (such as coal, oil, gas and biomass) and changing land use patterns through the introduction of factories, cars, exhaust fumes and deforestation to mention but a few, the layer

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1 IPCC, (2007). Climate change 2007, pp. 30, 36, 37: Synthesis report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change available at: <http://www.ipcc.ch>.

2 Ibid.

3 Ruddiman, W.F.,(2008), p.10, „Earth's climate: Past and Future, 2<sup>nd</sup> edition, W.H. Freeman and Company.

4 Ibid.

of GHGs in the atmosphere gets thicker and the earth's surface temperature begins to rise. The increase in temperature over the earth's surface results from the trapping of heat from the sun by the GHGs. According to the IPCC fourth assessment report on climate change of 2007, "for the next two decades, a warming of about 0.2°C per decade is projected for a range of Special Report on Emission Scenarios (SRES)."<sup>5</sup> "Even if the concentrations of all greenhouse gases and aerosols had been kept constant at year 2000 levels, a further warming of about 0.1°C per decade would be expected."<sup>6</sup>

Climate change is one of the greatest challenges facing humanity in the 21<sup>st</sup> century, as the Earth's near-surface temperatures continue to rise. As temperatures rise, precipitation is expected to increase along with the frequency and intensity of droughts, floods, heat waves and landslides. This poses a significant threat to lives and livelihoods of Ugandans as much as it does to the world. Climate change is likely to disrupt the Earth's ecological systems and to have serious negative consequences for agricultural production, forests, water supply, health systems and overall human development.<sup>7</sup> Uganda's ecosystems and the livelihoods that depend on them are under threat from these climatic changes. Vulnerable populations (mainly the poor and most marginalised including children, women and people with disabilities) are inadequately equipped to cope with the adverse impacts of climate change. For example, changes such as fluctuation in rainfall patterns cause more frequent and intense weather events such as floods and droughts. Additionally, ice

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5 Ibid.

6 Ibid.

7 IPCC, (2007). Climate change 2007, pp. 48-53: Synthesis report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change available at: <http://www.ipcc.ch>.

caps on the country's Rwenzori Mountains are rapidly shrinking.<sup>8</sup> The melting of mountain ice caps has serious consequences on local social and economic development, local ecosystems and eco-tourism.

Vulnerability to climate change in Uganda is mostly due to heavy reliance on climate-dependant resources, especially tourism and rain-fed agriculture. At the same time, adaptive and mitigation capacity is low due to shortages of economic resources and technology. Further still, Uganda's vulnerability to climate change is likely to increase due to continued over-reliance on nature for crop and animal husbandry as earlier mentioned. For instance agricultural products supply nearly all of Uganda's foreign exchange earnings; coffee alone contributes up to about 30 % of Uganda's foreign exchange earnings and employs directly and indirectly more than 3.5 million Ugandans.<sup>9</sup>

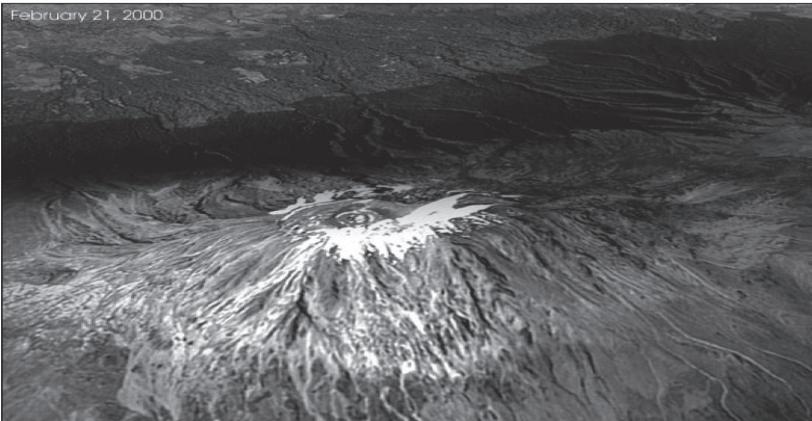
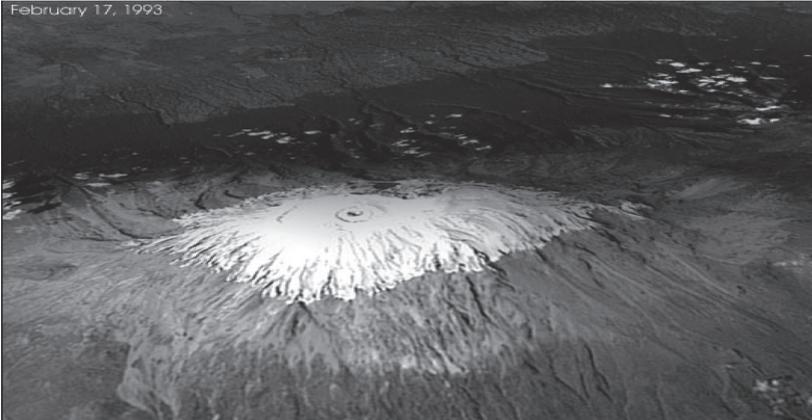
As a developing country, Uganda is more vulnerable to adverse effects of climate change because of its low adaptive capacities. This vulnerability is compounded by weak institutional capacity, lack of skills on climate change adaptation and inadequate expertise in disaster management. Moreover, lack of equipment for disaster management, limited financial resources, poor urban planning and an economy heavily dependent on exploitation of natural resources worsen the aforementioned weakness. Uganda has so far experienced an increase in the frequency and intensity of some climate change events (especially floods and drought) with serious socio-economic consequences. According to the United Nations Joint Action Framework on Climate Change in Uganda, climate change threatens to reverse development gains

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8 Ibid.

9 USDA Foreign Agricultural Service (2002), Uganda Coffee Annual Report.

and jeopardise the country's economic development goals.<sup>10</sup> At the regional level for example, global warming is responsible for the melting and receding of the snow cap on Mount Kilimanjaro as shown in the picture below.



*Photo 1: Receding ice cap on Mt. Kilimanjaro over a period of 7 years,  
Source: [globalclimatefacts.wordpress.com](http://globalclimatefacts.wordpress.com)*

10 Republic of Uganda, (2007). Climate change: Uganda National Adaptation Programmes of Action. Environmental Alert, GEF, UNEP; UN Habitat (2009). Climate Change Assessment for Kampala: Uganda, Cities and Climate Change Initiatives.

## **2. GEOGRAPHICAL AND ECONOMIC OVERVIEW OF UGANDA**

### **2.1 Geography of Uganda**

Uganda is a landlocked country located in the East African region bordering Kenya to the east, Tanzania to the south, Rwanda to the south-west, Democratic Republic of Congo to the west, and South Sudan to the north. Uganda lies across the equator with a total surface area of 241,550.7 km<sup>2</sup> of which 199,807.4 km<sup>2</sup> are land (arable land is only 21.6%), while water and swamps cover a total of 41,743.2 km<sup>2</sup>.<sup>11</sup> Uganda's population was estimated to be 30.7 million in 2009 according to the Uganda National Household Survey 2009/2010, of which 51% are females.<sup>12</sup> The country's annual population growth rate has remained relatively high at 3.2% well above the 2.6% average for Sub-Saharan Africa. It is important to note that over 80% of Uganda's population is rural and depends on rain-fed agriculture, which is particularly vulnerable to impacts of adverse effects of climate change.<sup>13</sup>

### **2.2 Economy of Uganda**

Uganda has substantial natural resources including fertile soils, regular rainfall, small deposits of copper, gold, and other minerals. More recently, the country discovered considerable commercial quantities of oil. Since 1990, national-based economic reforms ushered in a period of steady economic growth, based on continued investment in infrastructure, improved incentives for

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- 11 Republic of Uganda (2012). National Report on Progress on the Implementation of the Rio Commitments on Sustainable Development in Uganda, Report presented at the Rio+20 United Nations Conference on Sustainable Development, Rio De Janeiro, Brazil, 15 – 22 June 2012.
  - 12 Uganda Bureau of Statistics, Uganda National Household Survey 2009/2010.
  - 13 Republic of Uganda, 2007. Climate Change: Uganda National Adaptation Programmes of Action. GEF, UNEP and Environmental Alert at 12.

production and exports, lower inflation, better domestic security, and the return of exiled Indian-Ugandan entrepreneurs.<sup>14</sup>

Uganda's economy has expanded at an average rate of 8.8% over the past five years (2008-2013)<sup>15</sup>; and the projected growth is 7.2% per annum in the period 2010–2015 with a Gross Domestic Product (GDP)<sup>16</sup> of about USD1, 300 per person.<sup>17</sup> The agriculture sector is the most important source of employment and income, with 65.5% of the working population engaged in agriculture, forestry and fishing.<sup>18</sup> Although contribution of agriculture to the total GDP has been fluctuating since 2001/2, the sector continues to dominate Uganda's economy.<sup>19</sup> It contributed approximately 23.2% of GDP in 2012/13.<sup>20</sup> Coffee remained the major foreign exchange earner and its share to total export earnings increased from 17.5% in 2010 to 21.6% in 2011, with earnings increasing significantly to USD 466.6 million in 2011.<sup>21</sup> Services account for about half of the GDP in the country. Uganda has made progress in diversifying its productive base, with the manufacturing sector becoming more prominent.<sup>22</sup>

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14 Uganda Economy Profile 2013, available at [http://www.indexmundi.com/uganda/economy\\_profile.html](http://www.indexmundi.com/uganda/economy_profile.html).

15 IRC International Water and Sanitation Centre (2011). Lessons For Rural Water Supply Assessing progress towards sustainable service delivery Uganda, the Hague 2011 <http://www.waterservicesthatlast.org/content/download/333/2070/version/5/file/Uganda+country+study.pdf>.

16 Ibid.

17 Economy Watch, (2010).Uganda Economy [available at [http://www.economywatch.com/world\\_economy/uganda](http://www.economywatch.com/world_economy/uganda)].

18 Republic of Uganda, Agriculture and Budget Financial Year 2013/14.

19 Ibid.

20 Ibid.

21 Uganda Bureau of Statics (2012), Statistical Abstract.

22 Republic of Uganda (2010). Ministry of Finance, Planning and Economic Development. Uganda National Report For the Implementation of the Programme of Action for the Least Developed Countries for the Decade 2001-2010 available <http://www.un.org/en/conf/ldc/pdf/uganda.pdf>.

While Uganda's climate offers a great potential for food production, the prolonged and frequent droughts in many parts of the country, particularly the north-east, have led to a perpetual dependency on food aid. A typical example is the arid areas of Karamoja where the World Food Programme (WFP) supplies virtually all the food consumed here.<sup>23</sup>

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23 Climate Change (2007). Uganda National Adaptation Programmes of Action.

### 3. CLIMATIC CONDITIONS IN UGANDA

Uganda is naturally gifted in contrast to most other African countries with regards to its climatic and ecological conditions. However, some areas in the country experience extreme temperatures and rainfall. The northern region is especially vulnerable, being prone to both floods and droughts as a result of high rainfall variability.<sup>24</sup>

Uganda's overall climate is equatorial and experiences relatively humid conditions and moderate temperatures throughout the year, with mean daily temperatures of 26°C.<sup>25</sup> Average temperatures in the cooler regions of the south-west are below 20°C and reach 31°C in the northern parts of the country, also considered the warmest.<sup>26</sup>

The country experiences a wet climate with two distinct rainy seasons in a year in the southern parts of the country, which merge into one rainy season further north of the equator. The rainy period falls between October and December is described as the long rainy season, while the short season is between March and May.<sup>27</sup> The areas around Lake Victoria are wetter than other areas of in country. The Lake Victoria region receive more than 2,100 mm of rain annually, whereas the arid and

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24 The International Institute for Sustainable Development (2003). Climate Risk Management For Sustainable Crop Production In Uganda: Rakai And Kapchorwa Districts available at [http://www.iisd.org/pdf/2013/crm\\_uganda.pdf](http://www.iisd.org/pdf/2013/crm_uganda.pdf).

25 Ministry of Finance Planning and Economic Development (MoFPED) 2009. The State of Uganda Population Report 2009: Addressing the Effects of Climate Change on Migration Patterns and Women., Kampala, Republic of Uganda.

26 Ibid.

27 Mcsweeney C.; et al 2008, Uganda: UNDP Climate change. Profiles [http://www.geog.ox.ac.uk/research/climate/projects/undp-cp/UNDP\\_reports/Uganda/Uganda.lowres.report.pdf](http://www.geog.ox.ac.uk/research/climate/projects/undp-cp/UNDP_reports/Uganda/Uganda.lowres.report.pdf).

semi-arid north receives only 500 mm per year, reducing considerably to as low as 200 mm in the north-eastern part of the country.<sup>28</sup> Uganda's rainfall is influenced by a range of broader weather trends and phenomena. The country's bimodal rainfall is driven by the oscillation over the equator of the Inter-tropical Convergence Zone (ITCZ). The pattern of the zone's oscillation is in turn sensitive to the El Niño Southern Oscillation: El Niño brings about a wet phase in Uganda between October and December, which could cause flooding, while La Niña (the converse) brings about a dry phase, which leads to drought.<sup>29</sup> The effects of the oscillation in rainfall patterns can vary due to the influence of the Indian Ocean Dipole, an irregular oscillation of sea-surface temperatures in which the western Indian Ocean becomes alternately warmer and then colder than the eastern part of the ocean. Lake Victoria also affects rainfall patterns due to differential heating and vapour transport.<sup>30</sup>

Climatic conditions vary considerably within Uganda. The three main types of climate found in Uganda are highland, savannah tropical and semi-arid.<sup>31</sup> Most parts are on average height of 1,200 m above sea level. The lowest altitude is 620m (within the Albert Nile) and the highest altitude (Mt. Rwenzori Peak) is 5,110 m above sea level. Highland climates have cool temperatures and moderate rainfall; this climate is mostly found around Mount Elgon and the Rwenzori Mountains. Regions with a savannah tropical climate have moderate average temperatures and high mean annual rainfall. This climate is present in the central and

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28 Ibid.

29 The International Institute for Sustainable Development supra note 30.

30 Republic of Uganda, (2010). Climate Change Vulnerability Assessment, Adaptation Strategy and Action Plan for the Water Resources Sector in Uganda.

31 Republic of Uganda, (2007). Climate change: Uganda National Adaptation Programmes of Action. Environmental Alert, GEF, UNEP

western parts of the Lake Victoria Basin where most of Uganda's rainforests and wetlands can be found. Regions with semi-arid climates experience high average temperatures and low mean annual rainfall. Animal husbandry is common in this type of climate, and such areas are commonly referred to as the "cattle corridor" of Uganda. The corridor runs from the Karamoja region in the north-east, to the Ankole region of south-west.<sup>32</sup>

Uganda's highland and semi-arid climates receive an average of approximately 900 mm of rainfall per year, while savannah tropical climates receive 1200 mm per year. Social and economic activities in Uganda are more sensitive to rainfall than to any other climate variable.<sup>33</sup> Semi-arid climates experience extreme temperatures. Temperatures as high as 33° C have been recorded in Mbarara (south-west of the country), while in the north-east regions of Gulu, Kitgum and Moroto, high temperatures of 35°C and above have been recorded. Highland climates may experience extreme lows in temperature reaching as low as 4° C in Kabale of the western highlands and temperatures below freezing are regularly experienced in the Rwenzori and Elgon ranges.

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32 Ibid.

33 Ibid.

## 4. CLIMATE VARIABILITY AND CHANGE IN UGANDA

It is difficult to fully assess the degree to which climate variables and hazards have changed due to poor historical data collection. Important changes are nevertheless being observed in Uganda's climate. Human induced climate change is likely to result in unprecedented rise in average temperatures by up to 1.5 °C in about 2030 and by up to 4.3 °C by the 2080s.<sup>34</sup> The country is also expected to face changes in rainfall patterns and total annual rainfall amounts but these are less certain than changes in temperature and extreme climate events are also expected to increase in both frequency and intensity.<sup>35</sup>

Droughts have been reported as the most frequent climate change event occurring in the country with frequency of occurrence increasing (up to seven droughts) in the period between 1991 and 2000.<sup>36</sup> The occurrence of heavy rains and associated floods has also been reported to have increased in Uganda. The glaciers declined by 50% between 1987 and 2003.<sup>37</sup> This glacial recession is generally attributed to increased air temperature and decreased snow accumulation during the 20<sup>th</sup> century. It has recently been suggested that decreasing cloud cover during that same time period has contributed to a higher rate of sublimation (vaporization of ice without melting) of these glaciers as well. The mean annual temperature has increased by 1.3°C since 1960 at an average rate of 0.28°C per decade. Precipitation observations of rainfall over Uganda statistically show significant

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34 Mubiru, *supra* note 3.

35 Republic of Uganda, Uganda National Adaptation Programme of Action, 2007.

36 *Ibid.*

37 European Commission, "African Ice Caps will soon Disappear due Global Warming" Science for Environmental Policy 8 June 2006.

decreasing trends in annual rainfall, especially during the March to May rain season.<sup>38</sup>

The average temperature in semi-arid climates is on the rise, especially in the southwest of the country.<sup>39</sup> The country's National Adaptation Program of Action (NAPA), cites an average temperature increase of 0.28°C per decade between 1960 and 2010.<sup>40</sup> The months of January and February exhibit this warming trend averaging a 0.37°C increase per decade.<sup>41</sup> The frequency of hot days in the country has increased significantly, while that of cold days has decreased.<sup>42</sup> As a consequence, Malaria is spreading into new areas in the country.<sup>43</sup> Further, the ice cap on Rwenzori has shrunk significantly in the last 100 years.<sup>44</sup>

Changes in rainfall patterns are also being observed. Rainfall has reduced, become less reliable and increasingly unevenly distributed.<sup>45</sup> Recent years have seen erratic onsets and ends to rainfall seasons, which have been heavier and more violent.<sup>46</sup> Floods and landslides are on the rise and increasing in intensity. Since 2000, extreme rainfall conditions have been regularly experienced in Eastern Uganda.<sup>47</sup> There has been an increase of approximately 1,500 mm of precipitation during the December

38 Namanya D. B. (May 2009). An Assessment of the Impact of climate change on the Health Sector in Uganda: A case of Malaria and Cholera epidemics and how to improve planning for effective preparedness and response, Climate Change Regional Seminar Namibia.

39 Ministry of Water and Environment, supra note 6.

40 Uganda National Adaptation Programme of Action, 2007.

41 Ministry of Water and Environment, supra note 6.

42 Republic of Uganda, supra note 17.

43 Namanya supra note 26.

44 Intergovernmental Authority on Development (IGAD) 2010, Environment Outlook. Available from [http://igad.int/index.php?option=com\\_docman&task=cat\\_view&gid=58&Itemid=144](http://igad.int/index.php?option=com_docman&task=cat_view&gid=58&Itemid=144).

45 Ibid.

46 Republic of Uganda, supra note 11.

47 The International Institute for Sustainable Development supra note 30.

to January rainy season.<sup>48</sup> El Niño Southern Oscillation events have also been shorter and more irregular.<sup>49</sup> Floods wash away roads and bridges and isolate rural areas causing food shortages, inflation and acute health concerns, including an outbreak of cholera.<sup>50</sup>

The west, north and north-east of the country have been experiencing more frequent and longer-lasting droughts than seen historically.<sup>51</sup> Between 1991 and 2000, seven droughts occurred in the Karamoja region and the years 2001, 2002, 2005 and 2008 also saw major droughts.<sup>52</sup> While there have always been droughts in Uganda, evidence suggests they are becoming more frequent and more severe.<sup>53</sup> The increased frequency and duration of droughts is the most significant climate-related change in the country.<sup>54</sup> Since spring 1997, Uganda's track record of rapid economic growth was compromised by extreme weather conditions caused by El Niño.<sup>55</sup> Severe droughts in the west and torrential rains in the east had a disastrous effect on Uganda's agricultural production sector causing food insecurity especially in areas like Karamoja which is virtually dependent on food aid.<sup>56</sup>

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- 48 National Environmental Management Authority (NEMA), 2008. Uganda National Environment Report. Kampala, Republic of Uganda.
- 49 Intergovernmental Authority on Development (IGAD), supra note 50.
- 50 The World Bank report. El niño emergency Assistance for Uganda Washington,( May 8, 1998) Press Release No:98/1757/AFR.
- 51 Republic of Uganda, supra note 17.
- 52 Ibid.
- 53 Intergovernmental Authority on Development (IGAD), supra note 50.
- 54 Republic of Uganda, supra note 17.
- 55 World Bank, El NIÑO emergency Assistance for Uganda available at <http://web.worldbank.org/external/default/main?pagePK=34370&piPK=34424&theSitePK=4607&menuPK=34463&contentMDK=20015751>
- 56 Mubiru supra note 3.

Besides drought occurrences, in September 2010, flooding hit the Teso region leading to rotting of cassava, sweet potato tubers and peanuts in the farms contributing to food insecurity.<sup>57</sup> Previously in August 2007, floods had struck the Teso sub-region of north-eastern Uganda reaching catastrophic proportions. This caused the Parliament of Uganda to declare the first ever state of emergency.<sup>58</sup>

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57 Republic of Uganda, (2012). Uganda National Climate Change, Costed Implementation Strategy.

58 Ibid.

## 5. THE IMPACT OF CLIMATE CHANGE ON UGANDA'S ECONOMIC DEVELOPMENT

In Uganda, climate change is likely to impact the country's microeconomic stability and overall socio-economic development, as well as its ability to achieve the Millennium Development Goals (MDGs). Goal 7 requires ensuring environmental sustainability. Under this goal, the key targets are integrating the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources and reducing biodiversity loss. According to the Uganda's MDG progress report,<sup>59</sup> there has been slow progress to meet these two targets. Climate change is one of the factors that have affected the progress in achieving the targets.

Poor climatic conditions reduce the performance of Uganda's agricultural sector, which is the backbone of the economy.<sup>60</sup> This is likely to result in higher food prices that have steadily increased with a record high in 2012.<sup>61</sup> Food prices automatically increased due to reduced supplies to the market, which was mainly attributed to a drought spell in the country that began late December 2010 to early March 2011, and this affected production of commonly consumed food commodities.<sup>62</sup> Moreover, there was an increased demand for food commodities from Uganda by neighbouring countries such as South Sudan, Kenya and Rwanda.<sup>63</sup>

59 The Republic of Uganda, Uganda National Climate Change Policy 2013.

60 Ibid.

61 Ibid.

62 Ibid.

63 Ndatira Mukiza C, "Current Inflation Trends: Main Drivers, Causes and Policy Implications", Staff Working Paper May 2011, available at <http://www.ubos.org/onlinefiles/uploads/ubos/pdf%20documents/>

Additionally, there have been reports of lower domestic revenues and an increase in the current deficit due to lower export earnings. The likely overall impact is an increase in inflation (due to an increasing fiscal deficit), an increase in external debt and a depreciation of the Ugandan shilling.<sup>64</sup> The UN Food and Agriculture Organisation (FAO) determined that the drop in the growth of the Ugandan economy from 6.6% in 2004-05 to 5.3% in 2005-06, was largely due to the variability of the weather, specifically, its impact on agriculture.<sup>65</sup> The key sectors that tend to be most affected by climate and weather variability are agriculture, water, energy and transport.

Uganda has also experienced epidemics impacting on health resulting to significant economic cost. For example, in 1992, 1994, 1997/98 and 2000/2001, incidences of malaria of varying severity and extent were reported in the highland areas. Additionally, in 1997/98 a cholera epidemic affected over 50,000 people with 200 deaths recorded. Apart from loss of life, the country used approximately USD 4.3 million to control the epidemic. Decreased man power and lost man hours were also experienced causing economic losses, as some of the affected people were part of the workforce.<sup>66</sup>

In the absence of detailed data on economic costs of climate change and adaptation, including benefits of the later, in Africa and her individual countries facing similar challenges, ADAPT Cost project commissioned a cost study funded by United

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SWP\_CurrentInflationTrends\_6May2011.pdf

64 Uganda National Climate Change Policy supra note 65.

65 Ibid.

66 Republic of Uganda, (2011). An Assessment of the Impact of climate change on the Health Sector in Uganda: A case of Malaria and Cholera epidemics and how to improve planning for effective preparedness and response.

Nations Environment Programme (UNEP), which indicates that the economic costs of climate change in Africa could equal an annual loss in GDP of 1.5% to 3% by 2030 under a business-as-usual scenario.<sup>67</sup> In the longer term (after 2050), these costs could rise rapidly. The Policy Analysis of the Greenhouse Effect (PAGE)<sup>68</sup> model run as part of the ADAPT cost study, and is used in the Stern review<sup>69</sup> which indicates that these costs could rise to almost 10% of GDP lost by 2100. Table 2 below shows the estimated annual costs of climate change in Africa, as an equivalent percentage of GDP.

Temperature increase	Year	Economic costs (% of GDP)
1.5°C	2040	1.7%
2°C	2060	3.4%
4.1°C	2100	10%

*Table 2: Annual costs of climate change in Africa as an equivalent percentage of GDP*

*Source: AdaptCost report, 2009*

67 AMCEN, (2011). Addressing Climate Change Challenges in Africa; A Practical Guide Towards Sustainable Development available at [http://www.unep.org/roa/amcen/docs/publications/guidebook\\_CLimateChange.pdf](http://www.unep.org/roa/amcen/docs/publications/guidebook_CLimateChange.pdf)

68 PAGE is a stochastic model. 31 of its key input variables are defined not by a single value, but rather, as a probability distribution comprised of a range of possible values. For each such variable a minimum, maximum, mean, and mode is defined. PAGE simulates the economic and environmental impact of policies to address climate change. It is the current version of the Climate CoLab that uses only a single module of PAGE, the one that assesses the economic cost of damages caused by climate change.

69 The Stern Review on the Economics of Climate Change is a 700 page report released for the British government on 30 October 2006 by economist Nicholas Stern, chair of the Grantham Research Institute on Climate Change and the Environment at the London School of Economics and also chair of the Centre for Climate Change Economics and Policy (CCCEP) at Leeds University and LSE. The report discusses the effect of global warming on the world economy.

Some assessments conducted in Uganda have so far shown that climate change will have high economic impacts on key economic sectors. Table 3 below shows the estimated economic climate change impacts in the ecological region of Lake Victoria for three specific sectors.<sup>70</sup>

Sector	Maximum change in value (constant thousand USD)
Crops	-USD1,462,686
Livestock	-USD90,942
Health	-USD10,291,811

Table 3: Maximum change in value due to climate change between now and 2050 in Africa

Source: AdaptCost report, 2009

## 5.1 Impact on Agricultural Production

The economy and wellbeing of the people in Uganda is highly dependable on climate, especially because over 80% of the population lives in the rural areas and depends on rain-fed agriculture that is prone to impacts of climate variability.<sup>71</sup> Climate change impacts on agriculture production in various ways. According to the Ugandan Agricultural Census, 7% of the country’s 3.95 million agricultural households were reported to be prone to flooding, with most incidences reported in the eastern region of the country.<sup>72</sup> Furthermore, of the approximately 2 million agricultural households that experienced food shortages,

70 Hecht, J, Kahata, J, & Katharine, (2011). Costs Imposed By Climate Change in three Ecoregions of East Africa, USAID East Africa.

71 Ministry of Agriculture, Animal Industry and Fisheries ,(2010). Statistical Abstract.

72 Ministry of Agriculture, Animal Industry and Fisheries,(2011).The Draft National Coffee Policy. Revitalization of the Coffee Sector in Uganda. Republic of Uganda.

1.8 million (91.5%) experienced drought and 1.3 million (66%) experienced pests or diseases.<sup>73</sup>

Agricultural output growth rate in 2005/06 was estimated to be 0.4 %, down from 1.5 % in the previous year, the lowest since 1991/92 due to the prolonged drought conditions.<sup>74</sup> Currently, the main impacts of climate hazards on crop production, as reported during local and national consultations, range from total crop failure (maize and beans) to decreased yield quality and quantity, as well as increased susceptibility to pest and diseases (maize, beans, coffee). For instance, on average 800,000 ha of crops are destroyed annually by climate-related effects resulting in losses exceeding USD47million.<sup>75</sup> Additionally, increased pest infestations which affect agriculture production such as the armyworm, the cassava mosaic and weather related plant pathogens, have been brought about by changes in climate, which has created conducive environments for the propagation of these pests and pathogens.<sup>76</sup>

Reduction in food production due to climate change related impacts, has serious consequences, such as wide spread malnutrition, particularly in children. This could lead to impaired child development and decreased adult activity. As a result of the projected severe reduction in economic productivity, the country's socio-economic development is likely to drop.<sup>77</sup>

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73 Ibid.

74 African Development Bank/OECD (2007). Economic Outlook.

75 National Environmental Management Authority, *supra* note 25.

76 USAID (2013). Uganda Climate Change Vulnerability Assessment Report

77 Ibid.



*Photo 2: Maize plantation affected by drought in Bududa District posted by Marcia Bujold on August 10, 2010*



*Photo 3: Bududa (Eastern Uganda) landslide photo posted by Thomas White, March 2010*

Furthermore, during the 1997/1998 floods, coffee exports dropped by 60% and tea estate operations were suspended in

the eastern parts of the country, while 300 ha of wheat was lost in Kapchorwa District<sup>78</sup> as a result of the 2007/2008 floods.<sup>79</sup>

During the 1999/2000 droughts, the water table level dropped and the ensuing drying of wells and boreholes led to cattle deaths, low milk production as well as food insecurity within the cattle corridor.<sup>80</sup> The increased cattle death was mainly caused by a shift in vegetation zones particularly in the range lands and “cattle corridor” which adversely affect livestock and wildlife particularly the reduced pasture for livestock due to frequent droughts. Rising temperatures may also restrict Uganda’s coffee production, particularly of the higher-value Arabica bean, jeopardising an important source of income for rural households, including the country’s coffers as the cash crop is the highest export earner.<sup>81</sup> Coffee exports generate approximately 20% of the foreign exchange earnings. The foreign exchange value of coffee in Uganda has risen from over USD 250 million in 2010 to an estimated USD 480 million in 2012.<sup>82</sup> Therefore, climate change impact on this important cash crop is likely to result in a negative impact on the national economy.<sup>83</sup>

## **5.2 Impact on Fisheries**

Climate change related problems have also led to dammed lake levels dropping, while declining water levels of Lake Victoria have also caused shortages for water supplies in cities and towns around it. Compared to 1927, Lake Victoria surface waters have warmed by almost 1.2°C in 82 years, while the temperature rose by 1.6°C

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78 Ministry of Water & Environment (MWE), *supra* note 6.

79 National Environmental Management Authority, *supra* note 54.

80 *Ibid.*

81 Republic of Uganda, (2013). Millennium Development Goals Report for Uganda at 11.

82 Oxfam ,(2013).The Impact of climate Change on Coffee in Uganda. Lessons from a case study in the Rwenzori Mountains.

83 UCDA, 2012.

in waters greater than 50m deep over the same time period.<sup>84</sup> While global climatic changes may have primarily contributed to this change, human activities cannot be overlooked.<sup>85</sup> Higher temperatures may impact on fisheries productivity, as well as the ecology and species composition in the lake ecosystem either directly, or as a result of changes in mixing of different layers in the water column. Warm temperatures lead to faster depletion of the limited oxygen supply, negatively affecting fisheries, and limiting lake-overturn.<sup>86</sup>

Whereas the impact of climate change on commercial fishing in Lake Victoria is uncertain, any reductions in water levels and the impacts of extreme climate events resulting from climate change are likely to have significant negative effects on the shallow lake fisheries of the African Great Lakes; Lakes Victoria and Kyoga. Decline in fish species in Lake Victoria is the largest documented loss of biodiversity caused by humans in an ecosystem.<sup>87</sup> This is of concern as fish is an important source of protein for most people in Uganda. Additionally, economic losses are expected as freshwater lake fisheries are affected by climate change. The fishery industry is important for Uganda, as it contributes to the economy through foreign export earnings. It is reported that the fishing sector's contributed 1.56 trillion Ugandan Shillings to the national GDP in the fiscal year 2012/13. This was a rise

84 Njiri et al., (2012). Environmental degradation and ecological changes in the Lake Victoria fisheries: Causes, Issues and management.

85 Ibid.

86 Fick, A.A., C.A. Myrick, L.J. Hansen, (2005). Potential impacts of global climate change on freshwater fisheries. WWF, Gland, Switzerland.

87 Witte, F., Goudswaard, T., Katunzi, E. F. B., Mkumbo, O. C. Seehausen, O., & Wanink, J. H., (1999). Lake Victoria's ecological changes and their relationships with the riparian societies. In: H. Kawanabe., G.W. Coulter, A. C. Roosevelt (Eds.), Ancient lakes: Their cultural and biological diversity, pp. 189–202. Kenobi Productions, Belgium.

from 1.49 trillion Uganda Shillings reported in the previous year.<sup>88</sup> Local livelihoods along the lake shores depend heavily on fishing, as well as in its processing and trading. Therefore, any negative impacts of climate change on the Lake Victoria fishery would also have an impact on local incomes of these people, worsening poverty levels.<sup>89</sup>

It is of interest to note that despite negative impacts resulting from climate variability, positive impacts have also been experienced. For example, increases in lake levels could contribute to boosts in fish stocks. It is also believed that the flooding of 1997/98 led to a reduction in the problem caused by the water hyacinth weed that was clogging many of the bays of Lake Victoria and Lake Kyoga.<sup>90</sup> However, the negative impacts still considerably outweigh any advantages of climate changes.

### **5.3 Impact on Health and Water Sector**

Climate change imposes additional burden on the health services (human stress and capital) with consequences of life loss, particularly the most vulnerable age groups; the young, women and the elderly. Increase in lake temperatures and drop in water levels due to climate change, will also have impacts on domestic water supply, water availability for irrigation, transportation and infrastructure. Over the last few decades, Uganda has experienced an increase in the frequency and intensity of extreme weather events like landslides triggered by flash floods which seriously distress the health sector.<sup>91</sup> Additionally, a large proportion of the

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88 Ministry of Finance, Planning and Economic Development (MoFPED).

89 Goulden.M., (2008). Building Resilience to Climate Change in Lake Fisheries and Lake-shore Populations in Uganda, University of East Anglia, UK.

90 LTS ( 2008). Climate Change in Uganda: Understanding the implications and appraising the response, Scoping Mission report at 13.

91 Namanya D.B. (2009) "An Assessment of the Impact of climate change on the Health Sector in Uganda: A case of Malaria and

poor in rural community do not have pit latrines, and therefore floods threaten to pollute sources of drinking water and lead to outbreaks of water-borne diseases such as cholera, typhoid and dysentery.<sup>92</sup>

There has been a general increase of malaria incidences throughout the country, particularly in the south-west of Uganda, where it reached epidemic proportions. This is due to an increment of temperature which transforms areas once not susceptible to malaria, to become sites that promote the survival and breeding of mosquitoes. 1997 and 1998 data from health units in the districts reveal an increase in the cases of malaria cases ranging from 23% in Rukungiri to 135.5% in Mbarara district.<sup>93</sup> Moreover, the disease is also spreading into new areas in the country, causing malaria to be singled out as the most serious disease in Uganda as it results to a number of illness and deaths. It is only in the high altitude areas of the south-west of the country (especially Kabale and Kisoro), including the west and east that the malaria transmission is generally low. However, due to rising temperatures and the consequent transformation of these areas to become malaria prone, malaria will extend to higher altitude areas as well.<sup>94</sup>

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Cholera epidemics and how to improve planning for effective preparedness and response”, a paper was presented at Climate Change Regional Seminar organised by SMHI at Gobabeb Research Center in the Namibia Desert on 13 May 2009.

- 92 Department of International Development, UK Government, (2008). Climate change in Uganda: understanding the implications and appraising the response; Government of Uganda, (2007). National Programme of Action.
- 93 Ministry of Finance Planning and Economic Development, (2009). The State of Uganda Population Report: Addressing the Effects of Climate Change on Migration Patterns and Women. Kampala, Republic of Uganda.
- 94 Ibid (2010).

Droughts have also taken a significant toll on Ugandans. For example, 1.8 million people were affected through increased malnutrition, poverty, illness, asset loss and migration as a result of the 1993/94 drought.<sup>95</sup>

During 2009/10, the National Water and Sewerage Corporation (NWSC), a national urban utility, extended raw water intakes deeper into Lake Victoria at Gaba and Jinja. This aimed to address the water production challenges associated with deteriorating quality of raw water. This deterioration is caused by heavy pollution in the Inner Murchison Bay, including the negative effects of the drop in Lake Victoria water levels during dry seasons, exposing the raw water suction pipe.<sup>96</sup>

#### **5.4 Impact on Infrastructure and Human Settlements**

Climate variability, floods, droughts and changes in seasonal rainfall have caused significant socio-economic impacts in Uganda. Floods events of 1961/62, 1997/98 and in 2007 caused destruction of livelihood, assets and displacement of people<sup>97</sup>, widespread infrastructural damage of bridges, roads, telecommunications and buildings.<sup>98</sup> With hazards such as floods, transport systems, including bridges are damaged, while roads become impassable.<sup>99</sup> Pollution of water supplies, particularly in urban centres, causing water-borne disease outbreaks is also reported.

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95 Ibid.

96 Matyama. F., (ed) Financing of the water, sanitation and hygiene sector in Uganda.

97 Hepworth.N, and Goulden. M.,(2008). Climate Change in Uganda: Understanding the implications and appraising the response, LTS International, Edinburgh.

98 Orindi, V. A. and Murray L.A. (2005). Adapting to climate change in East Africa: a strategic approach. International Institute for Environment and Development.

99 Ibid.



*Photo 4: Impassable road due to heavy rainfall*

*Source: Photo taken by Mugira Fredrick on the 2<sup>nd</sup> April, 2010 (South-west Uganda)*

## **5.5 Impact on the Energy Sector**

Fluctuations of water levels in Lake Victoria continuously impacts on the generating capacity of Uganda's hydroelectric facilities. A high frequency of droughts has persisted since 2000. Evidence of decline in water resources on hydro-power generation is clear. Any decrease in the water level of Lake Victoria is reflected in the reduction of hydroelectricity supplies produced by the two dams – Nalubale and Kiira – located downstream.<sup>100</sup> The declining lake levels experienced since 2002 and particularly since 2004, coupled with increasing demand for electricity, led to severe power shortages and black-outs in Kampala during 2005 and 2006.<sup>101</sup> Additionally, the extension of the Owen Falls

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100 Kaggwa, R., Hogan, R., and Hall, B (2009) . Enhancing the Contribution of Weather, Climate and Climate Change to Growth, Employment and Prosperity (UNDP/NEMA/UNEP Poverty Environment Initiative, Environment And Natural Resources Report Series) at 25.

101 Ibid.

dam, opened in 2000, appears to have been designed to operate with the conditions of high average lake levels seen between 1960 and 1990.<sup>102</sup> The dam's inability to operate the plant at full capacity during recently experienced low lake levels are evidence of this.<sup>103</sup>

When production of hydro-electricity declined substantially, the country was plunged into a power crisis that undermined investment and slowed the country's economic growth. In the period 1998-2004, there was a 14.7% decrease in catchment inflows into Lake Victoria and a 1.64m drop in water level. Analysis of the components of the hydrological balance of the lake indicate that the recent decline in the lake water level is primarily the result of excessive withdrawals at the Nile River outflow, during a period of falling river discharges to the lake."<sup>104</sup> Drought is described as the foremost factor that has affected the water balance of the lake and consequently the water level recession."<sup>105</sup> This illustrates the vulnerability of hydro-power production to climate change, should it cause lowering of lake levels in the future.<sup>106</sup>

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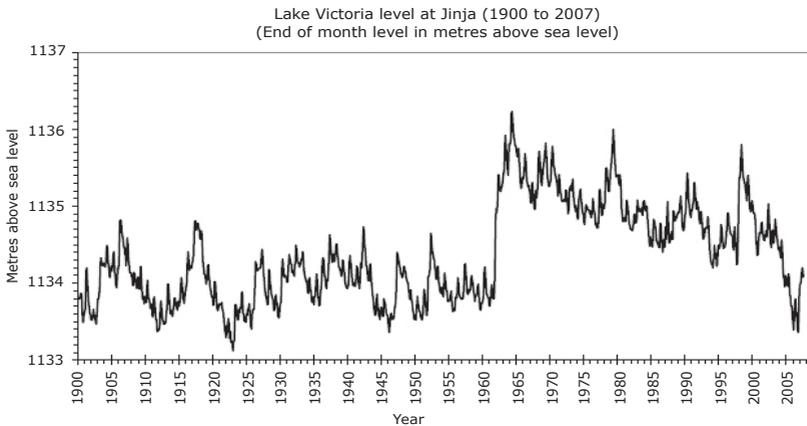
102 Ibid.

103 Ibid.

104 Mwanuzi, et al ed, (2005. Lake Victoria Environment Management Project (LVEMP). Water Quality and Ecosystem Status. Lake Victoria Regional Water Quality Synthesis Report.

105 Tungaraza. et al, (2012). "Long-term Climate Impact on the Lake Victoria region influences water level fluctuation and resource availability". International journal of environmental sciences Vol 2, No.3, 2012.

106 Ibid.



*Figure 1: Graph showing water levels of Lake Victoria between 1900 and 2007*

*Source: Water levels of Lake Victoria 1900 – 2007 (from Goulden 2006, updated 2007, data obtained from DWRM)*

The combination of increasing demand for electricity, and the possibility of lower lake levels in the future due to climate change, mean that it is extremely important to study climate change scenarios and their impacts on future lake water levels. Specific climate change scenarios should also be considered in the design of all new hydro-power facilities and electricity supply plans.

Uganda has been faced with an acute shortage supply of electricity. The central grid's hydro-power capacity is 300MegaWatts (MW), with an additional 80MW being installed. However, due to the current drought, only 135MW is generated from the hydro-power facilities in Jinja (Nalubaale/ Kiira Power Stations) which are located east of Kampala. Since the end of 2004, the water level of Lake Victoria has experienced a sharp decline thus limiting the capacity for electricity generation at the power plant in Jinja.<sup>107</sup>

<sup>107</sup> Rugumayo, A., The Electricity Supply Situation in Uganda and Future Direction, Energy for Rural Transformation Ministry of Energy and

Consequently, the hydro-power generation at the Nalubaale and Kiira stations has been curtailed, due to a prolonged drought which started in 2003. This resulted to a decline in generation of hydro-power from 270MW in 2004 to 120MW in 2007.<sup>108</sup>

## **5.6 Impact on Biodiversity including the Tourism Sector**

Wildlife-based tourism is a central source of foreign exchange for Uganda. In 2004, tourism was recorded for the first time after so many years, as the leading foreign exchange earner for the country, bringing in over USD 300 million. It accounted for about 64.1% of the service export receipts for the country.<sup>109</sup>

The Rwenzori Mountains are a habitat for important endemic and restricted species that, among other factors, could be there as a result of its unique climate. Elephants, leopards, monkeys and chimpanzees inhabit the thick lower jungle, while at higher altitudes, colourful birds endemic to the range swoop over the vast bogs that line the valleys.<sup>110</sup> Among the alpine and sub-alpine species are the Giant Lobelia, Tree Senecio (plants), Rwenzori Leopard and Rwenzori Red Duiker or Rwenzori Black-fronted Duiker (animals). The Rwenzori Red Duiker, *Cephalophus rubidus*, is a rare and unique duiker subspecies only found in these Mountains. It is not well studied but it inhabits alpine and sub-alpine zones at altitudes above 3000m corresponding with colder climate. Unique species of chameleons are also found on the Mountains, including the three-horned chameleon, *Chameleon johnstoni* whose range is reportedly shifting upward

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Mineral Development.

108 Ibrahim Kasita, "Owen falls dam: Powering Uganda for five decades" New Vision(3 Feb 2012).

109 Republic of Uganda, Uganda National Adaptation Programme of Action, supra note 41 at 32.

110 Ibid.

as a result of rising temperatures. The same kind of shift is reported for the *Senecio* tree species.<sup>111</sup>

Tracking of the famous Mountain Gorillas is another activity that attracts tourists to this area, including mountain climbing. Unfortunately, the Mountain Gorilla, of which half of the world's population is found in Uganda, is under threat from climate change as its habitat undergoes changes and recedes. Extreme weather and climatic events such as storms and flooding destroyed trees on a massive scale in Bwindi Impenetrable National Park (BINP) which is found around the Rwenzori Mountains.

Global warming is causing the retreating of glaciers, particularly in the tropics. In East Africa, the ice caps on Mt. Kilimanjaro and the Rwenzori Mountains are retreating. By 1990, glaciers on the Rwenzori Mountains had receded to about 40% of their recorded cover in 1955.<sup>112</sup> A recent study carried out by researchers from the University College London and their counterparts from Uganda, suggests that all the glaciers in the Rwenzori Mountains could disappear within the next two decades.<sup>113</sup> The melting of the ice cap on tropical mountains has a negative effect on both the water catchments and eco-tourism as well as on the overall economy. For instance the melting of ice caps on Rwenzori Mountains has increased the erosive power of River Semliki.<sup>114</sup> Additionally, the associated cultural loss due to melting of the ice cap is immeasurable. The mountains provide vital water catchments for humans and wildlife; such changes could drastically affect wildlife species.

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111 Ibid.

112 Republic of Uganda (2007). Climate Change: Uganda National Adaptation Programmes of Action, *supra* note 41.

113 Ibid.

114 Ibid.

Any losses of the flora and fauna due to climate change and other factors, would therefore negatively affect the socio-economic development of Uganda.

### **5.7 An Overview of Climate Change Related Disasters in Uganda**

Uganda has experienced a wide range of disasters resulting from climate change. These range from floods, famine, drought to landslides, to mention but a few. Climate change impacts on a wide range of ecosystems, sectors and key social and economic programmes. The tables below (5 and 6) give a summary of these impacts and their effects.

<b>Year</b>	<b>Nature of Disaster</b>	<b>Effects</b>
1999	Drought and famine	Over 3.5 million people in 28 districts affected by lack of food and a large number livestock suffered from inadequate pasture and water.
2005/06	Drop in lake Victoria level	Prolonged drought lowers water level in Lake Victoria by about 1m leading to limited hydroelectric generation, followed by frequent load shedding.
2007	Teso floods	Floods hit Pader and Serere districts leaving gardens, homesteads and road infrastructure severely damaged.

2010	Landslides	Landslides hit eastern and south eastern Uganda. About three villages buried and over 90 people killed while a big number is displaced.
2012	Caterpillar infestation	Caterpillar infestation hit east and central Uganda due to prolonged rain and leaving hectares of crops lost in just one week.
2012/13	Prolonged drought	Wide spread famine in Karamoja region and central Uganda. Loss of pasture and water in Ssembabule, Lwengo. Nine people killed in bush fires related to drought in Northern Uganda.
2013	Quelea bird infestation	Quelea birds hit the Eastern region and an estimated 1,095 acres of sorghum was lost.
2013	Floods	Heavy rains make River Nyamwamba to burst its banks and consequent extensive floods in Kasese District. Kilembe Hospital severely damaged and closed, over 190 people injured in the ordeal.

Source: Republic of Uganda (2013).

The State of Uganda Population Report 2013.

Table 4: Climate change related Disasters in the Recent Past

Sector	Specific climate change parameters experienced and their impacts			Effects
	Higher Temperature	Increased Drought	Increased rainfall & shift in seasonality	
<b>Human health</b>	Shifts in areas/ incidence of malaria; respiratory problems	Increased risk of water related disease; food shortage; water conflict; famine risk	Increased risk of water-borne disease; flood/ landslide risk	Conflict; health burdens and risks; economic costs; poverty; inequity
<b>Agriculture</b>	Shifts in the viable area for coffee and other cash crops; reduced maize output; higher evaporation losses	Crop failure; reduction in grazing potential within the cattle corridor	Elevated erosion, land degradation crop loss; change in crop yields/ disease	Food insecurity; economic shocks; loss of income and livelihood options; poverty
<b>Infrastructure and human settlements</b>	Increased evaporative losses; damage to roads; cooling costs	Significant implications for run-off-river Hydro Electricity Power (HEP); water shortage	Flood damage to infrastructure, transport, communications and settlements	Economic loss and growth volatility; reduced reliability of HEP; migration

<b>Biodiversity</b>	Biodiversity loss as niches are closed out; changing ecosystem dynamics and production	Additional pressure on natural resource use through fall back on forests	Shift in habitats and growing seasons	Impacts on biodiversity and agro-ecological systems; fishery productivity deforestation
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*Table 5: Effects of Climate Change in Uganda on Select Sectors*

The effects of climate change highlighted in the tables above, show that Uganda’s economy is particularly vulnerable to climate change and variability. For example the heavy dependence on rain-fed agriculture increases the country’s vulnerability to effects of flood and drought, as agriculture performance fluctuates with changes in climate. Consequently, the contribution of agricultural exports to the GDP, including food security, livelihoods is also affected. Additionally, a high population growth rate of 3.2% per year which is coupled with the high level of poverty makes it difficult for Uganda to cope with the adverse effects of climate change. An increasing population puts pressure on forests and wetlands which has resulted to deforestation and wetland degradation, thus contributing to increased GHG emissions and a low per capita income of about USD506.<sup>115</sup> Managing climate change impacts in Uganda poses a challenge, as the country is regarded as the most vulnerable and least climate resilient, due to poverty and low income diversity.<sup>116</sup>

115 The Republic of Uganda (2012). Uganda National Climate Change Policy.

116 Republic of Uganda, Uganda National Adaptation Programme of Action, supra note 41 at 32.

## **6. CLIMATE CHANGE STRATEGIES AND POLICY FRAMEWORK AND THEIR IMPACT ON ECONOMIC DEVELOPMENT**

Nationally, the existing relevant climate change legislature draws its strength and legitimacy from the Constitution of the Republic of Uganda (1995). This coupled with particular international conventions and treaties such as the United Nations Framework Convention on Climate Change (ratified 1994), and the Kyoto Protocol. By addressing local level governance, urban development and management, environmental and natural resource management, the constitution essentially guides and supports national and local level interventions and actions related to climate change. Uganda has undertaken some policy and strategic measures to address climate change. Besides climate change mainstream instruments, other policies, strategies and plans that are designed to sustainably use and manage the environment, as well as guide development while taking into consideration likely climate change impacts. The major ones include:

### **6.1 The Uganda National Climate Change Policy 2013**

The National Climate Policy approved in 2013 sets out a number of objectives and guiding principles. The policy recognises that the climate change impacts are economically significant, especially for African countries like Uganda. It is supported by an implementation strategy that sets out the estimated financial requirements for the implementation of identified public interventions. A first estimate of the costs of responding to climate change is quoted at Uganda Shillings 664 billion (USD 258 million) per year. This approximates to 1.6% of Uganda's

GDP, which is a considerable amount compared to current levels of spending.<sup>117</sup>

The Policy provides some strategies that are important in addressing climate change economic issues. These include: building incentives for climate-friendly approaches to development and technology transfer in various sectors; and to ensure that climate change concerns are main-streamed into national, sectoral and district-level budgets and investment screening processes, in order to leverage both public and private sources of financing; providing indicative costing for these programmes and indicating in a more detailed manner potential sources of funding, financial tools to be undertaken and financial management arrangements, including start-up funding that may be required to kick start the policy implementation process.<sup>118</sup>

## **6.2 The National Adaptation Programme of Action (NAPA)**

NAPAs are quick channels of communicating urgent and immediate adaptation needs to Conference of Parties 7. The Uganda NAPA was published in 2007 and launched with support from the Global Environment Fund (GEF), which presents a list of nine priority projects with a cost of approximately USD 40 million. It is important to note that the preparation of the Uganda NAPA was guided by the principle of participatory approach, drawing heavily on the views of the vulnerable communities and their knowledge on coping mechanisms. This approach raised the level of awareness and expectations of the rural poor vulnerable communities.

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117 The Republic of Uganda (2012). Uganda National Climate Change Policy.

118 Ibid.

The Government of Uganda has endorsed NAPA and is committed to its implementation. The government demonstrated commitment to the well-being of its people as evidenced by the Poverty Eradication Action Plan (PEAP) and other supporting programmes such as the Plan for Modernisation of Agriculture, Universal Primary Education and Primary Health Care. However, adverse effects of climate change unless taken seriously will negate progress on poverty reduction. Therefore, effective implementation of NAPA will go a long way towards meeting the expectations of the rural poor and vulnerable communities. Meeting this expectation is a challenge not only to the Least Developed Countries (LDCs) but the global community.

### **6.3 The National Environment Management Policy**

One of the objectives of the policy (1994) is to monitor the climate and atmosphere of the country, in order to better guide land-use and economic development decisions. The policy is intended to better manage air pollution and GHG emissions. Its guiding principles state the following: climate is a vital natural resource which should be properly harnessed for social and economic development; the utilisation of climate and atmospheric information is critical in agriculture and for the efficient management of the environment; resource users (particularly farmers) should be involved in the monitoring and dissemination of climate information; and, the promotion of international cooperation for the smooth exchange of climate information and the control of trans-boundary atmospheric air pollution is important in the management of the resource. Furthermore, the policy emphasises that access to climate data and information should be guaranteed on terms determined by the relevant authority.

## 6.4 National Development Plan

The National Development Plan (NDP) for the fiscal period 2010/11 to 2014/15 stipulates Uganda's medium term strategic direction, development priorities and implementation strategies. In addition, it details the country's current development status, challenges and opportunities. It recognises that the sustainable economic and social development of Uganda largely depends on exploitation of its environmental and natural resources, including climate.

The development plan proposes building capacity to respond to climate change in accordance with the following intervention: identify climate effects, vulnerabilities and coping measures as they relate to the various agricultural production strategies in Uganda; improving climate forecasts along with procedures for use in agricultural management; integrating climate risk management in agricultural business strategies and strengthening central and local government capacity to integrate climate change into planning.<sup>119</sup>

## 6.5 Uganda Vision 2040

Vision 2040 is conceptualised around strengthening the fundamentals of the economy to harness the abundant opportunities around the country Uganda. It provides development paths and strategies to aimed to operationalise the country's vision statement "*a Transformed Ugandan Society from a Peasant to a Modern and Prosperous Country within 30 years*".<sup>120</sup>

Vision 2040 recognises that climate change affects all sectors of the economy, requiring urgent redress. The national government

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119 Republic of Uganda, National Development Plan.

120 Republic of Uganda, Uganda Vision 2040.

pledge that during the period Vision 2040 is implemented, it will develop appropriate adaptation and mitigation strategies to climate change; liaise with key development partners; continue to participate in, and benefit from, international arrangements on climate change and variability and in particular focus on how to tap the available global climate change funding mechanisms. Additionally, the government commits to ensure that guidelines for incorporating climate change in sector and local government budgets are popularised.

## **7. CLIMATE CHANGE INSTITUTIONAL ARRANGEMENTS AND THEIR IMPACT ON ECONOMIC DEVELOPMENT**

Management of climate change impacts in a country requires the joint efforts of all stakeholders- public, private sectors, civil society and communities. Economic endowment of a country greatly influences its ability to adapt and mitigate climate change effectively and efficiently.

The institutional framework for climate change arrangements and its implications for economic development in Uganda is at three levels. The first level involves government institutions that are responsible for the implementation of the policies and actions set out by the government; the second level involves development partners who provide funds to implement programmes; and the third level involves NGOs and communities which participate in the implementation of projects and programmes.

### **7.1 Government Institutions**

Several government institutions are important in addressing climate change, as well as contributing to economic development of the country. These include:

- The Ministry of Finance, Planning and Economic Development is the key ministry responsible for fiscal policy and national budgeting. It mobilises funds, allocates them to sectors, coordinates development partner inputs and also reviews sector plans, as a basis for allocation and release of funds. Additionally, this ministry also reports on compliance with sector and national objectives. In implementing climate change projects, the ministry undertakes research, analyses and formats financial as well economic policies, strategies and legislation.

- The Ministry of Water and Environment has the mandate to promote and ensure the rational, sustainable utilisation, development and security of land, water resources and environment for socio-economic development, as well as for regional and international peace. The functions of this ministry include the formulation and oversight of appropriate policies, standards and legislation for the environment. The ministry also carries out co-ordination and supervision of environmental institutions and ensures cross-sectoral linkages, including the mobilisation of funds and other resources.

Therefore, through the above functions, the Ministry of Water and Environment can play several roles in the implementation of climate change management in Uganda. It has a specific department responsible for climate change – the Climate Change Unit (CCU), established in 2008, directly under the office of the Permanent Secretary. The main objective for the establishment of the CCU is to strengthen Uganda’s implementation of the United Nations Framework Convention on Climate Change (UNFCCC) and its Kyoto Protocol (KP). The key functions of the unit include: **(a)** serving as a National Focal Point for UNFCCC and its Kyoto Protocol; co-ordination of national climate change actions (mitigation and adaptation) in different sectors, including the creation of awareness among various stakeholders to enable them internalize their roles and responsibilities under the convention and its KP, **(b)** monitoring the implementation of mitigation and adaptation activities and progressively updates the government, Uganda population and the Conference of Parties (COP) to the UNFCCC and its KP, **(c)** initiating the development and review of appropriate

policies, laws and programmes necessary to ensure effective implementation of climate change adaptation and mitigation activities in Uganda, **(d)** establishing and maintaining relationships with national, regional and international organizations, institutions and agencies as may be appropriate for facilitating the implementation of the relevant policies, programmes, projects, **(e)** making decisions that provide guidance on precautionary measures which anticipate, prevent or minimize the causes of climate change and its adverse effects, **(f)** serving as the Secretariat for the Designated National Authority (DNA) for the purpose of facilitating Uganda's participation in Clean Development Mechanisms (CDMs), in accordance with the decision of the Seventh COP held in Marrakesh, Morocco in 2001.

- The Uganda National Meteorological Authority (UNMA) established under the Uganda National Meteorological Authority Act 2012, is intended to perform the functions of the Department of Meteorology. The Authority is responsible for collecting, analysing and disseminating meteorological data and advisories to the government and other stakeholders, for use in sustainable development of the country.
- The National Environment Management Authority (NEMA), is a semi-autonomous institution that was established by the National Environment Act.<sup>121</sup> NEMA is specifically provided for under the Act as the principal agency in Uganda, charged with the responsibility of coordinating, monitoring, supervising and regulating all environmental management matters in the country.<sup>122</sup> NEMA is mandated to provide an oversight of environmental activities associated with climate change.

121 Laws of Uganda, (2000) Cap 153, section 4.

122 Ibid, Section 5.

NEMA has representation in the national Climate Change Unit which is under the Ministry of Water and Environment.

- The National Forestry Authority (NFA) is the lead institution in the forest sector, charged with the responsibility for the management of the Central Forest Reserves (CFRs) in partnerships with local governments, private businesses and local communities. It is established under the National Forestry and Tree Planting Act.<sup>123</sup> The mission of NFA is to manage CFRs on a sustainable basis and to supply high quality forestry-related products and services to the government, local communities and private sector.<sup>124</sup> As a lead agency for the forestry sector, NFA is crucial in the implementation of CDM projects in Uganda.
- The National Forestry Resources Research Institute (NAFORRI) is the lead agency in charge of conducting forestry research. NAFORRI provides research and technology development services that respond to demands from forest producers and users. The mandate of the NAFORRI covers all aspects of natural and plantation forests management and conservation, forest products and utilisation, agro forestry, forest genetics resources and any other field as approved by the NARO Council.<sup>125</sup> The Institute also assists in the development of the Agricultural Research and Development Centres (ARDCs) in each agro-ecological zone in Uganda. The goal of NAFORRI is to generate appropriate technologies for increasing the productivity and supply of forest products on a sustainable basis. The institute also strives to strengthen and develop national forestry research capacity

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123 The National Forestry and Tree Planting Act, Section 52 (1).

124 Available at: <http://www.nfa.org.ug/>.

125 Available at: <http://www.naro.go.ug/Institute/Forestry/Index.html>.

through personnel training, physical facilities improvement, management, networking and collaborative work.<sup>126</sup> To achieve its objectives, NAFORRI aims at generating technologies and policy recommendations that ensure efficient, effective and environmentally sound and socially acceptable forest management and utilisation systems through technology generation and dissemination; and facilitate scientific forest-based conservation of biodiversity and environment protection.<sup>127</sup>

NAFORRI is implementing a Natural Forest Management and Plantation Forest Management sub-programmes which are critical in the implementation of CDM projects in the forestry sector of Uganda.<sup>128</sup> The Natural Forest Management Sub-programme directs research to the assessment of growth in the establishment of long-term, permanent, sample plots of various tree species in relation to various management practices such as clear and selective felling. Opportunities and constraints to collaborative forest management are also studied.<sup>129</sup> On the other hand, the Plantation Forest Management Sub-programme directs its research to promoting appropriate cultural practices, identifying appropriate tree species and making provisions for specific sites used in the production of timber poles and other products from plantation forests.

- Uganda Investment Authority (UIA) is a semi-autonomous government agency operating in partnership with the private sector and government to drive national economic growth and development.<sup>130</sup> The Authority was established by the

126 Ibid.

127 Ibid.

128 Ibid.

129 Ibid.

130 Available at <http://www.ugandainvest.go.ug/>.

Investment Code Act.<sup>131</sup> This Act guides local and foreign investments in Uganda, including providing more favourable conditions for investment in Uganda.<sup>132</sup>

## 7.2 Development Partners

Some Multilateral development partners provide funding of various projects that on one hand influence economic and social development, and on the other hand, also address climate change. The development partners work closely with the public, private sectors including the civil society in implementing these projects. Below is a synopsis of select development partners and the projects they are currently supporting in Uganda.

- The World Bank Bio Carbon Fund is supporting the Nile Basin Reforestation Project<sup>133</sup> that is being implemented by the National Forestry Authority and the Uganda Wildlife Authority, in association with local community organisations. The support promotes the cultivation of trees for carbon sequestration. In addition, NEMA with support from the World Bank is implementing CDM waste composting projects in a number of municipalities, aimed to reduce carbon emissions to the atmosphere.
- The Royal Danish Embassy has initiated several avenues for financial support of approximately USD 917,515 over four years. This support aims to strengthen the National Climate Change Unit within the Ministry of Water and Environment. In addition, a lump sum of USD 1.09 million is earmarked for the development of a national strategy on climate change to support the integration of climate change into the National Development Plan, including supporting Uganda in

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131 Chapter 92 Revised Edition (2000 ) Laws of Uganda.

132 Preamble.

133 Available at <http://cdm.unfccc.int/Projects/DB/JACO1200649370.95/view>.

its international negotiation efforts such as COP 15 that was held in 2009.<sup>134</sup>

- The WFP and FAO of the United Nations have conducted vulnerability assessments in various parts of the country and promoted the installation of automatic weather stations for early warning in Karamoja.<sup>135</sup> These institutions also promote sustainable forestry management and livelihood projects through piloted initiatives such as REDD. The projects aim to plant trees and high value drought resistant staple crops in various parts of the country.<sup>136</sup>
- The World Wide Fund for Nature (WWF), Uganda Country Office, in collaboration with UWA, is engaged in a biodiversity conservation project on Mt. Rwenzori, and integrated water resources (catchment) in the Semliki valley. Funding for these projects is provided by the German Climate Change Funding Initiative.<sup>137</sup>
- Furthermore, WWF with funding from UNDP implemented a biodiversity conservation project in Kibaale and Kyenjojo districts in Uganda. The project which ended in June 2012 is highly recommended to be rolled out into other districts.
- In the energy sector, WWF is engaged in pilot studies on clean energy with the Department of Technology, Makerere University.
- The Norwegian Embassy support focuses on the Environment and Natural Resource Management Policy (ENRM), including

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134 Available at <http://uganda.um.dk/en/danida-en/climate-change/climate-change-support-to-uganda/>.

135 Available at [http://www.undp.org/content/dam/undp/documents/projects/UGA/00062248\\_Approved%20Prodoc%20SSENRCCAM.pdf](http://www.undp.org/content/dam/undp/documents/projects/UGA/00062248_Approved%20Prodoc%20SSENRCCAM.pdf).

136 Ibid.

137 Ibid.

climate change mitigation. The support targets the forestry and energy sectors.

- The UK's Department for International Development (DFID) has provided core funding to the Parliamentary Forum on Climate Change, a non-partisan group of parliamentarians, to promote public awareness and co-operation on climate change issues.<sup>138</sup>
- Oxfam has provided analytical and advocacy support on climate change issues.
- UNEP/UNDP/IUCN are piloting a four year Ecosystem Based Approach programme in the mountainous regions of Uganda. The programme is funded by the Germany Federal Ministry for Environment, Nature Conservation and Nuclear safety (BMU).
- The German Development Organisation (DED) and Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) engage in conservation of biomass energy through building awareness and promoting charcoal saving stoves and efficient kilns.
- UNDP is supporting a USD 3.6 million programme on Sustainable Land Management in the Cattle Corridor. The programme site is deemed to have considerable emission reduction potential.<sup>139</sup>
- UNEP is supporting the Katoomba Group to develop initiatives that promote REDD. Additionally, support is

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138 Ibid.

139 Ibid.

provided through the Poverty Environment Initiative to NEMA, to integrate climate change into the NDP.<sup>140</sup>

- The Royal Norwegian Embassy focuses on mitigation and adaptation activities (REDD) through its support to the forestry sector (NFA) on Mount Elgon. Support is also provided to the energy sector.<sup>141</sup>
- GIZ promotes renewable energy projects. The institutions also fosters technical development in the field of wood-fuel efficiency, micro-hydro and solar Photo Voltaic (PV) systems.<sup>142</sup>

### 7.3 NGOs

The civil society is an important extension of communities they represent at the global, regional, national and local levels. As indicated earlier, climate change management is a collaborative effort of all stakeholders. Below are some projects that impact on economic development and address climate change:

- IUCN in partnership with CARE International, ACF, CRS, as part of the Global Water Initiative, are piloting projects that balance conservation with livelihoods in the upper Aswa-Agago catchment area.<sup>143</sup> These includes setting up REDD pilot projects, ecosystem based adaptation, and integrated watershed management.
- ECOTRUST under their Trees for Global Benefit,<sup>144</sup> work with communities to plan afforestation and reforestation projects.

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140 Available at <http://www.katoombagroup.org/documents/events/event18/IVARJORGENSEN-REDD.pdf>.

141 NORAD (2009). Capacity Building for CDM in Uganda , NORAD Report.

142 Ibid.

143 Available at [http://www.undp.org/content/dam/undp/documents/projects/UGA/00062248\\_Approved%20Prodoc%20SSENRCCAM.pdf](http://www.undp.org/content/dam/undp/documents/projects/UGA/00062248_Approved%20Prodoc%20SSENRCCAM.pdf).

144 Available at <http://www.planvivo.org/projects/registeredprojects/trees-for-global-benefits-uganda/>.

These projects enable communities to access voluntary carbon market through the Plan Vivo system. ECOTRUST is currently working with approximately 300 farmers who have so far sold about 75 tonnes of CO<sub>2</sub> in a year. The target is set for 100 tonnes of CO<sub>2</sub> a year. About 400 farmers are on the waiting list for ECOTRUST's support. This programme has proved to be popular because it provides access to finance, its technical specifications to match local context is flexible, the technical assistance provided is relevant and one could start at a small scale. Other benefits are the low risk nature of the contracts, careful controls against leakage, including its sustainability, where carbon revenues are expected to be paid ex-ante over ten years to farmers through a co-operative.

## **8. CLIMATE CHANGE PROJECTS AND THEIR IMPACT ON ECONOMIC DEVELOPMENT**

There are three important dimensions to economic implications of climate change in Uganda. These include: direct costs/benefits related to taking mitigation actions for climate change; costs incurred in adapting to the physical changes that result from climate change, and indirect costs incurred in the loss of markets in the rest of the world as a result of the mitigation actions.

In Uganda, there are various climate change mitigation projects that are being implemented. These include: Mpererwe Landfill gas project, The Anaerobic Sugar Corporation of Uganda Limited Project, Uganda Nile Basin Reforestation Project and the Kachung Forest Project: Afforestation on Degraded Lands.

### **8.1 Mpererwe Landfill Gas Project**

The Mpererwe landfill<sup>145</sup> which is located 13km north of Kampala city centre has been in operation since 1996. The landfill<sup>146</sup> primarily receives municipal wastes from Kampala city. Historical landfill development and waste input information is limited, although since 2000, a weighbridge has been used to record waste tonnages and types of wastes received. The landfill receives about 500 tonnes of waste per day. The total volume of waste deposited is estimated to be about 900,000 m<sup>3</sup>.

The purpose of the project activity is to develop and implement a landfill gas extraction and flaring scheme at the Mpererwe

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145 Available at <https://cdm.unfccc.int/Projects/DB/AENOR1320656892.37/view>.

146 A landfill is a place to dispose of refuse and other waste material by burying it and covering it over with soil, especially as a method of filling in or extending usable land.

landfill, which currently has none. The required technical skills and knowledge to establish and run such a scheme is also lacking in the country.

Once the project is established, the expected economic benefits include:<sup>147</sup>

- Provision of employment opportunities related to the operation and maintenance of equipment
- Training of local staff to become experts in the monitoring and control of landfill gas
- Restoration of the site to a beneficial status after use.

It is also foreseen that electricity could be generated from the project site. This activity would be implemented under CDM by a different project.

## **8.2 The Anaerobic Sugar Corporation of Uganda Limited Project**

The project<sup>148</sup> was registered in 2013 and is located at the Sugar Corporation of Uganda Limited (SCOUL) complex in Lugazi, Buikwe District. The parties involved in the project are SCOUL and Shell Trading International Limited. The project aims to generate and promote the use of domestically available bio-gas as an energy resource. This is envisaged to reduce the need to import fossil fuels to meet the country's growing energy requirements. The project temporarily created employment opportunities in the area during the construction phase, which had a total of 35 expatriates and about 100 local workers. Permanent or long term work opportunities will become available during the operation phase of the project, which expects approximately 25 people, including highly skilled workers. Surplus sludge that is

147 Ibid.

148 Ibid.

generated as a by product from the project, is used as manure for the sugar cane fields.

### **8.3 Uganda Nile Basin Reforestation Project**

This project<sup>149</sup> was registered in 2009. It aims to provide new financing mechanism to manage the current barriers to establishing timber plantations in Uganda and allow communities to benefit from the CDM initiative. In total, the project activities cover an area of 341.9 ha within Rwoho Central Forest Reserve. Of this area, 318.2 (93%) is under NFA planting area, while 22.7 ha (7%) is under the community planting area.

The project allows the involvement of private and community-based tree planting initiatives with different investor shares. Based on a successful implementation of the first pilot cluster, there are plans to extend the portfolio across the country in a number of deforested public forest reserves.

In addition to increasing the forest cover as a means of mitigating climate change impacts through carbon sequestration, employment especially for the local community is another key benefit. The employment plan for the project indicates a need for approximately 500 people in the establishment phase. Work opportunities shall be made available in the nurseries, fire protection, thinning and pruning of tree plantations. In addition to the direct employment, the support to private wood-lot owners will provide further employment. The local communities further benefit from the provision of fuel-wood for their energy needs. An additional source of income include the expected receipt by community groups of payments from sequestration of carbon, at a price stipulated in the Emission Reductions Purchase Agreement between the buyer and NFA. Detailed rights and responsibilities

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149 Ibid.

are regulated in Community Forest Management Agreements and a Tree Farming License.<sup>150</sup>

#### **8.4 Kachung Forest Project: Afforestation on Degraded Lands**

This project<sup>151</sup> is been implemented in the Kachung Central Forest Reserve, which is in the administrative district of Dokolo and sub-county of Agwata. The project expects to establish and manage exotic and indigenous plantations on approximately 2,099 ha of degraded grass and shrub land in the area.

The project is expected to facilitate economic development of the local communities, through provision of employment opportunities and establishment of community wood-lots in community owned land that is around the project site. Establishment of wood-lots seek to increase fuel and timber supply within the communities. The project also seeks to designate 10% of the carbon revenues generated, to community development initiatives in the villages surrounding the project area, including developing local infrastructure such as roads, health centres, water supply and communication systems.

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150 Ibid.

151 Ibid.

## **9. CHALLENGES FOR DEVELOPING CLIMATE CHANGE STRATEGIES TO ADDRESS ECONOMIC DEVELOPMENT**

There exists a myriad of challenges that affect the development of the climate change strategies that ensures economic development in Uganda. The first challenge is lack of effective policy and legal framework to guide climate change and economic development. National sectoral policies still fall short of specifying the linkages between economic development and climate change opportunities. Secondly, there is minimal support provided by the international climate funds, particularly for capacity building, technical assistance and raising awareness. Thirdly, there is lack of strong institutional frameworks to support the establishment and monitoring of climate change projects. This is further exacerbated by the inadequate human and financial resources for implementation of these projects. Fourthly, there is a low level of awareness in relation to climate change issues and economic development. In many cases, climate change issues are overlooked. There is insufficient dissemination of information on the existing indigenous knowledge/options on climate change adaptation and how they contribute to economic development.

In conclusion, a couple of ways that the above challenges could be addressed include: the implementation of the newly created Climate Change Policy for Uganda. At the national level, it is believed that this legislation would specifically guide and support interventions or initiatives in the climate change areas of awareness-raising, in-depth analysis of dynamics and impacts, monitoring, as well as prioritizing and mainstreaming climate change adaptation and mitigation into national and local level plans. It is expected that this legislature would enable

the country respond to climate change in a holistic, systemic and sustainable manner. Additionally, to counter the obvious disconnects between climate change issues and policy, the following proposals are made:

- Increase capacity building through awareness campaigns on climate change at all levels
- There is need to support networking in research, especially on adaptation and mitigation technologies
- Requirements stipulated in the United Nations Framework Convention on Climate Change should be localized, for example by ensuring that they are addressed in local Environment Impact Assessments
- Measures to promote mitigation and adaptation vis-à-vis the convention requirements should be supported

## **10. CONCLUSION AND RECOMMENDATIONS**

As a developing country, Uganda is vulnerable to adverse effects of climate change particularly because of her dependence on rain-fed agriculture which is prone to dangers of climate variability. Additionally, climate change also impacts other sectors such as health, water, infrastructure, environment, fisheries, industry and tourism. These sectors are crucially important to economic development.

It has been noted that the challenge of climate change is compounded by weak institutional capacity, lack of skills on climate change adaptation and inadequate management. Uganda's adaptability to climate change is moreover weakened by limited financial resources, poor planning and above all the economy's dependency on exploitation of natural resources. The following strategies are proposed to address the issues outlined above:

### **10.1 Strengthening Legal, Policy and Institutional Frameworks**

As noted above, weak legal, institutional and policy frameworks affect the implementation of climate change related economic projects. Thus, there is need to strengthen the institutional, legal and policy frameworks in order to address this gap.

There is a general consensus and acknowledgement of the cross-cutting nature of climate change. The newly established Climate Change Unit is expected to offer coordination and technical support to all stakeholders (government, private sector, civil society and communities) in their quest to streamline and implement climate change issues in their programmes. It is

also encouraging to note that the Climate Change Policy for Uganda promotes the coordination of all ongoing and future climate change management initiatives that are being, or shall be implemented. Historically, climate change initiatives in the country have been scattered, and the policy seeks to streamline and integrate these interventions, where possible, to ensure maximum benefits, efficient and effective use of resources, knowledge sharing and duplication of effort is avoided.

## **10.2 Resource Mobilisation**

Managing climate change impacts requires building partnerships at various levels including global, regional, national, local and community levels. Through these partnerships, assistance could be mobilised to help build adaptive capacity, provide funding, share technologies, knowledge, experiences, support education as well as awareness programmes.

Local capacity should be developed to participate in carbon trading, including forging partnerships with financial institutions that would provide the much needed investment finance. Uganda Investment Authority (UIA) could play a critical role in mobilising investments to promote natural resource management programmes such as afforestation, sustainable land management and protection of water catchments.

Efforts should be made to mobilise local and international resources to invest in climate change activities and projects. This could be strengthened by the establishment of a Climate Change Fund that serves as pool of resources. Raising further awareness about climate change and its related economic opportunities should be reinforced at the grass-root levels, so that both NGOs and local communities participate in climate change activities. Furthermore, the government could provide financial incentives

and technical support to promote the inclusion of climate change related activities within District Development Plans.

### **10.3 Capacity Building**

The real and potential impacts of climate change are not adequately understood and appreciated especially by the local leaders and communities. Building capacity to adapt to climate change through improving social, economic and technical resilience, and also increasing flexibility within the existing systems, is necessary. At the moment, there is a scarcity of skilled manpower in climate related disciplines. Therefore, to ensure a sustainable supply of human resources for the climate change industry and sub-sector, competent tertiary institutions should offer training programmes in related disciplines. In addition, more effort is required to increasing awareness and education about the impacts of climate change.

### **10.4 Climate Change Information**

There is a need to strengthen research, to enhance climate monitoring and effective response, in order to provide regular information that support sustainable socio-economic development. For example, most farmers currently plant at the onset of rains. They are largely guided by traditional season calendars rather than reasonable forecast information. The meteorological station and NAPA should be sufficiently strengthened both technically and logistically, to enable them generate, analyse, provide and disseminate relevant information required in the design of adaptive response mechanisms.

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This project is funded by  
**Konrad-Adenauer-Stiftung e.V. Uganda**  
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P.O. Box 647 Kampala, Uganda  
Tel: +256 - (0)312 - 262011/2  
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