CARIAA
Collaborative Adaptation Research Initiative in Africa and Asia

Review of Current and Planned Adaptation Action in Uganda

CARIAA Working Paper #19

Daniella Echeverría
Anika Terton
Alec Crawford

Echeverría, D., Terton, A., and Crawford, A. 2016. Review of current and planned adaptation action in Uganda. CARIAA Working Paper no. 19. International Development Research Centre, Ottawa, Canada and UK Aid, London, United Kingdom. Available online at: **www.idrc.ca/cariaa**.

ISSN: 2292-6798

This CARIAA working paper has been prepared by the International Institute for Sustainable Development (IISD).

About CARIAA Working Papers

This series is based on work funded by Canada's International Development Research Centre (IDRC) and the UK's Department for International Development (DFID) through the **Collaborative Adaptation Research Initiative in Africa and Asia (CARIAA)**. CARIAA aims to build the resilience of vulnerable populations and their livelihoods in three climate change hot spots in Africa and Asia. The program supports collaborative research to inform adaptation policy and practice.

Titles in this series are intended to share initial findings and lessons from research and background studies commissioned by the program. Papers are intended to foster exchange and dialogue within science and policy circles concerned with climate change adaptation in vulnerability hotspots. As an interim output of the CARIAA program, they have not undergone an external review process. Opinions stated are those of the author(s) and do not necessarily reflect the policies or opinions of IDRC, DFID, or partners. Feedback is welcomed as a means to strengthen these works: some may later be revised for peer-reviewed publication.

Contact

Collaborative Adaptation Research Initiative in Africa and Asia
c/o International Development Research Centre
PO Box 8500, Ottawa, ON
Canada K1G 3H9
Tel: (+1) 613-236-6163; Email: cariaa@idrc.ca

Creative Commons License

Cover photos:

Top: © PANOS/Jean-Leo Dugast
Bottom: © PANOS/Abbie Trayler-Smith
Left: © Blane Harvey

IDRC | CRDI

International Development Research Centre
Centre de recherches pour le développement international

Canada

Abstract

Climate change challenges Uganda's efforts to become a middle-income country by 2040. Rising temperatures and variable rainfall patterns are expected to negatively affect important sources of livelihoods and economic activity, including commercial and subsistence crop production, livestock, forestry, and fisheries. These changes are of particular concern for Uganda's semi-arid northern and northeastern regions, as well as its "cattle corridor," which are more vulnerable to climate change due to their lower levels of socioeconomic development. Concerted adaptation and poverty reduction efforts will be required in these areas to build resilience to climate change. The Government of Uganda has recognized climate change as a risk to its National Development Plans and responded by developing a National Climate Change Policy as well as a supporting political structure for its implementation. A process to develop a National Adaptation Plan is under way. The majority of international financial support for adaptation is concentrated in the agriculture and water sectors. There are also ongoing projects that aim to strengthen governance capacity, provide climate information, and improve disaster risk management. Gaps remain in mainstreaming adaptation into sectoral strategies and plans, as well as decision-making at the district level. Greater investment could also be made to improve adaptive capacity in the fisheries, forestry, energy, and health sectors. These issues are explored more fully in this report, which is one in a series of country reviews prepared in support of the Collaborative Adaptation Research Initiative in Africa and Asia.

Résumé

Examen des mesures d'adaptation actuelles et prévues en Ouganda

Les changements climatiques représentent un enjeu de taille pour l'Ouganda qui souhaite devenir un pays à revenu intermédiaire avant 2040. On prévoit que la hausse des températures et la variabilité des précipitations nuiront à des ressources de subsistance et aux activités économiques majeures, notamment à la production agricole commerciale, à la culture vivrière, à l'élevage, à l'industrie forestière et à l'industrie de la pêche. Ces changements climatiques sont particulièrement inquiétants pour les régions du nord et du nord-est de l'Ouganda, qui sont semi-arides, ainsi que pour le « corridor du bétail »; en effet, ces régions sont plus vulnérables en raison de leur faible taux de développement socio-économique. L'adoption d'une stratégie d'adaptation et de réduction de la pauvreté concertée sera nécessaire dans ces régions afin d'accroître la résilience à l'égard des changements climatiques. Le gouvernement de l'Ouganda a reconnu que les changements climatiques posaient un risque pour le plan de développement du pays, et il a donc entrepris l'élaboration d'une politique nationale sur les changements climatiques, avec une structure politique appuyant sa mise en œuvre. Un processus visant l'élaboration d'un plan national d'adaptation est en cours. La majorité du soutien financier international destiné à l'adaptation se retrouve dans le secteur agricole et le secteur de l'eau. On élabore également des projets visant à améliorer la capacité de gouvernance, à fournir des renseignements sur le climat et à bonifier la gestion des risques associés aux catastrophes. Des lacunes sont toujours présentes dans l'intégration des mesures d'adaptation au niveau des stratégies et des plans sectoriels ainsi que dans la prise de décision à l'échelle du district. De plus grands investissements pourraient également être engagés envers l'amélioration des capacités d'adaptation dans les secteurs de la pêche, de la foresterie, de l'énergie et de la santé. Ce rapport fait partie d'une série d'examens de pays préparée dans le cadre de l'Initiative de recherche concertée sur l'adaptation en Afrique et en Asie, et il fournit un aperçu plus approfondi de ces questions.

Acronyms

ACCRA	Africa Climate Change Resilience Alliance
ASDSIP	Agriculture Sector Development Strategy and Investment Plan
ASSAR	Adaptation at Scale in Semi-Arid Regions
CAN	Climate Action Network
CARIAA	Collaborative Adaptation Research Initiative in Africa and Asia
CCD	Climate Change Department
DFID	Department for International Development (UK)
DRC	Democratic Republic of the Congo
ENSO	El Niño Southern Oscillation
FAO	Food and Agriculture Organization of the United Nations
GCF	Green Climate Fund
GNI	Gross National Income
GOU	Government of Uganda
HSSP	Health Sector Strategic Plan
IDRC	International Development Research Centre
IPCC	Intergovernmental Panel on Climate Change
ITCZ	Inter-Tropical Convergence Zone
KCCA	Kampala Capital City Authority
LDCF	Least Developed Countries Fund
MAAIF	Ministry of Agriculture, Animal Industry and Fisheries
MDG	Millennium Development Goal
MWE	Ministry of Water and Environment
NAP	National Adaptation Plan
NAPA	National Adaptation Programmes of Action

NCCP	National Climate Change Policy
NDP	National Development Plan
NHP II	Second National Health Policy
OECD	Organisation for Economic Co-operation and Development
RCP	Representative Concentration Pathway
REDD	Reducing emissions from deforestation and forest degradation
SPCR	Strategic Program for Climate Resilience
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

About the authors

Daniella Echeverría
Project Officer, International Institute for Sustainable Development
Winnipeg, Canada

Daniella Echeverría is a researcher with the CARIAA-supported review of current and planned adaptation in the CARIAA program's countries of focus. Her work focuses on building capacity to manage climate risks through knowledge sharing, the use of decision-support tools, and policy analysis focused on the green economy and food security.

Contact: decheverria@iisd.ca

Anika Terton
Project Officer, International Institute for Sustainable Development
Winnipeg, Canada

Anika Terton is a researcher with the CARIAA-supported review of current and planned adaptation in the CARIAA program's countries of focus. She undertakes research in areas such as transitioning to the green economy, achieving the Sustainable Development Goals, and building climate resilience in the Canadian Prairies and internationally.

Contact: aterton@iisd.ca

Alec Crawford
Associate, International Institute for Sustainable Development
Toronto, Canada

Alec Crawford is a researcher with the CARIAA-supported review of current and planned adaptation in the CARIAA program's countries of focus. His research examines the links among environmental change, natural resources, conflict, and peacebuilding in fragile states.

Contact: alec.crawford@iisd.ca

Acknowledgements

The authors thank Julie Dekens for her advice and guidance regarding efforts in Uganda to prepare for the impacts of climate change, and Professor John B. Kaddu for his feedback and insights on its content, which helped to enrich the final version of the paper.

Contents

Synopsis

Climate risks	• Increasing temperatures and rates of evapotranspiration • Rainfall variability • Potential increase in risk of drought and floods	**Key sources of vulnerability**	• One-third of the population continues to live in severe poverty, although significant progress in reducing poverty levels has been made in recent years • Rapidly growing population, more than 80% of which lives in rural areas • High dependence of livelihoods and national economy on natural resources • Land degradation, rapid deforestation, loss of wetlands, and water pollution

Vulnerable sectors	**Illustrative potential impacts on vulnerable sector**	**Illustrative priority adaptation measures in each sector**	**Projects in sector[1]**
Agriculture	• Loss of livestock and crop production • Increased risk of food insecurity • Increase in soil erosion and loss of soil nutrients • More favourable conditions and extension of crop growing season in highlands • Increased prevalence of livestock and crop pests and diseases • Changes in ecosystems and land degradation, leading to a loss of plant biodiversity	• Enhance resiliency, productivity, and sustainability of agricultural systems • Improve land productivity through sustainable land use and better management of soil and water resources • Improve access to high-quality inputs, planting, stocking materials, and advisory services • Improve agriculture technology development and promote labour-saving technologies and mechanisms • Control disease, pests, and vectors • Increase supply of water for agricultural production (irrigation, water for livestock, aquaculture) • Promote value addition and improve food storage	46%
Water	• Reduction in water availability for human consumption • Reduction in hydropower generation • Lower water levels, potentially contributing to food insecurity and civil conflict	• Integrate climate change considerations into national water management efforts • Increase access to and effective use and management of water resources	37%
Fisheries	• Loss of fisheries production as water levels decline, potentially leading to an increase in food insecurity and malnutrition	• Promote integrated fisheries management • Improve aquaculture in production	0%

[1] Percentage of total identified discrete adaptation projects and programs based upon research undertaken as part of this review. Note that individual projects may address more than one sector.

Forests	• Loss of forest biodiversity • Loss of soil fertility and soil nutrients, and increased soil erosion • Migration of trees • Increased risk of wildland forest fires	• Increase reforestation and afforestation rates • Restore degraded natural forest in forest reserves and private forests • Implement rural electrification program, reducing pressure on forest cover as a source of wood fuel • Promote use in alternative and renewable energy sources and energy-efficient technologies	0%
Health	• Increased incidence of human morbidity and mortality due to vector-, water-, air-, and food-borne diseases • Incidence of malaria in previously malaria-free areas • Interruption of health services, along with injuries and loss of lives, due to extreme climate events • Increased malnutrition due to greater food insecurity	• Enhance early-warning systems • Increase preparedness for changes in vector-, water-, air-, and food-borne diseases due to climate change	4%

Particularly vulnerable regions	**Particularly vulnerable groups**	**Status of climate governance (policies, institutions)**
• Semi-arid areas (north and northeastern Uganda and the "cattle corridor")	• Pastoral communities • Fishing communities within semi-arid areas • Women • The elderly • Children • Disabled individuals • The rural and urban poor	• Climate change recognized as a risk in *Uganda Vision 2040* • National-level coordinating entity for climate change established and active • *Uganda National Climate Change Policy* approved in April 2015 and published • Climate change law is being prepared • National Adaptation Programme of Action published in 2007 • Process to develop National Adaptation Plan initiated • Climate change desk officers established in key ministries • Climate change integrated into some national sectoral policies

Introduction

Uganda is a landlocked East African country bordered by Kenya, South Sudan, Tanzania, Rwanda, and the Democratic Republic of the Congo (DRC) (see Figure 1). Much of the country is located on a plateau, which moderates its tropical climate. Ecological and climatic conditions are further influenced by a series of mountain ranges that rim parts of its western, northern, and eastern borders. A significant portion (17.2%) of the country's 241,550 km^2 is covered by open waters and swamps; its largest water bodies are Lakes Victoria, Kyoga, and Albert.

An estimated 38 million people live within Uganda's borders (African Development Bank, 2015), and its population is rapidly growing. This rate of growth is placing ever-greater pressure on the country's natural resources, contributing to problems such as water pollution, soil fertility losses, and deforestation. Poverty levels are declining, but about one-third of Ugandans continue to live in severe poverty. The country's education and health care systems remain weak, and the country is impacted by corruption and the conflicts occurring in surrounding countries such as South Sudan and the DRC. These factors limit the capacity of Ugandans and their government to cope with shocks and stresses, such as the recurrent droughts that affect its arid and semi-arid areas.

While Uganda is currently classified among the least developed countries in the world, its government has set a target of becoming a middle-income country by 2040. However, climate change threatens efforts to achieve this goal. Many of the country's main economic sectors, such as rain-fed agriculture, forestry, and fisheries, are climate-sensitive. These sectors are also the main source of livelihoods for millions of Ugandans. Of particular concern are the potential impacts of climate change on Ugandans living in semi-arid areas and along the "cattle corridor," who rely on pastoralism and fishing for their livelihoods. These remote areas already face recurrent drought, are food insecure, and have limited access to water resources (Few et al., 2015).

In response to these concerns, the Government of Uganda (GOU) has identified climate change as a risk in its National Development Plans (NDPs), completed development of a National Climate Change Policy (NCCP), and begun to integrate climate change issues into its national sectoral policies. Efforts are also under way to develop a National Adaptation Plan (NAP). The GOU is receiving assistance from the international development community to build its resilience to climate change in priority areas, such as agriculture and water. However, gaps remain, such as with respect to strengthening the capacity of districts to engage in adaptation planning and action.

This paper provides a snapshot of current and planned efforts in Uganda to advance action at the local, subnational, and national levels to adapt to the impacts of climate change. Drawing upon available literature, it has been prepared to support the contribution of the Collaborative Adaptation Research Initiative in Africa and Asia (CARIAA) to adaptation

policy and practice. CARIAA is jointly funded by the UK Department for International Development (DFID) and Canada's International Development Research Centre (IDRC), with the aim of building the resilience of vulnerable people and their livelihoods in three hot spots of climate change vulnerability in Africa and Asia: semi-arid areas, deltas in Africa and South Asia, and glacier- and snow-fed river basins in the Himalayas. To achieve this goal, it is supporting four consortia to conduct high-calibre research and policy engagement activities that will inform national and subnational planning processes in 17 countries.

This report has been prepared to provide CARIAA with a picture of the policies, programs, and projects designed and implemented specifically to address the current and projected impacts of climate change in Uganda. It begins by providing an overview of the country's current and projected climate risk context, followed by a discussion of the factors that contribute to its vulnerability to climate change and its most vulnerable sectors, regions, and groups. A review of the critical policies and plans shaping Uganda's efforts to address climate change adaptation at the national and subnational levels is then provided. To assess the extent to which efforts are presently under way to address the country's critical adaptation priorities, Section 5 paints a general picture of the scale, type, and focus of current and planned adaptation-focused programs and projects being implemented in Uganda, as well as the level of international climate finance flowing into the country to support this work. A profile of in-country efforts to advance adaptation learning and knowledge sharing is then provided in Section 6. The paper concludes with an assessment of the general state of adaptation action in Uganda.

Figure 1 – Map of Uganda (Nations Online Project, n.d.)

1. Current climate and projected changes

Uganda's climate is influenced by its location in a humid, equatorial climate zone and its varied topography. Lying between the western and eastern trenches of the Rift Valley, much of the country is located on a plateau. The country is surrounded by four mountain ranges: the Rwenzori range in the west, the Mufumbiro range in the southwest, the Elgon range along its border with Kenya, and the Moroto range in the northeast (GOU, 2007; Ministry of Water and Environment [MWE], 2014). In combination with Uganda's lakes and rivers, these mountain ranges lead to large differences in rainfall patterns across the country (Caffrey et al., 2013).

Temperatures in Uganda are moderated by the country's high altitude and do not vary significantly throughout the year or between different regions of the country. Temperatures are coolest in the southwest, where mean annual temperatures are about 20°C (McSweeney, New, & Lizcano, 2010); extreme low temperatures (0°C to −4°C) can be experienced in the western highlands of Rwenzori and Mount Elgon (GOU, 2007; MWE, 2014). Temperatures are warmest in the north and northeastern parts of the country, where they can reach an average of 25°C (McSweeney et al., 2010).

Uganda's rainfall patterns are largely driven by the migration of the Inter-Tropical Convergence Zone (ITCZ). Two distinct wet periods occur annually: the country's short rains occur from October to December as the ITCZ migrates southward, and its long rains occur between March and May as the ITCZ moves northward (McSweeney et al., 2010). Interannual climate variability is heavily influenced by the El Niño Southern Oscillation (ENSO). The El Niño phase of the ENSO is generally associated with higher than average rainfall during the short rains, while the La Niña phase generally brings drier conditions (MWE, 2014; Caffrey et al., 2013). Uganda's climate is also affected by the Indian Ocean Dipole, which influences rainfall levels largely in the September to November period. Studies suggest that Indian Ocean Dipole events have a stronger effect than the ENSO on climatic conditions in the region (Caffrey et al., 2013).

Average annual rainfall in Uganda is 1,318 mm (GOU, 2007), but precipitation levels vary between different areas of the country. The Lake Victoria Basin is the wettest area of the country, receiving an average of 1,200 mm to 1,500 mm of rain per year (Mwebaze, n.d.). The driest areas in the country are located in the northeast and east of Lake Edward, where the climate is semi-arid (MWE, 2014; Few et al., 2015). In these areas, average annual rainfall is as low as 700 mm. Stretching from the northeast to the southwest in Uganda's semi-arid land is the cattle corridor, which is home to pastoral communities and among the country's most fragile ecosystems (see Figure 2) (GOU, 2007).

The occurrence of floods and droughts in Uganda is strongly influenced by the ENSO phenomenon: flooding is more likely to occur during the El Niño phase, while droughts are generally associated with the La Niña phase. Drought is more likely to occur between April and October in southwestern Uganda, and between October and April in northeastern Uganda (MWE, 2014). Overall, the eastern region has received the highest incidence of dry years and drought periods (MWE, 2014; Few et al., 2015).

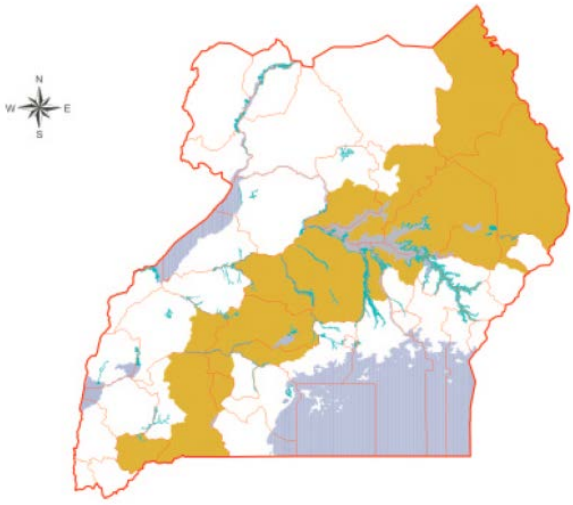

Figure 2 – Uganda's cattle corridor (GOU, 2007)

1.1 Climate trends

In past decades, Uganda has experienced oscillating wet and dry periods, reflecting the interdecadal variability of its climate (MWE, 2014). McSweeney et al. (2010) indicate, though, that a statistically significant decrease in annual rainfall has been observed since 1960, as well as in the rainy season of March to May. Annual rainfall has decreased at an average rate of 3.4 mm per month per decade, while the amount of rain falling in March to May has decreased by 6.0 mm per month per decade (McSweeney et al., 2010). Similarly, mean annual rainfall between 2000 and 2009 was about 8% lower than the level of rainfall recorded between 1920 and 1969 (Funk, Rowland, Eilerts, & White, 2012). These observations are consistent with trends across East Africa, which saw a decline in total annual rainfall between 1963 and 2012. The greatest decline occurred during the March to May period. This trend is of greater importance in drier areas, where it can represent a proportionally greater decline in rainfall (Daron, 2014).

Observations indicate an upward trend in temperatures, with an increase of 1.3°C in mean annual temperatures between 1960 and 2003. The highest increase occurred in the January to February period (McSweeney et al., 2010). Similarly, Funk et al. (2012) found that mean annual temperatures increased across most of Uganda by up to 1.5°C between 1900 and 2009, typically about 0.2°C per decade. Analysis of data since the 1970s shows that minimum temperatures have increased at a higher rate than maximum temperatures (MWE, 2014). The increase in minimum temperatures has been observed to be higher during El Niño years in the months of October to April, with temperature anomalies reaching up to 1°C. The opposite is true during La Niña years, where negative anomalies could reach up to −0.4°C (MWE, 2014). Again, these trends are consistent with those across East Africa, which has seen an increase in temperatures across all seasons, with the greatest increase occurring in the March to May period (Daron, 2014).

Changes in the pattern of extreme climate events are more difficult to determine given the limited availability of climate observations across East Africa (Daron, 2014). However, it has been suggested that heavy rainfall events have become more frequent and intense, particularly in the Lake Victoria Basin, and in eastern and northwestern Uganda. Uganda's western, northern, and northeastern districts are said to be experiencing prolonged droughts that are increasing in both severity and frequency (GOU, 2007).

1.2 Climate change projections

In its most recent assessment, the Intergovernmental Panel on Climate Change (IPCC) has projected that mean annual temperatures will continue to increase across East Africa. Under a high-emissions scenario, the IPCC projects that mean annual temperatures will increase by 0.9°C by 2035 (within a range of 0.6°C to 1.5°C), by 2.2°C by 2065 (range of

1.6°C to 3.2°C), and by 4.0°C by 2100 (range of 2.4°C to 5.6°C) (Christensen et al., 2013).[2] Similarly, a study by Daron (2014) using regional climate models projects that temperatures in East Africa will increase significantly across the region, particularly in the central and northern subregions. Modelling results suggest that maximum temperatures could rise between 2.1°C and 2.7°C by 2050.[3]

Climate modelling conducted specifically for Uganda agrees that temperatures will continue to increase in the coming decades. The GOU projects that maximum temperatures could rise between 1.7°C and 2.1°C under a medium-emissions scenario (Representative Concentration Pathway [RCP] 4.5) and between 3.2°C and 3.9°C under a high-emissions scenario (RCP8.5) by 2100. Minimum temperatures are projected to increase by 1.4°C to 2.1°C under RCP4.5 and by 1.2°C to 2.3°C under RCP8.5 in the same time period (MWE, 2014, p. 78).[4] In an earlier study, Caffrey et al. (2013) projected that, under RCP4.5, maximum temperatures in Uganda could increase by 1.2°C to 1.4°C by 2030. Under the same conditions, minimum temperatures could increase by 0.8°C to 0.9°C. Slightly warmer temperatures were projected under the RCP8.5 model. No significant changes in the range of warming were noted between different seasons (Caffrey et al., 2013).[5]

Projections regarding how precipitation patterns will change in the future are more uncertain than those for temperature. In part, this stems from the greater difficulty in modelling precipitation projections for East Africa given the region's natural climate variability, a limited understanding of the various atmospheric and oceanic elements that influence rainfall in the region (such as sea surface temperatures), and the limited availability of reliable and readily accessible data (Caffrey et al., 2013; Daron, 2014). In its fifth assessment report, the IPCC stated that precipitation levels in East Africa could be unchanged through 2035, increase by 4% by 2065, and increase by 11% by 2100. However, these represent the median projected rate of change, and there is considerable variability in the magnitude and direction (increasing or decreasing) of potential change among all of the modelling results (Christensen et al., 2013).[6] This degree of variability in regional climate model projections was also found in the analysis by Daron (2014) for the East Africa region.[7] He concluded that the existing drivers of decadal and multi-decadal climate

[2] These projections represent the median (50%) likelihood of occurrence and the minimum and maximum range of results, using 39 global models and the Representative Concentration Pathway (RCP) 8.5 scenario, assessed against a baseline period of 1986 to 2005. Projection periods are 2016 to 2035, 2046 to 2065, and 2081 to 2100.

[3] As part of the Coordinated Regional Downscaling Experiment project, Daron (2014) used a combination of two general circulation models (HadGEM2 and ICHEC) and two regional climate models (KNMI and CCLM4) to provide 50 km resolution projections up to the year 2100, compared to a baseline of mean temperatures between 2050 and 2000. Using the RCP8.5 scenario, projections were based on three modelling combinations: HadGem2-CCLM4, ICHEC-CCLM4, and ICHEC-KNMI. The warmest projections were generated by the HadGem2-CCLM4 model runs.

[4] The study used 20 models from the World Climate Research Program's Coupled Model Intercomparison Project Phase 5 Multi-Model Dataset under RCP4.5 and RCP8.5 (MWE, 2014).

[5] Caffrey et al. (2013) used 10 different models and two emissions scenarios, RCP4.5 and RCP8.5.

[6] For example, projections for 2100 range from a decline of 11% to an increase of 34%. These figures are for RCP8.5 and compared against a baseline period of 1986 to 2005 (Christensen et al., 2013).

[7] The projections used two general circulation models (HadGEM2 and ICHEC) in combination with two regional climate models (KNMI and CCLM4). For the driest conditions, modelling was based on ICHEC-CCLM4; modelling for the wettest conditions was based on ICHEC-KNMI (Daron, 2014).

variability will continue to dominate rainfall patterns in the region over the remainder of this century (Daron, 2014).

Analysis undertaken by Caffrey et al. (2013) specifically for Uganda similarly suggest that any change in annual rainfall levels due to climate change will be smaller than changes driven by interannual variability. Model results also project that mean annual rainfall levels could either increase or decrease, with no clear tendencies in terms of annual, seasonal, and monthly rainfall amounts (Caffrey et al., 2013). The exception to these findings in the study conducted by Caffrey et al. (2013) is the potential for a significant overall increase in precipitation levels in the dry December to February period.

In contrast, analysis conducted by the GOU using 20 downscaled general circulation models found that the ensemble means project an overall increase in mean annual rainfall in Uganda by the mid-2000s and, to a lesser extent, by 2100. Their study projects that rainfall will increase significantly and consistently in the areas extending from the western shores of Lake Victoria to the central western region, in the Mount Elgon region, and between Mount Rwenzori and the southern parts of Lake Kioga (MWE, 2014).

Overall these projections suggest that Uganda's temperatures will continue to rise in the future, leading to greater rates of evapotranspiration — changes that could have significant implications for the country's semi-arid areas. Annual precipitation levels will continue to change, likely driven primarily by existing climatic influences and potentially resulting in an increase in mean annual precipitation levels in the central and eastern parts of the country. The impact of these changes will be determined by the adaptive capacity of the ecosystems and communities that depend on them.

2. Vulnerability to climate change

The capacity of Uganda's people and government to prepare for and respond to the current and future risks associated with climate change will be shaped by its socioeconomic and political circumstances. To better understand the vulnerability of Uganda to the potential impacts of climate change, this section therefore begins by providing an overview of Uganda's current socioeconomic and political profile. It then presents a synopsis of present understanding of the vulnerability of different sectors, regions, and population groups to climate change.

2.1 Current drivers of vulnerability

A combination of socioeconomic and political factors influence Uganda's vulnerability to climate change. Prominent among these factors are the country's high levels of poverty, rapidly growing population, strong economic dependence on climate-sensitive activities, and ongoing environmental degradation.

Uganda is categorized as having a low level of human development, according to the Human Development Report of the United Nations Development Programme (UNDP). As noted in Table 2, which provides a snapshot of human development in Uganda, the country ranked 164th of the 187 countries included on the Human Development Index (UNDP, 2014). This ranking falls below the average for Sub-Saharan African countries and puts Uganda at a similar level of development as Benin and Senegal. A third of the population is categorized as living in severe poverty, and 38% of the population falls below the income poverty line (i.e., earning less than US$1.25 per day). That said, progress is being made: the government reports that the country has now achieved the Millennium Development Goal (MDG) target of halving the number of people living in absolute poverty (Ministry of Finance, Planning and Economic Development, 2013). Gross National Income (GNI) per capita is US$1,335 (in 2011 dollars, adjusted for purchasing power parity), though it should be noted that there is a significant gap in income across gender lines. GNI per capita for women is US$1,167, while for men it is US$1,502 (UNDP, 2014). Development progress has not been universally felt across all geographical regions; northern Uganda continues to lag behind the central and western parts of the country in most development indicators, which is in part a result of the conflict between the Lord's Resistance Army and government forces (Higgins, 2009).

Uganda's population is currently 37.6 million, and it is growing quickly; the country's population growth rate of 3.3% per year is among the highest in the world (Few et al., 2015; UNDP, 2014). Life expectancy at birth is improving, and at 59.2 years is now higher than the average for Sub-Saharan Africa. The population is young: the median age for Ugandans is just 15.9 years (UNDP, 2014). Students attend school for 5.4 years on average, though the expected number of years spent at school is slightly lower for female students (UNDP, 2014). Just over 83% of Ugandans live in rural areas, and the population growth rate in its cities is higher than in its rural locations (UNDP, 2014).

Expenditures on health and education, as a percentage of Uganda's GDP, remain low; education spending in particular is much lower than the average for Sub-Saharan Africa. Three-quarters of the population has access to improved water sources, but only one-third of Ugandans have access to improved sanitation facilities (World Bank, 2014). Uganda also has lower rates of economic and gender inequality than the average for Sub-Saharan Africa, and the government reports that it is on track to achieve the MDG of promoting gender equality and empowering women by the end of 2015 (Ministry of Finance, Planning and Economic Development, 2013; UNDP, 2014). Illustrative of this, 35% of parliamentarians in Uganda are women, which is nearly 10% higher than the average for those countries categorized by the United Nations as having a very high level of human development (UNDP, 2014).

Economic growth in Uganda is steady, with GDP growth averaging about 6% per year (World Bank, 2015). The country's economic activity is largely derived from its natural resource base, with key industries including coffee, brewing, cement production, tobacco, and cotton textile manufacturing. Agriculture is the most important economic sector due to

the country's fertile soils and regular rainfall. This sector employs 80% of the population, covers 70% of Uganda's land area, and accounts for nearly a quarter of Uganda's GDP (UNDP, 2014; World Bank, 2014). Rain-fed agriculture dominates the sector; less than 1% of agricultural land is irrigated nationally (World Bank, 2014). Fishing is also an important economic source, employing over 200,000 people, primarily from poor households. The discovery of oil deposits in Lake Albert has resulted in the rapid expansion of the national petroleum sector, and oil revenues are expected to fund many of the activities proposed in Uganda Vision 2040, the country's long-term National Development Plan (NDP) (GOU, 2013).

The country has experienced significant political change over the past decade. Its current constitution was adopted in 1995 and amended in 2005, the same year in which its multi-party political system was restored following 19 years of restrictions on the activities of political parties. Despite this opening up of the political process, Uganda remains perceived as "very corrupt," according to the Corruption Perceptions Index by Transparency International (2014). The country is also impacted by regional insecurity as it hosts significant refugee populations from South Sudan and the DRC.

High population densities and widespread livelihood dependence on natural resources are both putting pressure on Uganda's natural landscapes and ecosystems. Deforestation to support agricultural production is a key concern: with a deforestation rate of 2.6% between 2000 and 2010, Uganda's remaining forests are disappearing at a faster rate than in the rest of Sub-Saharan Africa. The other main environmental challenges facing the country are land and wetland degradation; soil erosion and decreased soil fertility; the loss of biodiversity; fisheries depletion; and the pollution of air, water, and land resources (National Environment Management Authority, 2010). The government has formally protected 11.5% of the country's terrestrial area, much of it in a string of protected areas in the west and southwest of the country along the border with the DRC (World Bank, 2014).

Table 2 – Key indicators of development progress for Senegal

Category	Indicator	Year	Value	Source
Human development	Human Development Index (score[e])	2013	0.484	UNDP (2014)
	Human Development Index (rank[d] out of 187 countries)	2013	164	
	Population in multi-dimensional poverty (%)	2013	70.3	
	Under-five mortality rate (per 1,000 live births)	2013	69	
	Adult literacy rate (15 years of age and above) (%)	2012	73.2[c]	
	Improved water sources, rural (% of	2012	71	World Bank

	population with access)			(2015)
	Improved sanitation facilities (% of population with access)	2010	34	
	Access to electricity (% of population)	2013	14.6	
Gender	Gender Inequality Index (score[e])	2013	0.529	UNDP (2014)
	Gender Inequality Index (rank[d] out of 187 countries)	2013	164	
Demographics	Total population (in millions)	2010	37.578 [a]	UNDP (2014)
	Average annual population growth rate (%)	2011	3.4	
	Population, urban (% of population)	2013	16.1[b]	
Economic development	GDP (in current USD, millions)	2012	21,493 .61	World Bank (2015)
	GDP growth (annual %) (average of period from 2010 to 2013)		5.5	
	Agricultural land (% of land area)	2014	71.4	
Governance	Corruption Perceptions Index (score[f])	2014	26	Transparency International (2014)
	Corruption Perceptions Index (rank[d] out of 174 countries)	2014	142	
	Fragile States Index (score out of 120[g])	2014	96.0	Fund for Peace (2014)
	Fragile States Index (status)	2014	Alert	
	Expenditure on education, public (% of GDP)	2012	5.6[c]	UNDP (2014)
	Expenditure on health (% of GDP)	2011	9.5	
Environment	Population living on degraded land (%)	2010	23.5	UNDP (2014)
	Change in forest area, 1990/2011 (%)	2013	−39.0	

[a] Projections based on medium-fertility variant
[b] Because data are based on national definitions of what constitutes a city or metropolitan area, cross-country comparison should be made with caution
[c] Data refer to the most recent year available during the period reviewed by the source; the year listed is the final year of this time period
[d] Where 1 or first is best
[e] Where 0 is best
[f] Where 0 is highly corrupt and 100 is very clean
[g] Where 120 is very high alert and 0 is very sustainable

2.2 Vulnerability of key sectors, regions, and groups

Uganda's existing socioeconomic context and exposure to changing climatic conditions has led the country to be ranked among the 30 most vulnerable countries in the world to the impacts of climate change, according to the University of Notre Dame Global Adaptation Index (ND-GAIN). However, as illustrated in Table 3, Uganda has been decreasing its vulnerability and increasing its readiness to address climate change in recent years. According to the ND-GAIN, the main factors contributing to the country's vulnerability to climate change are the likely changes in yields from cereal crops, the limited productive capacity of its agricultural sector, and increasing urban concentration. In terms of its readiness to respond to the impacts of climate change, the country's limited social development is cited as a key concern. For example, while the county has seen improvements in its information and communication technology infrastructure, challenges remain with respect to its education system and innovation potential (ND-GAIN, 2015).

Table 3 – Global Adaptation Index rank and scores for Uganda in 2013

	World rank	Score	Trend
Vulnerability	158 (out of 180)	0.541*	Decreasing
Readiness	147 (out of 184)	0.335**	Increasing
Overall	154 (out of 178)	39.7	Increasing

* A lower score on a scale of 0 to 1 indicates lower vulnerability
** A higher score on a scale of 0 to 1 indicates higher preparedness

Source: ND-GAIN, 2015

Among the sectors considered to be most vulnerable to climate change are agriculture, water, forestry, fisheries, and health — all of which play an important role in generating the country's GDP. The vulnerability of these sectors and others is summarized in Table 4.

The country's agriculture sector is already affected by climate risks and is experiencing declines in production due in part to unsustainable land management practices, which have contributed to soil degradation and a loss of soil fertility (MWE, 2014). The sector is expected to be impacted in the future by higher temperatures, higher rates of evapotranspiration, lower soil moisture levels, more variable rainfall patterns, and a potentially greater risk of drought and flood. These changes in turn are likely to affect the productivity of different crops, the well-being of livestock, and the occurrence of pests and diseases. Of particular concern given its importance to the national economy is the potential impact of climate change on coffee production, the country's main export. Arabica coffee production in particular is sensitive to higher temperatures and more variable rainfall events, which increases the likelihood of diseases and pests, including in higher-altitude locations where they are not currently a problem (Caffrey et al., 2013). Production of maize and beans, which are widely grown, common food crops, is likely to be affected by changes

in interannual rainfall variability. Should there be an increase in rains during the dry season, when farmers traditionally sun-dry their crops, there could be greater risk of diseases such as aflatoxin. Crops such as cassava, sweet potato, and sorghum are considered less sensitive to climate change (Caffrey et al., 2013).

Uganda has an abundance of water resources, but they are unevenly distributed throughout the country (GOU, 2007). Although the country's level of irrigation is currently low, the potential exists to expand this technology in areas where surface water is present, which would help reduce the vulnerability of the agriculture sector in these regions. In areas far from surface water sources, irrigation systems drawing from available groundwater sources are likely to be a less viable option due to their high cost (Caffrey et al., 2013).

Water management, particularly in wetlands, has historically been poorly handled and administered. This has led to the degradation of wetland ecosystems, a process that is likely to increase future flood risks (Caffrey et al., 2013). Population growth is another pressure on water resources, particularly in areas where access is already limited, such as semi-arid areas and the cattle corridor (GOU, 2007; MWE, 2015a). For communities in the highlands, accelerated glacier melt is a concern for long-term water availability. This process could also impact eco-tourism activities and increase downstream siltation (GOU, 2007; MWE, 2015a). Future reductions in water access have the potential to contribute further to civil unrest.

Hydropower generation in the country has historically been adversely affected by declines in water availability. The 2004 to 2005 drought, for instance, caused a power crisis and slowed Uganda's economic growth rate (GOU, 2007; MWE, 2015a). While uncertainty remains regarding precipitation projections and potential changes in the occurrence of drought, the expected increases in temperatures and evapotranspiration rates have the potential to reduce future hydropower generation.

Freshwater fisheries are an important resource for a number of communities, particularly those around Lake Victoria. These fisheries are already challenged by overexploitation, pollution, and habitat degradation. Climate change could further affect this livelihood activity by lowering water levels, leading to reduced populations of fish and other aquatic species (MWE, 2015a).

Forests are a significant livelihood source for many Ugandans, who rely on it to provide household energy and medicine. Farmers also clear forest cover to obtain land for agricultural and livestock production (GOU, 2007; MWE, 2014). These practices are affecting the well-being of the country's dwindling forest resources, reducing their capacity to withstand climate impacts.

The health sector is also vulnerable to climate change. Extreme climate events, such as floods and drought, have both direct and indirect impacts on the health of Ugandans. Heavy rains, floods, and associated events such as landslides have historically led to morbidity and

loss of life. Indirectly, these events have contributed to water- and vector-borne diseases, such as cholera, typhoid, and dysentery, leading to serious health problems in vulnerable populations (Ministry of Health, 2010a; MWE, 2014). For example, floods in 1997 and 1998 resulted in 525 deaths and the hospitalization of 11,000 people due to cholera infections (MWE, 2014). Populations in the highlands are vulnerable to malaria epidemics during El Niño years, when precipitation levels are typically greater. Health services are also affected by disruptions due to infrastructure destruction, which can further contribute to human illness and loss of life. Drought can lead to respiratory problems from dry and dusty air. Food insecurity due to crop failures associated with extreme climatic events can significantly contribute to malnutrition in vulnerable Ugandans. The groups most vulnerable to the health impacts of climate change are the rural and urban poor, the sick, the elderly, children, orphans, pregnant women, and the disabled (Ministry of Health, 2010a; MWE, 2014).

Ugandans living in the country's northern arid and semi-arid areas, including the country's approximately 3 million pastoralists, are particularly vulnerable to climate change due to their remoteness, low population density, and limited access to infrastructure (Few et al., 2015). Along with agro-pastoralists and pastoralists, this includes the sizeable number of people who rely on fishing in the wetlands found within Uganda's drylands (Few et al., 2015). One of the most vulnerable areas is the cattle corridor due to the low rainfall it receives (MWE, 2012). This region also experiences recurrent droughts, which, in combination with low soil fertility conditions and low levels of rainfall, expose local communities to chronic food insecurity (Dekens et al., 2011). Also vulnerable is the northern Karamoja region, which regularly experiences droughts, has been plagued by internal conflict for 20 years, and is almost entirely dependent on food aid. The Karamoja region is also prone to floods, as are the Kyoga Basin and other parts of northeastern Uganda (Dekens et al., 2011; Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH, 2015).

Table 4 – Potential impacts of climate change on Uganda's key sectors

Sector	Likely impacts of climate change
Agriculture	• Decrease in livestock and crop production, contributing to food insecurity • Increase in soil erosion and loss of soil nutrients • More favourable conditions and extension of growing periods for crops in highlands • Increase in the prevalence of livestock and crop pests and diseases • Changes in ecosystem and land degradation leading to a loss of plant biodiversity
Water	• Reduction in water available for human consumption • Reduction in hydropower generation capacity • Reduction in water levels, potentially contributing to loss of crop, livestock, and fish production, and greater food insecurity and civil conflicts

Fisheries	• Decrease in fish production, potentially contributing to an increase in food insecurity and malnutrition • Increase in fish diseases in highland ecosystems
Forests	• Loss of forest biodiversity • Migration of trees • Loss of soil fertility and soil nutrients • Increase in soil erosion and landscape changes
Health	• Increase in incidences of human morbidity and mortality through vector-, water-, air-, and food-borne diseases • Incidence of malaria in previously malaria-free areas • Interruption of health services • Injuries and loss of life due to extreme climatic events • Increase in malnutrition due to food insecurity spurred by the loss of crops and livestock

Source: GOU, 2007

3. Adaptation planning context

This section provides an overview of the policies, strategies, and plans that are shaping Uganda's efforts to advance adaptation efforts. This includes national development policies and plans that establish the broad vision and goals of the country, as well as those that focus specifically on meeting the challenges of climate change. The extent to which current sectoral strategies and plans address the need to adapt to climate change and the progress of subnational governments to prepare for climate change are also discussed. A general assessment of Uganda's progress on adaptation planning is provided in Table 5.

Table 5 – National adaptation planning context: Summary of progress as of October 2015

Indicator	Progress
Climate change recognized in country's guiding development vision or plan	Addressed in *Uganda Vision 2040* and Uganda's *National Development Plan (2010/11–2014/15)*
National-level coordinating entity for climate change established and active	National Climate Change Policy (NCCP) committee established, as well as Climate Change Department (CCD) within the Ministry of Water and Environment (MWE)
Climate change policy and/or law in place	NCCP and its costed implementation strategy published in April 2015; climate change law is being developed
Climate change strategy published	Not present
Climate change action plan published	Not present

Adaptation plan published	Roadmap for developing a National Adaptation Plan (NAP) submitted to the United Nations Framework Convention on Climate Change (UNFCCC)
Climate change fund or adaptation fund operational	Not present
Climate change units established in key ministries	Climate change points of contact established in each ministry, department, and agency
Climate change integrated into national sectoral policies	Integration has occurred to varying degrees in different sectoral policies; guidelines for integrating climate change into sector plans and budgets have been developed

3.1 National-level development policy context

Development planning in Uganda is shaped by Uganda Vision 2040, the GOU's long-term national development roadmap, which was released in 2007. It sets a vision for transforming Uganda to become a modern, prosperous, middle-income country with a per capita income of US$9,500 by 2040. Sectors in which opportunities for growth have been identified include oil and gas, tourism, minerals, information and communication technologies, water resources, industrialization, and agriculture. Other elements identified as being fundamental to the country's growth are infrastructure, land, urban development, human resources, science, technology, engineering, innovation, peace, security, and defence (GOU, 2013).

Uganda Vision 2040 notes the vulnerability of Uganda to the impacts of climate change. Some of the key climate change impacts it highlights are changes in rainfall patterns, the potential for prolonged drought, health-related risks (e.g., malaria in formerly mosquito-free areas), the loss of soil fertility due to heavy runoff, frequent floods, and an increase in pests and diseases due to higher temperatures (GOU, 2013). It also states how climate change affects all sectors — from infrastructure damage to health risks to reduced agricultural productivity. It notes that despite the country's clear vulnerabilities to climate change, there is a gap in fully understanding the risk it presents and therefore an insufficient response to date by the government, the private sector, and civil society.

In response, under Uganda Vision 2040, the GOU proposes to develop appropriate climate change adaptation and mitigation strategies, and to popularize the use of guidelines on how to include climate change in sector and local government plans and budgets. In addition, it highlights that policies and organizational structures will be developed to advance climate change efforts, with an emphasis on strengthening coordination at the national and local levels with the support of legal instruments. Commitments are also made to build capacity to access international funds for climate change initiatives and to develop a comprehensive monitoring and evaluation mechanism (GOU, 2013). Though measures are outlined on how

to increase internal capacity and address climate change, there is no budget assigned to these measures (Isabirye, 2014).

Uganda's five-year National Development Plan (2010/11–2014/15) is intended to support achievement of the goals identified in Uganda Vision 2040. It again recognizes climate change as a threat to key sectors, such as agriculture, and as a contributing factor to social hardships and poverty. To address climate change threats, it seeks to build capacity to identify vulnerabilities, effects, and coping measures; to improve climate forecasts; and to integrate climate risk management into agricultural business strategies and local government planning (GOU, 2010). Within the document, climate change is categorized as a cross-cutting issue, and a set of objectives is outlined to improve Uganda's capacity to address climate change. Among these objectives are improving national capacity for coordination and implementation of climate change adaptation and mitigation measures, climate-proof planning, low-carbon development, and meeting international obligations (GOU, 2010). Despite measures identified to increase capacity and awareness of climate change, there is little identification of any adaptation measures within the National Development Plan (NDP) beyond the agriculture and forestry sectors (see Table 6).

A five-year NDP for 2015/16 to 2019/20 was approved for implementation in June 2015. It identifies agriculture, tourism, human capital development, minerals, oil and gas, and infrastructure as priority sectors for development (GOU, 2015). Climate change is recognized as a significant threat to the country's long-term sustainable development. Similar to Uganda Vision 2040 and the previous NDP, the NDP for 2015/16 to 2019/20 seeks to mainstream climate change adaptation and mitigation measures within government operations and priorities. Adaptation to climate change is particularly emphasized in relation to the agriculture sector, such as through the use of technologies like irrigation. It also emphasizes the need to promote ecosystem-based adaptation, afforestation, and reforestation, and to improve water management.

3.2 National-level climate policy context

Uganda has developed a series of plans and strategies to advance climate change action in the country, as well as prepared submissions to the United Nations Framework Convention on Climate Change (UNFCCC) to meet its international commitments. These submissions include its Second National Communication to the UNFCCC, released in 2014. It identifies adaptation measures for the agriculture, forestry, health, and water sectors (MWE, 2014).

Uganda has also prepared a National Climate Change Policy (NCCP), the final version of which was approved in April 2015. The policy's directive is to "ensure a harmonised and coordinated approach towards a climate resilient and low-carbon development path for sustainable development in Uganda" (MWE, 2015a, p. iv). Its overarching objective is to address climate change in a way that contributes to Uganda's sustainable development and the creation of a green economy. This objective is to be achieved through the identification and promotion of common policy priorities for addressing climate change, including those

focused on climate adaptation and mitigation, and for monitoring and evaluating policy responses. The policy also aims to mainstream climate change into all sectoral and cross-sectoral plans, decision-making processes, and investments, and to facilitate the mobilization of financial resources to address climate change (MWE, 2015a). A fully costed implementation strategy for the NCCP has also been developed and published.

The NCCP prioritizes climate change adaptation for the country, placing mitigation efforts as a secondary concern. It identifies specific adaptation priorities within the following key sectors: agriculture and livestock, water, fisheries and aquaculture, transportation and public works, forestry, wetlands, biodiversity and ecosystem services, health, energy, wildlife and tourism, human settlements and social infrastructure, disaster risk management, and vulnerable groups, as presented in Table 6 (MWE, 2015a). As well, the policy seeks to promote relevant research and development, and to encourage technology transfer and knowledge sharing. Mainstreaming gender issues is also promoted in the policy to reduce the vulnerability of women and children (MWE, 2015a). These priorities expand on those identified under Uganda's National Adaptation Programme of Action (NAPA), released in 2007, as discussed below, and support regional commitments under the East African Community Climate Change Policy (Maikut, n.d.).

Policy and planning specifically focused on adaptation began in Uganda with the development of its NAPA. It outlines adaptation measures to help increase its adaptive capacity and presents the government's capacity-development needs to enable it to implement these measures. A number of priority areas for interventions are identified, namely weather and climate information, awareness creation, land and land use, farming and forestry, water resources, disaster preparedness, alternative livelihoods policy and legislation, health, and infrastructure (GOU, 2007). This document has guided Uganda's adaptation efforts since its submission to the UNFCCC.

Early in 2015, Uganda submitted to the UNFCCC its road map for developing its National Adaptation Plan (NAP) (MWE, 2015b). Support for development of its NAP is being provided by the UNDP through the NAP Global Support Program (UNDP, n.d.). In partnership with the UNDP and the Food and Agriculture Organization of the United Nations (FAO) through the Integrating Agriculture in National Adaptation Plans program, the GOU has also initiated efforts to integrate agriculture into the NAP process (FAO, n.d.). Based on experience with prior processes, such as formation of the country's NDPs, some challenges that could be faced as Uganda moves to develop its NAP have been identified. These include climate change not being a core national development funding priority, varying degrees of understanding of climate change as a development issue at different levels of government, and the absence of effective monitoring and evaluation processes (Isabirye, 2014).

In May 2015, Uganda was invited to develop a Strategic Program for Climate Resilience (SPCR) for the Pilot Program for Climate Resilience, with funding from the World Bank's

Climate Investment Funds. A scoping mission to initiate development of the SPCR and identify priority needs was undertaken in October 2015 (African Development Bank & World Bank, 2015).[8]

To support its efforts to act on climate change, in 2013 Uganda launched its National Strategy and Action Plan to Strengthen Human Resources and Skills to Advance Green, Low-Emission and Climate-Resilient Development in Uganda 2013–2022. Developed through a UN Climate Change Learning Partnership pilot project, the strategy is designed to support climate change learning by government and other stakeholders. Under the strategy, the GOU outlines an intention to build and strengthen the capacity of government entities, such as the Climate Change Department (CCD). It also aims to increase the capacity of the Department of Meteorology to monitor climate change, and to strengthen capacities to mainstream climate change in key sectors such as agriculture, water, and energy. Education is a focal point of the strategy, which calls for climate change to be part of the national curricula at primary, secondary, and tertiary levels (United Nations Institute for Training and Research, 2013).

Finally, in October 2015, Uganda submitted its Intended Nationally Determined Contribution to the UNFCCC. Within it, Uganda identifies agriculture, forestry, infrastructure (human settlements, social infrastructure, and transportation), water, energy, health, and disaster risk management as priority areas for adaptation. Adaptation actions are generally outlined for each of these areas. The priorities and actions are modelled from Uganda's NCCP and reflect the content of Uganda Vision 2040 and the country's NPD for 2015/16 to 2019/20. While a detailed budget is not provided, the GOU estimates that US$2.4 billion will be required for adaptation actions over the next 15 years, which will amount to US$107.4 million per year or 6.6% of the net official development assistance it receives. The document emphasizes that implementation of its planned adaptation actions is conditional on international support through climate finance instruments and international market mechanisms. Of the total financial cost, 30% is to come from national sources and 70% from international sources (MWE, 2015b).

[8] In January 2016, Uganda was approved to receive US$1.5 million to prepare a SPCR. The funding will be used to identify, through a stakeholder-led process, projects that will advance resilience in the country. Preparation of the SPCR is being led by the MWE, with the support of the African Development Bank. Among activities to be completed by the end of 2016, through the SPRC preparation phase, are assessment of institutional capacity to mainstream climate change, identification of vulnerability hot spots, completion of relevant studies in the agriculture sector, identification of mechanisms to promote urban resilience, and assessment of the financial needs for implementing the future program (African Development Bank, 2016).

Table 6 – Priority adaptation actions by sector identified in Uganda's National Development Plan and National Climate Change Policy

Sector	Adaptation priorities
Agriculture	• Implement climate change adaptation strategies that promote resilient, productive, and sustainable systems • Improve production and productivity through better agricultural technology development and by ensuring effective delivery of advisory services and improved technologies • Assist in controlling disease, pests, and vectors affecting local crops • Use land sustainably and manage soil and water resources to improve land productivity • Increase water supply for agricultural operations, including for irrigation, livestock, and aquaculture • Promote labour-saving technologies and mechanisms • Improve access to high-quality inputs for agricultural and aquaculture production • Improve agricultural livelihoods in northern Uganda • Encourage value addition to products, and improved food storage and management systems to ensure food security year round
Forestry	• Promote reforestation, afforestation, and sustainable management of forestry resources • Restore degraded natural forests in forest reserves and private forests • Reduce pressure on forests as a source of wood fuel and construction materials • Implement a rural electrification program, promote the use of alternative and renewable energy sources, and promote the use of energy-efficient technologies
Water	• Integrate climate change into national efforts to achieve access to and sustainable use and management of Uganda's water resources
Fisheries and aquaculture	• Promote integrated resource management of the fisheries industry and ensure sustainable fisheries production through improved aquaculture
Transportation and works	• Include climate change projections in planning and management of transportation and other physical infrastructure
Wetlands	• Promote wetland conservation and restoration
Biodiversity and ecosystem services	• Address the impacts of climate change on biodiversity and ecosystems, and promote ecosystem health and the provision of important ecosystem services
Health	• Enhance early-warning systems, strengthen adaptive mechanisms, and provide adequate preparedness for dealing with climate change–related diseases

Energy	• Promote sustainable energy use in the face of climate change uncertainties
Wildlife and tourism	• Ensure wildlife conservation and improve the resilience of tourism infrastructure and resources
Human settlements and social infrastructure	• Implement urban planning and develop resilient and robust human settlements that are able to withstand climate change–related risks
Disaster risk management	• Prioritize disaster preparedness and mitigation strategies for climate change–induced risks, hazards, and disasters
Vulnerable groups	• Prioritize actions to improve the resilience of vulnerable groups to climate change

Source: GOU, 2010, 2015

3.3 Institutional structure for climate governance

The CCD was established in 2008 as the coordinating body on climate change efforts for Uganda and the country's point of contact with the UNFCCC (CCD, 2015). It is housed under the Ministry of Water and Environment (MWE). Within the CCD is a smaller division looking after national programs and international commitments on adaptation to climate change (CCD, 2015). It is expected that the CCD will establish a number of units or sections that will focus on adaptation and mitigation, outreach and implementation, international relations, and monitoring and evaluation.

The NCCP Committee is the body responsible for coordination and implementation of the NCCP; it is chaired by the prime minister and includes ministers from key sectors (Maikut, n.d.; MWE, 2015a). The National Climate Change Advisory Committee provides coordination support and technical input to the NCCP Committee (Maikut, n.d.; MWE, 2015a). The advisory committee is chaired by the MWE and has technical representatives from the national-level ministries, the private sector association, civil society, academia, and district authorities (Maikut, n.d.).

Other ministries and agencies are to play a pivotal role in supporting the implementation of the NCCP, including the Ministry of Finance, Planning and Economic Development; the National Planning Authority; and the Ministry of Local Government. Departmental points of contact are to be appointed, who will be accountable for implementation of the NCCP within their respective ministries, including reporting on progress and achieving results (MWE, 2015a). Training manuals are being prepared to support these positions and other relevant stakeholders. The Ministry of Finance, Planning and Economic Development acts as the designated authority for the Adaptation Fund and the Green Climate Fund (GCF). In addition, Uganda has started to prepare its no-objection procedure and a coordination mechanism to enable it to access the GCF readiness program, and some implementing agencies have already been accredited by the GCF.

3.4 National-level sectoral policies

At the sectoral level, Uganda has made progress in integrating climate change considerations into various national strategies and plans. Among these are documents that set the country's priorities and direction in the areas of agriculture, water, health, and disaster risk reduction.

The Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) rolled out its Agriculture Sector Development Strategy and Investment Plan 2010/11–2014/15 (ASDSIP) in 2010. Focused on the role of agriculture in food and income security, the ASDSIP is designed to increase agricultural development in the country and enhance the sector's contribution to poverty reduction and economic growth (MAAIF, 2010). The ASDSIP puts forward the following two development objectives: increase rural incomes and livelihoods, and improve food security and nutrition. Climate change is described as a major challenge for the sector's improvement and opportunities, with the ministry showing concern that increased frequency of intense rainfall, heat waves, droughts, floods, and storms will continue to negatively affect the sector (MAAIF, 2010).

The ASDSIP contains strategies to address the need to adapt to climate change, including capacity building; knowledge sharing to increase the adaptive capacity of government, the private sector, and local actors; and providing greater access to technology and infrastructure. In relation to capacity building, the strategy focuses on strengthening capacity to engage in district-level planning, undertake vulnerability assessments, identify climate impacts and coping measures, deliver improved and timely seasonal climate forecasts, and integrate climate risk management into agri-business. The vast majority of measures identified in the document focus on improving government and industry capacity and commercial expansion of the sector. Consistent with these commitments, the MAAIF has undertaken planning and training processes on climate change with government officials at the national and local levels. The strategy contains budget lines for its outlined programs and subprograms, including those that integrate climate change adaptation. Specific indicators are provided, but no targets are included for the identified measures. Some known adaptation actions, such as the introduction of crop and livestock insurance, are not fully developed within the strategy. A new strategy and investment plan for the agriculture sector is currently being prepared.

In 1999, the GOU approved its National Water Policy, which outlines the framework for water resource management in the country. Approved prior to the emergence of climate change adaptation as a policy concern, it makes reference to the implications of existing climate risks for water resource management, such as variations in rainfall, and the impact on water availability of human interventions such as deforestation and wetland drainage. It calls for more efficient use of water in the agriculture sector, improved coordination between sector stakeholders, greater awareness of water management issues, and pollution control measures. Overall, its objective is to promote an integrated and sustainable

approach to water management and use in Uganda (Ministry of Water, Lands and Environment, 1999).

In 2009, the MWE released the Strategic Sector Investment Plan for the Water and Sanitation Sector in Uganda. It is geared toward supporting the Poverty Eradication Action Plan of 2004 and aligns with the national planning framework by providing investment targets to 2015, 2020, and 2030. Its objectives include managing and developing water resources in a sustainable manner; increasing the provision of safe water to 77% and 100% of the rural and urban populations, respectively, by 2015; achieving an 80–90% effective use and functionality of facilities; and developing and efficiently using water supply for production in key sectors, such as agriculture (crops and livestock), aquaculture, rural industries, hydropower, and tourism (MWE, 2009). Increased temperatures, decreased rainfall, and climate variability are depicted as additional challenges in ensuring the sustainability of Uganda's water resources. In response, the plan includes a commitment to "develop and implement a strategy to mitigate and adapt to the negative effects of climatic change (droughts, flooding, etc.) and improve water security of the country" (MWE, 2009, p. 37); a climate change adaptation plan was to be completed by 2011. It also indicates plans to integrate adaptation considerations into efforts to develop national and catchment-based integrated water resources management plans, as well as to strengthen investments in water storage and bulk water systems to address flood and drought risks (MWE, 2009). The document also emphasizes that inadequate funding in water resource management can limit Uganda's ability to prepare for climate change impacts and achieve long-term, sustainable water resource management (MWE, 2009).

The MWE released a new national plan for the forest sector in 2013. The National Forest Plan 2011/12–2021/22 sets out a medium-term plan for the sector, with the vision of achieving a "sufficiently forested, ecologically stable and economically prosperous Uganda" (MWE, 2013, p. 1). The plan's main objectives are to increase economic productivity and employment in the forest industry, increase household incomes through forest-based initiatives, and enhance the provision of forest sector ecosystem services through sustainable forest management (MWE, 2013). Climate change is identified as a cross-cutting issue, with the focus being on the role of forests in mitigating the impacts of climate change through international mechanisms such as Reducing emissions from deforestation and forest degradation (REDD). The plan also promotes sustainable land management practices that could contribute to increasing the resilience of farmers and communities to climate change (MWE, 2013).

The Ministry of Health is under the directive of its Second National Health Policy (NHP II), released in 2010, and its Health Sector Strategic Plan III (HSSP III) for 2010 to 2015. The HSSP III was designed specifically to operationalize the NHP II, and both documents are designed to support measures identified under the NDP for the health sector. The NHP II supports implementation of the Uganda National Minimum Health Care Package and is the health sector component of the NDP (Ministry of Health, 2010b). Climate change is not

referenced in this document, but the Minimum Health Care Package contains elements that may be expected to enhance adaptive capacity. This includes a focus on disaster and epidemic preparedness and response, as well as environmental health. The latter includes efforts to advance secure access to safe drinking water, proper waste and sanitation, food security, and vector control (Ministry of Health, 2010b).

The main goal of the HSSP III is to "attain a good standard of health for all people in Uganda in order to promote a healthy and productive life" (Ministry of Health, 2010a, p. 38). To achieve its goal, the HSSP III seeks to achieve universal coverage under Uganda's National Minimum Health Care Package through "promotive, preventative, curative and rehabilitative services" (Ministry of Health, 2010a, p. 49), with a major focus on vulnerable populations. As a strategic objective, the HSSP III outlines mainstreaming climate change and improving adaptation within the sector (MWE, 2014). Planned interventions include developing guidelines for integrating climate change adaptation into the health sector, increasing the awareness of health service providers regarding the effects of climate change on health, increasing health managers' access to early-warning systems and weather forecasts, and coordinating climate change response interventions with relevant ministries and agencies (Ministry of Health, 2010a).

In 2011, the Department of Disaster Preparedness and Management launched Uganda's National Policy for Disaster Preparedness and Management. The policy seeks to mainstream disaster risk management in the development process for the country in order to "reduce the vulnerability of people, livestock, plants, and wildlife to disasters in Uganda" (GOU, 2011, p. 2). Strengthening institutional capacity to deliver services and improve management and preparedness is a main focus of the policy. Among its related objectives are the generation and dissemination of disaster and hazard trend analysis to improve early-warning systems; the creation of public private partnerships in the areas of disaster preparedness and management; and the coordination of effective emergency responses at national, district, and local levels of government. The policy recognizes climate change as a risk for Uganda and identifies the need to develop proactive measures that tackle climate change through adaptation and mitigation actions (GOU, 2011). Although specific adaptation measures are not identified within the policy, some of its planned actions will promote increased adaptive capacity in vulnerable sectors, such as health and agriculture.

Table 7 – Integration of climate change into national sectoral strategies, polices, and plans: An assessment of progress

Policies	Absent	Climate change mentioned as potential risk	Possible actions for reducing risk identified	Targets identified for specific adaptation measures
ASDSIP (2010)		✓	✓	
National Water Policy (1999)	✓			
Strategic Sector Investment Plan for the Water and Sanitation Sector in Uganda (2009)		✓	✓	
National Forest Plan (2013)		✓		
HSSP III (2010)		✓	✓	
NHP II (2010)	✓			

3.5 Subnational policies

While the NCCP states a commitment to mainstreaming climate change action and developing climate change plans and strategies at the district level, progress toward this goal appears to be limited at present. However, three districts — Buteleja, Masindi, and Nakasongola — wrote District Environment Policies in 2009. All three documents include similar policy statements on climate change and the need for adaptation measures, especially to support highly vulnerable populations. Strategies focus on educating citizens about how their livelihoods are affected by climate change; involving schools and communities in developing monitoring systems, risk reduction strategies, and coping strategies; and conserving land and water. They also reference implementation of climate change and desertification adaptation activities at the district level through operationalization of the United Nations Convention to Combat Desertification and the UNFCCC (Butaleja District Local Government, 2009; Masindi District Local Government, 2009; Nakasongola District Council, 2009).

Districts are also encouraged to prepare state of the environment reports. Uganda's National Environmental Management Authority previously developed guidelines to inform the development of these reports, which recognize climate change as an emerging issue (National Environmental Management Authority, 2003).

At the municipal level, the City of Kampala is preparing a low-carbon and climate-resilient development strategy with funding from the Government of France and support provided by the French Agency for Technical Cooperation and Development (Drunet, 2014; Kampala Capital City Authority [KCCA], 2015). The initiative is taking place as part of a larger project,

Africa4Climate, which is being implemented in Uganda, Kenya, Gabon, and Benin. The vision of the strategy is to lead Kampala's development onto a sustainable pathway, corresponding to both Uganda Vison 2040 and the Greater Kampala Development Framework 2040 (KCCA, 2015). The strategy seeks to mainstream climate change into human resources, public procurement, and budgets; increase energy efficiency in buildings; diversify energy sources; and improve water management and wastewater treatment (Drunet, 2014; KCCA, 2015). To date, the main emphasis has been on supporting climate mitigation actions. The strategy is expected to be launched in September 2016 (KCCA, 2015).

4. Current and planned adaptation programs and projects

The extent to which Uganda will be able to achieve its stated adaptation objectives will depend in part on the focus and type of adaptation action being implemented within its borders, and the support of its international development partners. This section therefore provides an overview of current and recently completed projects and programs in Uganda, along with a brief analysis of the climate finance flowing into the country.

4.1 Adaptation projects and programs

To assess the range of discrete adaptation projects and programs currently being implemented in Uganda, an extensive review was undertaken of the websites of UN agencies, multilateral development banks, bilateral development agencies, and research and international NGOs. The research focused on projects and programs that specifically aim to support adaptation to climate change, as reflected in their title, goals statement, and/or objective statement. All relevant projects and programs were captured in a database and classified according to their type and area of focus. A detailed description of the methodology used in the review is provided in Annex A.

The review process revealed 24 significant projects and programs under way in Uganda, the majority being implemented solely within the country. Table 8 provides a synopsis of the focus of these projects; summaries of each of the projects identified can be found in Annex B. These current adaptation projects and programs focus on a wide range of sectors, though the primary emphasis is on agriculture, freshwater supply, governance, improved access to climate information, and disaster risk management. Although these areas align with priority sectors identified in Uganda's NAPA, some gaps in programming can be identified. In particular, there appears to be limited adaptation action occurring that addresses needs related to forests, fisheries, energy, and health.

Table 8 – Sectors of focus for adaptation projects and programs identified, compared to adaptation priorities identified by the government

Sector of focus	Priority sectors for adaptation	Number of projects*	Percentage of total projects**
Agriculture	✓	11	46%
Pastoralism		1	4%
Forestry	✓	0	-
Fisheries	✓	0	-
Energy	✓	0	-
Ecosystem conservation		3	13%
Ecosystem restoration		3	13%
Watershed management		2	8%
Freshwater supply	✓	7	29%
Disaster risk management		4	17%
Gender		1	4%
Private sector		3	13%
Peri-urban areas		1	4%
Urban areas		2	8%
Human health	✓	1	4%
Climate information		5	21%
Government		8	33%
Civil society		3	13%
Social protection		2	8%
Multisectoral		1	4%

Geographical characteristics	
National projects	13
Regional projects	6
Global projects	5
Total	24

*Individual projects may address one or more sectors.
**Calculated by the number of projects active in this sector relative to the total number of projects identified, reflecting the potential for a single project to address adaptation needs in more than one sector.

Adaptation projects are being implemented in all parts of Uganda, with the majority taking place in the eastern and northeastern parts of the country. Many are occurring in the Karamoja region. Other projects are taking place in the Lake Victoria and Kagera River Basins, areas faced with challenges such as the provision of sustainable water supply, sanitation, and wastewater treatment services. Activities taking place in eastern Uganda are centralized around Mount Elgon, including districts that are highly vulnerable to landslides and flooding. Districts in central Uganda are an additional focal area for adaptation initiatives, as they are particularly vulnerable to drought and climate variability (Global Climate Change Alliance, 2012).

Projects and programs implemented at the national level primarily aim to build adaptive capacity and support community-based adaptation, along with working with the government to develop adaptation strategies and mainstream adaptation into sectoral policies. These are further complemented by initiatives that strengthen monitoring capabilities, climate information access, and early-warning systems. One of the significant national projects under way is Enhancing Resilience in Karamoja Uganda, the goal of which is to increase resilience to extreme climate and weather events in vulnerable communities in the semi-arid Karamoja region through improved nutrition programs and food security initiatives (DFID, n.d.). Further large notable projects and programs under way just in Uganda include Adaptation to Climate Change in Uganda, funded by the European Union's Global Climate Change Alliance; Adapting Agricultural Cultivation Methods of the Karimojong to Climate Change in the Karamoja Sub-region, funded by Germany; and Northern Uganda: Transforming the Economy through Climate Smart Agribusiness and Enhancing Adaptation to Climate Smart Agriculture Practices in the Farming Systems of Uganda, funded by the United Kingdom. These projects focus support on the adoption of climate-resilient agricultural practices, the improvement of livelihoods, and food security. The Reducing Vulnerability of Banana Producing Communities to Climate Change Through Banana Value Added Activities project, funded in part by the Least Developed Countries Fund (LDCF), is another project focused on building adaptive capacity in the agriculture sector. It is supporting vulnerable communities in western Uganda to better adapt to the effects of climate change by promoting value addition to banana-production activities, creating opportunities for livelihood diversification, sensitizing farmers to climate risk management options, and mainstreaming adaptation into agriculture-focused policy documents (Global Environment Facility, n.d.-a).

Four national initiatives are under way in Uganda's water sector. The multi-million-dollar Joint Water and Environment Sector Support Programme (funded by the Governments of Denmark, Austria, and Germany; the European Union; the African Development Bank; and the FAO) focuses on supporting local governments to provide water and sanitation facilities in all of Uganda's 111 districts. Part of this initiative includes developing institutional capacities for climate change adaptation (Danish International Development Assistance, 2013). The Climate Change Adaptation and ICT project, funded by IDRC, assesses the extent to which the capacity of communities to adapt to the impacts of climate change on water

resources can be strengthened by implementing an integrated information and communication technology system that provides access to climate-related information and informs communities of appropriate adaptation mechanisms (CCD, n.d.-b). Others also emphasize building resilience to climate change in the water and sanitation sector of flood- and drought-prone regions of Uganda, as well as in urban centres.

Uganda is also involved in several regional adaptation programs. Among these is the Planning for Resilience in East Africa through Policy, Adaptation, Research and Economic Development project funded by the United States Agency for International Development (USAID). It aims to mainstream climate-resilient development and programming into the development agenda of the East African Community and its partner states, with a particular focus on the conservation of transboundary freshwater biodiversity, drinking water supply, and sanitation services (USAID, 2013). Uganda is also part of the Regional Capacity Building for Sustainable Natural Resource Management and Agricultural Productivity under a Changing Climate project, funded by Norway, and the Africa Climate Change Resilience Alliance (ACCRA) project, supported by the Governments of the United Kingdom and the Netherlands. The first project's overall goal is to improve agricultural productivity and livelihoods by strengthening the human and institutional capacities of southern institutions (Norwegian Agency for Development Cooperation, 2015). The ACCRA project is helping the Governments of Ethiopia, Mozambique, and Uganda modify their decision-making processes to build the resilience of their citizens. It is also helping international and national civil society organizations enhance their ability to increase the adaptive capacity of vulnerable communities (Oxfam, 2015). Additionally, the Building Resilient Governance, Markets and Social Systems project is working to build the resilience of northern communities and households through actions such as strengthening the role of communities in natural resource management decision-making, improving livestock markets, and promoting the transformation of gendered paradigms (Building Resilience and Adaptation to Climate Extremes and Disasters, n.d.). Finally, Uganda is among the countries targeted by the Climate for Development in Africa program, which aims to strengthen access to and use of climate information for decision-making.

Relevant global projects being implemented in Uganda include the Adaptation at Scale in Semi-Arid Regions (ASSAR) project, the Partners for Resilience project, and the Climate-Smart Villages project. The ASSAR initiative, launched under the CARIAA program, aims to enable proactive, longer-term approaches to climate change adaptation in semi-arid regions, while supporting the management of current risks. The goal is to generate credible information that decision-makers and others can use to develop robust adaptation strategies (Climate System Analysis Group, 2015). Partners for Resilience is an initiative implemented by the Netherlands Red Cross to increase the resilience of citizens against natural disasters, climate change, and the deterioration of ecosystems (Partners for Resilience, 2015). The Climate Change, Agriculture and Food Security research program has developed the Climate-Smart Villages initiative to model local actions that ensure food security, promote adaptation, and build resilience to climatic stresses (Climate Change,

Agriculture and Food Security, 2015). Lastly, Uganda is a target country of the Building the Capacity of Civil Society Organizations in Africa and Asia program, implemented by the Aga Khan Development Network. It intends to strengthen the effectiveness of civil society organizations to work with communities to adapt to climate change and ensure food security by testing innovative approaches that improve livelihood opportunities (Government of Canada, 2014).

4.2 Climate finance

Significant financing is required to support the adaptation actions identified by Uganda in its NCCP. As outlined in the policy's implementation strategy, which sets out financial requirements, the cost of addressing climate change in Uganda is estimated at approximately 1.6% of GDP, or US$258 million annually. Currently, the level of expenditures equates to 0.2% of national GDP, a considerable gap compared to the target of 1.6% (Tumushabe et al., 2013). This gap may be met in part through domestic financing, but Uganda will also require significant support from the international community. To provide a picture of the current status of international funding support for adaptation in Uganda, this section provides an overview of the scale, sources, and orientation of current climate finance flowing into the country.

International finance for climate change adaptation in Uganda comes from a variety of sources, including designated climate funds and official development assistance. According to the Climate Funds Update (2015), which tracks climate financing through designated bilateral and multilateral climate funds, Uganda received a total of US$54.1 million in climate finance between 2003 and April 2015. Of this amount, US$46.6 million (86%) was allocated to adaptation projects. Notable multilateral sources of funding include the LDCF, the Adaptation for Smallholder Agriculture Programme, and the European Union through the Global Climate Change Alliance. The United Kingdom's International Climate Fund also provides bilateral climate change finance to Uganda. Eight out of 13 projects tracked by the Climate Funds Update focus on climate change adaptation. These projects focus on sustainably improving the livelihoods and food security of the rural population, building resilience to climate change in the water and sanitation sector, restoring livelihoods in the northern region, and reducing the vulnerability of banana-producing communities to climate change.

Between 2003 and April 2015, Uganda received the least amount of overall climate financing from international funds compared to its Eastern African neighbours, though it secured the largest share of funding for adaptation, as illustrated in Figure 3. The remaining funds were directed toward REDD projects and multi-foci projects. Only Rwanda and Tanzania received close to the same amount of financing from international funds as Uganda.

	East Africa				
	Uganda	Tanzania	Rwanda	Kenya	Ethiopia
Adaptation	$46.5	$38.7	$45.4	$16.8	$28.1
Mitigation – general	$0.0	$15.1	$4.5	$30.0	$41.1
Mitigation – REDD	$3.8	$83.7	$5.8	$0.2	$3.8
Multiple foci	$3.8	$9.3	$5.3	$18.9	$18.6

Figure 3 – Comparison of approved funding from designated bilateral and multilateral climate funds in Eastern Africa from 2003 to April 30, 2015, in USD millions (based on Climate Funds Update, 2015)

An analysis of the Organisation for Economic Co-operation and Development (OECD) Rio Markers, which reports on climate-related official development assistance, discloses that Uganda received US$385.4 million for projects and programs with a principal or significant focus on climate change adaptation between 2010 and 2013, as shown in Figure 4. Primary bilateral funders for climate adaptation include Denmark, Germany, Sweden, Norway, and the United Kingdom. According to the OECD Rio Markers, the vast majority of bilateral aid contributions target adaptation related to water supply and sanitation, agriculture, and energy; less or no attention is given to forestry, wildlife, or the health sector, although these also are priority areas for adaptation action identified in Uganda's NAPA (OECD, 2015).

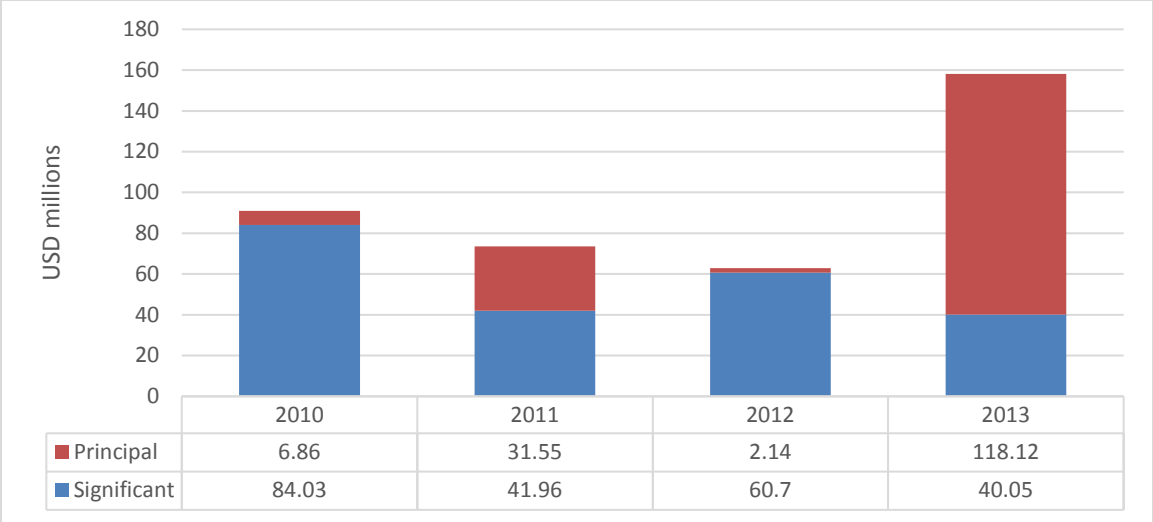

Figure 4 – Bilateral development aid to Uganda between 2010 and 2013 identified as having as its principal or significant objective[9] supporting adaptation, in USD millions, constant 2012 prices (based on OECD, 2015)

5. Networks and communities of practice

Communities of practice provide a space for climate change practitioners, policymakers, and civil society members to interact with one another and share experiences and best practices on climate change action. Within Uganda there are a few networks actively engaged in promoting climate change adaptation and the exchange of knowledge. Among these is the Coalition on Environment and Climate Change in Uganda, a network that brings together more than 30 civil society organizations across the country that are focused on the environment, climate change, waste, and pollution issues. Its aim is to use advocacy for sustainable conservation, environmental protection, and natural resource use to maximize benefits to the people of Uganda. The Pro-Biodiversity Conservationists in Uganda is the host institution for this platform.

A number of civil society organizations within Uganda are also members of Climate Action Network Uganda, which advocates for climate change action. The network was established in 2008 under the leadership of Oxfam (Hepworth, 2010), and is part of the international Climate Action Network. As previously noted, the ACCRA program is also supporting research and advocacy by civil society organizations in Uganda. Finally, local NGOs noted for being engaged on climate change include the Development Network of Indigenous

[9] Based on the definitions used by the OECD Rio Markers system, activities are considered to have supporting adaptation as their "principal" objective "when promoting the objectives of the UNFCCC is stated in the activity documentation to be one of the principal reasons for undertaking the activity. In other words, the activity would not have been funded but for that objective. Activities marked 'significant' have other prime objectives, but have been formulated or adjusted to help meet climate concerns" (OECD, 2011, p. 3).

Voluntary Associations, the Uganda Coalition for Sustainable Development, Environmental Alert, Ecotrust, and Nature Uganda (Hepworth, 2010).

In the research and academic communities of Uganda, Makerere University is well-known for being actively engaged in efforts to better understand the potential implications of climate change for the country and to develop appropriate response strategies. The Economic Policy Research Centre, an economic and development policy think tank, has also undertaken research and policy engagement on climate change adaptation.

To support information sharing among those engaged on climate change in Uganda, the CCD and Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH (German Society for International Cooperation) have developed the Actors Landscape database. It identifies different actors engaged in adaptation, the projects they are undertaking, each project's sector of focus, and their government partners. The database provides a better understanding of what actions are taking place in the country, by whom, and where coordination and possible overlap in initiatives exist (CCD, n.d.-a; Hepworth, 2010).

Ugandans are also able to participate in several regional networks, including the PanAfrican Climate Justice Alliance, a coalition of over 1,000 African civil society organizations in 45 African countries working together on climate change and sustainable development (PanAfrican Climate Justice Alliance, n.d.). They are also able to access AfricaAdapt, a network aimed at sharing climate change adaptation knowledge between researchers, policymakers, and civil society organization across Africa. Interactions are both Web-based and face to face between its members and the public at large (AfricaAdapt, n.d.).

6. Conclusions

Climate change presents a significant challenge for Uganda as it strives to achieve its development objectives. Of particular concern are the country's semi-arid areas in northern and northeastern Uganda as well as along the cattle corridor, where development progress has been slower, access to social services is more limited, and food insecurity is higher. These regions are more vulnerable to projected temperature increases, continued variability in rainfall patterns, and a potential rise in the frequency of extreme climate events. Not only would such changes affect vulnerable communities by reducing rain-fed agriculture production, livestock productivity, and human health, but they also have the potential to adversely affect social progress and the economic prosperity of the country as a whole.

Positive development steps, such as halving the number of Ugandans living in severe poverty and reducing gender inequalities, have helped increase the capacity of Uganda to adapt to climate change. However, challenges remain in important sectors such as agriculture, where productivity remains low, limited areas benefit from access to irrigation

technology, and soil fertility is declining. The fisheries sector is affected by overexploitation and pollution in Lake Victoria, and by the degradation of wetlands found in Uganda's drylands. Deforestation driven by the expansion of agricultural lands and livestock activities also contributes to the country's vulnerability to climate change.

The GOU has responded by recognizing the risk climate change poses to its development prospects, in Uganda Vision 2040 and in its current NDP, and by initiating development of an institutional structure within the national government to support climate change action. It has also released its NCCP and a supporting expenditure framework, which complements past development of its NAPA. Efforts have also been initiated to establish a national adaptation plan. Priority sectors for adaptation action have been identified, and resilience-building measures have been implemented. The GOU has also indicated an intention to mainstream climate change into sectoral and cross-sectoral planning and decision-making. However, while climate change is referenced in various sectoral policies and plans, mainstreaming remains limited. Adaptation planning and action also need to expand at the district level, a challenge that is being addressed to some extent through a few ongoing projects. Further capacity building is needed, as well as access to the knowledge and resources needed to shape adaptation plans at the sectoral and local levels. Projects geared toward increasing the capacity of government officials to address climate change are helping address some of these gaps and limitations.

Uganda is receiving substantial support for adaptation action from its bilateral and multilateral development partners, which has been largely oriented toward agriculture and water — sectors prioritized for adaptation action. Investment is also being directed to assisting particularly vulnerable areas, such as Uganda's northern and semi-arid regions. Other priority sectors, such as health, fisheries, and forestry, appear to be receiving less attention and may need to be given stronger support in the future. Greater support could also be given to foster stronger networks and communities of practice, such as those that encourage more engagement by the private sector in efforts to reduce vulnerability to climate change.

Overall, Uganda has increased its readiness to address climate change, but it still faces challenges. With a rapidly growing population and increased pressure on its natural resources, Uganda will need to increase its efforts to protect and enhance its natural capital, improve the economic and social well-being of its people, and build stronger governance institutions. The country's capacity to respond would be strengthened by greater mainstreaming of adaptation concerns into national- and district-level development planning, which may be enabled by current efforts related to the development of Uganda's NAP process. Such steps would help increase the resiliency of the country and better enable it to reach its vision of becoming a middle-income country by 2040.

7. Annexes

Annex A: Methodology

This section presents the research parameters established to guide development of the standardized reviews of current adaptation action in the CARIAA program's countries of engagement. It sets forward definitions used in this study, particularly with respect to the identification, selection, and classification of programs and projects considered in the review. This methodology was previously developed by the International Institute for Sustainable Development to support a review of current and planned adaptation action in 12 regions, which was completed in 2011 for the Adaptation Partnership. Modest updates to this original methodology were made to support the current review undertaken for the CARIAA program. For more information, see Adaptation Partnership (2015).

A.1 Adaptation actions included in the review

Within the review, adaptation action was defined as "policies, programs, and projects designed and implemented specifically to address the current and projected impacts of climate change." Therefore, the review focused on examining policies, programs, and projects in which specific reference has been made to supporting adaptation to climate change or climate risk reduction.

Consistent with this definition, the review gave attention to discrete, time-bounded programs and projects designed and implemented specifically to support preparation for or implementation of practical adaptation actions within the broader context of achieving development objectives. Therefore, at least one of the following terms appeared in the title, goals statement, or objectives statement of each program or project included in the review: "adaptation," "climate change adaptation (CCA)," "climate risk management," or "climate vulnerability reduction."

Based upon these parameters, the following types of programs and projects were not included in the review: disaster risk reduction, prevention, or management projects, unless they specifically reference that this activity is being undertaken in support of CCA; primary scientific research studies (for example agrology, botany, or meteorology) on the potential impacts of climate change (for example on changes in crop production, glacial melt rates, or typhoon patterns); long-term monitoring efforts (whether climatic or socioeconomic) needed to inform decision-making; stand-alone workshops, conferences, and training programs; and capacity building to support participation in processes related to the UNFCCC (such as training for negotiators, enabling activities to prepare reports).

The following additional parameters were established to guide the selection of programs and projects incorporated in the study:

- *Official start date.* To ensure that only "current" projects were included in review, selected projects needed to have begun on or after January 1, 2012, with the

exception of projects that began before this date but were still ongoing as of January 1, 2015.

- *Official end date*. Ongoing projects are those who official completion day is on or after January 1, 2015. Projects completed after January 1, 2012, were classified as completed.
- *Funding characteristics*. Projects with a value of US$100,000 or more were included in the study. However, reflecting the greater level of adaptation action underway in Bangladesh and India, the minimum value of projects included in the reviews for these two countries was raised to US$250,000. Projects financed by international and domestic sources of funding were considered.

Additionally, identified projects were classified by geographical scale in accordance with the following definitions:

- Global: Projects involving countries throughout the world, including the profiled country.
- Regional: Multi-country projects within a particular subregion, be it a continent or subcontinental area (such as South Asia or West Africa), that includes the profiled country.
- National: Projects occurring within one country.

A.2 Type of project being undertaken

To better understand the orientation of the projects underway in the countries examined as part of the review, projects were classified by type using the following definitions:

- *Research*. Encompassing efforts to develop new knowledge or organize existing information so as to increase understanding of the links among climate change, human society, and ecosystems and inform adaptation decision-making.
- *Assessment*. Encompassing risk, impact, and vulnerability assessments, as well as monitoring of ecological and societal trends.
- *Capacity building*. Encompassing the provision of technical training, technical assistance, institutional strengthening, and education.
- *Knowledge communication*. Encompassing efforts to share information, knowledge, and practices related to CCA, including awareness raising and engagement of media.
- *Policy formation and integration*. Encompassing efforts to inform, develop, and implement CCA plans, strategies, frameworks, and policies at the local, subnational, national, and international levels.
- *Field implementation*. Encompassing physical measures to reduce vulnerability to the impacts of climate change, including the implementation of pilot projects, construction of infrastructure, development and modification of technologies, and management of physical resources.

- *Community-based adaptation*. Encompassing actions that directly engage community members in efforts to understand, plan for, and respond to the impacts of climate change.

A.3 Sector or area of focus

To further inform analysis of the range of adaptation action taking place in each country reviewed, programs and projects examined in the study were classified by sector using the following definitions:

1. **Food, fibre, and forests**. Defined as the management and use of terrestrial natural resources to directly improve human well-being. Its subcategories are:
   - *Agriculture*. Encompassing subsistence agriculture, commercial agriculture, and the rearing of confined domestic animals.
   - *Pastoralism*. Encompassing the use of domestic animals as a primary means for obtaining resources from habitats (UNEP, 2007), particularly in nomadic and semi-nomadic communities.
   - *Forestry*. Encompassing afforestation, reforestation, agroforestry, commercial forestry, community-based forest management, and woodland management.
   - *Fire management*. Encompassing monitoring, planning, and management to address the impact of fires on settlements and ecosystems, including forested and grassland ecosystems.
   - *Aquaculture.* Food production through the rearing of aquatic animals, such as fish, crustaceans, and molluscs, or the cultivation of aquatic plants in natural or controlled marine or freshwater environments.

2. **Ecosystems**. Defined as a system of living organisms interacting together and with their physical environment, the boundaries of which may range from very small spatial scales to, ultimately, the entire Earth (IPCC, 2001). Its subcategories are:
   - *Biodiversity protection*. Encompassing activities related to the maintenance of living organisms at various spatial scales, including the establishment and protection of parks and bioreserves.
   - *Ecosystem conservation*. Encompassing efforts to *maintain* the health of particular ecosystems, such as wetlands, grasslands, forests, mangroves, and coral reefs.
   - *Ecosystem restoration*. Encompassing efforts to *restore* the health of particular ecosystems, such as wetlands, grasslands, forests, mangroves, and coral reefs.

3. **Freshwater resources**. Defined as the management and use of freshwater contained in terrestrial ponds, lakes, rivers, and watersheds, among others. Its subcategories are:
   - *Freshwater fisheries*. Encompassing the catching, packing, and selling of fish and shellfish derived from lakes, rivers, and ponds, as well as through freshwater aquaculture.

- *Watershed management*. Encompassing management of the basins that supply water to different streams, rivers, lakes, and reservoirs, including integrated watershed management.
- *Freshwater supply*. Encompassing efforts to access and preserve freshwater for human consumption and use, including drinking water sources, groundwater resources, rainwater harvesting, and water infrastructure such as wells, dams, and dikes.

4. **Oceans and coastal areas**. Defined as the management and use of coastal areas and oceans. Its subcategories are:
   - *Coastal zone management*. Encompassing the management of land and water resources in coastal areas, including through integrated coastal zone management and the establishment and maintenance of coastal infrastructure.
   - *Marine management*. Encompassing the management and use of offshore ocean and sea resources.
   - *Marine fisheries*. Encompassing the catching, packing, and selling of fish, shellfish, and other aquatic resources found in the oceans and seas, including through marine and coastal aquaculture.

5. **Disaster risk management**. Defined by the United Nations International Strategy for Disaster Reduction (2009) as the "systematic process of using administrative directives, organizations, and operational skills and capacities to implement strategies, policies and improved coping capacities in order to lessen the adverse impacts of hazards and the possibility of disaster" (p. 10). It includes emergency response measures, preparation for extreme events and early warning systems. No sub-categories were established in relation to this macro project category.

6. **Migration and security**. Defined as efforts to support the movement of people and maintain their personal security in the face of incremental climate changes or climate shocks.
   - *Migration*. Encompassing preparations for and responses to the potential movement of people from one location to another due to climate change impacts.
   - *Security*. Relating to personal security and freedom from violence, crime, and war due to natural and human-induced disasters (UNEP, 2007) and encompassing peace building, conflict reduction, and conflict avoidance.

7. **Gender**. Defined as the social attributes and opportunities associated with being male and female and the relationships between women and men, and girls and boys, as well as the relations among women and among men. These attributes, opportunities, and relationships are socially constructed and are learned through socialization processes (United Nations Entity for Gender Equality and the Empowerment of Women, n.d.). This category includes efforts to understand the vulnerability of women to the impacts of climate change, gender-sensitive adaptation strategies, and measures to improve the

situation of women at the local and policy level, including through gender mainstreaming. No subcategories were established in relation to this macro project category.

8. **Business**. Defined as the purchase and sale of goods and services with the objective of earning a profit. Its subcategories are:
   - *Tourism*. Encompassing the adjustment and development of tourist facilities and operations to account for current and future vulnerabilities, including these actions in relation to ecotourism.
   - *Private sector*. Encompassing potential impacts of climate change and potential adaptation strategies on the diverse activities underway in the portion of the economy in which goods and services are produced by individuals and companies including industry, mining, and other economic sectors.
   - *Trade*. Encompassing the exchange of goods and services within and between countries.
   - *Insurance*. Encompassing the development, testing, and adjusting of insurance and risk-management schemes, including weather-based index systems.

9. **Infrastructure**. Defined as the basic equipment, utilities, productive enterprises, installations, institutions, and services essential for the development, operation and growth of an organization, city or nation (IPCC, 2001). Its sub-categories are:
   - *Energy*. Encompassing energy-related systems and infrastructure, including small-scale and large-scale energy generation through hydroelectric power generation, wind, solar, and other forms of traditional and new energy sources, as well as transmission networks.
   - *Transportation*. Encompassing the components of the system required to move people and goods, including roads, bridges, railway lines, shipping corridors, and ports.
   - *Waste management*. Encompassing sanitation, sewage systems, drainage systems, and landfills.
   - *Buildings*. Encompassing actions related to built structures such as houses, schools, and offices, including changes to building codes, building practices, and green ways of construction.

10. **Human settlements**. Defined as a place or area occupied by settlers (IPCC, 2001). Its subcategories are:
    - *Peri-urban areas*. Encompassing the outskirts of urban centres and the transition zones between rural and urban areas.
    - *Urban areas*. Encompassing municipalities, towns, and cities, as well as areas in these centres (such as slums).
    - *Rural areas*. Encompassing villages and other small settlements, as well as rural landscapes and integrated rural development.

11. **Human health**. Defined as a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity (WHO, n.d.). It includes efforts to assess vulnerabilities to and the impacts of climate change on human health directly and indirectly, and the development and implementation of appropriate adaptation strategies at the local, regional, and national levels. No subcategories were established in relation to this macro project category.

12. **Climate information services**. Defined as the production and delivery of authoritative, timely, and usable information about climate change, climate variability, climate trends, and impacts to different users at the local, subnational, national, regional, and global levels. It includes efforts to develop, adjust, and provide short- and long-term climate forecasts, including climate change projections, to different audiences. No subcategories were established in relation to this macro project category.

13. **Governance**. Defined as the institutions (laws, property rights systems, and forms of social organization) through which societies define and exercise control over resources (UNEP, 2007). Its subcategories are:
    - *Government*. Encompassing efforts to build the capacity of government officials, either at the national or subnational level, to prepare for and facilitate adaptation to climate change, including through the development of policies, plans, frameworks, and strategies, as well as the establishment and operation of climate change trust funds.
    - *Civil society*. Encompassing efforts to build the capacity of the public, including NGOs, to understand, prepare for, and respond to climate change.

14. **Social protection**. Based on DFID's definition of social protection, projects within this category focus on three sets of instruments to address chronic poverty and vulnerability:
    - *Social insurance*. Referring to "the pooling of contributions by individuals in state or private organizations so that, if they suffer a shock or change in circumstances, they receive financial support."
    - *Social assistance*. Encompasses "non-contributory transfers that are given to those deemed vulnerable by society on the basis of their vulnerability or poverty."
    - *Workplace safety*. Involves the "setting and enforcing of minimum standards to protect citizens within the workplace" (DFID, 2006, p. 1).

    Adaptation projects that focus on labour market interventions and social assistance would be included in this category. No subcategories were established in relation to this macro project category.

15. **Multisectoral**. Defined as actions that simultaneously address more than one sector in one or multiple locations. It includes efforts that address more than one sector, which are challenging to tease apart, and in the context of this review includes large, multi-

country projects in which the specific sector of focus is nationally determined and, therefore, varies from country to country. No subcategories were established in relation to this macro project category.

16. **Other**. To capture areas of focus not clearly identified in the previous categories.

Annex B: Projects and programs

Projects working to address vulnerability to the impacts of climate change in Uganda are presented alphabetically in the table below.

Name of project	Objectives	Funder(s)	Implementing agencies	Type of project	Sector	Duration	Geographical scale
Adaptation at Scale in Semi-Arid Regions	This project will enable proactive, longer-term approaches to climate change adaptation in semi-arid regions, while supporting the management of current risks. It draws on a number of disciplines to address the complex interactions among climate, biophysical, social, political, and economic dynamics. Research on each of these aspects will be integrated through transformative scenario planning, involving stakeholders throughout. The project will generate credible information that decision-makers and others can use to develop robust adaptation strategies.	DFID, IDRC through the CARIAA program CA$13.5 million	University of East Anglia; International START Secretariat; Oxfam; Indian Institute for Human Settlements; University of Cape Town, South Africa	Research; capacity building; knowledge communication	Multisectoral	2014–2019	Global Botswana, Ethiopia, Ghana, India, Kenya, Mali, Namibia, Niger, South Africa, Uganda
Adaptation to Climate Change in Uganda	The overall objective of the project is to improve livelihoods and food security in rural Uganda. It specifically aims to strengthen the resilience of rural populations and improve agricultural production in districts within the cattle corridor that are particularly vulnerable to climate change. Planned activities focus on strengthening the institutional capacity of the CCD, selected other departments, and districts; increasing livestock access to water sources and strengthening capacity of water user groups; and increasing the resilience	Global Climate Change Alliance €11 million	FAO, MWE, MAAIF	Capacity building; field implementation	Agriculture; freshwater supply; government	July 2012–July 2016	National

	of livestock and coffee production in the cattle corridor.						
AdaptEA: Adaptation of people to climate change in East Africa	The project aims to analyze the potential and effectiveness of ecosystem-based adaptation strategies to address climate challenges in East Africa. Its outcomes are expected to inform rural stakeholders, district resource managers, and national policymakers regarding the sustainability of different local and national adaptation strategies.	The Rockefeller Foundation	World Agroforestry Center, Makerere University, Kenya Forestry Research Institute	Research; knowledge communication	Ecosystem conservation; ecosystem restoration	2011–2015	Regional Kenya, Uganda
Adapting Agricultural Cultivation Methods of the Karimojong to Climate Change in the Karamoja Sub-region	The project aims to improve the livelihoods of the Karimojong, traditionally nomadic pastoralists who have recently become subsistence farmers, by establishing community-based disaster prevention capacities, introducing agro-pastoralist practices adapted to climate change, improving access to water, and supporting sustainable resource management. It is also working to strengthen the capacity of local governments in four southern districts of Karamoja.	German Federal Ministry for Economic Cooperation and Development	Office of the Prime Minister of Uganda	Capacity building; community-based adaptation	Agriculture; disaster risk management	2011–2016	National
Africa Climate Change Resilience Alliance	The project aims to change the decision-making and decision-implementation processes of governments in Ethiopia, Mozambique, and Uganda to better support the resilience of their citizens, and for international and national civil society to implement programs, policies, and processes that increase the adaptive capacity of vulnerable people. The second phase of this project aims to produce solid evidence of how to incorporate	DFID and the Netherlands through the Climate and Development Knowledge Network £240,000	Oxfam Great Britain, Overseas Development Institute, Save the Children International, Care International, World Vision International	Research; capacity building	Government; civil society	October 2012–2016	Regional Ethiopia, Uganda, Mozambique

	adaptive capacity into development programming to improve all types of development interventions and plans. The research looks at, theoretically, what changes are needed in how decisions are made in a changing climate, and, practically, what has been learned through trying to make those changes in local planning processes in Mozambique, Uganda, and Ethiopia.						
Building Resilience to Climate Change in the Water and Sanitation Sector	The project aims to increase the resilience of poor communities in drought- and flood-prone areas of Uganda. Specifically, it aims to build the resilience of communities in the Mount Elgon area to floods through ecosystem-based watershed management, to increase flood resilience of sanitation systems in peri-urban areas, and to increase access to water in drought-prone areas through technologies like rainwater harvesting.	LDCF, African Development Bank US$46.62 million	African Development Bank, CCD	Field implementation	Ecosystem restoration; freshwater supply; watershed management; peri-urban areas	October 2014–unknown	National
Building Resilient Governance, Markets and Social Systems	The aim of the project is to increase the absorptive, adaptive, and transformative capacities of households and communities in northern Kenya and Uganda, better enabling them to cope with shocks and stresses (e.g., aridity, soil erosion, deforestation) that lead to environmental degradation and limit the viability of local livelihoods. The project has three thematic focus areas: improving the management and governance of natural resources by strengthening the role of communities in decision-making; implementing market systems–based	DFID through the Building Resilience and Adaptation to Climate Extremes and Disasters program	Mercy Corps (lead organization) with the Wajir South Development Association, the University of Nairobi, the Uganda Land Alliance, TANGO International, and Makerere University	Capacity building; community-based adaptation	Agriculture; gender; private sector; government	September 2014–March 2018	Regional Kenya, Uganda

	development focused on livestock markets, climate-smart agriculture, and clean energy products; and supporting activities that promote the transformation of gendered paradigms.						
Building the Capacity of Civil Society Organizations in Africa and Asia	The project aims to strengthen the effectiveness of civil society organizations to work with communities to adapt to climate change and ensure food security, to test innovative approaches that improve livelihood opportunities, and to support gender equality. Community-based organizations are often best placed to respond to basic needs and services in marginalized communities.	Canadian Department of Foreign Affairs, Trade and Development; the Aga Khan Foundation Canada through the Partnership for Advancing Human Development in Africa and Asia	Aga Khan Development Network agencies	Capacity building; knowledge communication	Civil society	June 2012–December 2017	Global Bangladesh, India, Pakistan, Tajikistan, Kenya, Tanzania, Uganda, Mali, Egypt, Afghanistan, Kyrgyzstan, Madagascar, Mozambique
Climate for Development in Africa (ClimDev-Africa)	This project aims to increase the climate resilience of Africa's population by addressing the need for improved climate information and strengthening the use of such information for decision-making. ClimDev-Africa is an initiative of the African Union Commission, the United Nations Economic Commission for Africa, and the African Development Bank.	European Union, Finland, Nordic Development Fund, Sweden, UK Aid, USAID €8 million	African Climate Policy Centre	Research; capacity building; knowledge communication	Climate information	January 2012–December 2015	Regional Ethiopia, Kenya, Tanzania, Uganda, Burkina Faso, Ghana, Mali, Senegal, Botswana, Namibia, South Africa, Egypt
Climate Change Adaptation and ICT	The project is assessing the extent to which the capacity of communities to adapt to the impacts of climate change on water resources could be strengthened by implementing an integrated information and communication technology–enabled	IDRC	MWE, FHI 360, Uganda Chartered Healthnet, Makerere University	Research; knowledge communication; policy formation and integration	Freshwater supply; climate information	2012–2017	National

	system that provides communities with access to climate-related information and information about appropriate adaptation mechanisms. Outcomes of the project are expected to inform policy processes regarding the role of information and communication technologies in improving the adaptive capacity Ugandans.						
Climate-Smart Villages	The project aims to sustainably increase productivity and incomes, build resilience to climate change, reduce greenhouse gas emissions, and enhance national food security and development goals. It will do this by establishing climate-smart villages that will act as models of local actions that ensure food security, promote adaptation, and build resilience to climatic stresses. Researchers, local partners, farmers' groups, and policymakers will collaborate to select the most appropriate technological and institutional interventions that support climate-smart agriculture, taking into consideration global knowledge and local conditions.	CGIAR Research Program on Climate Change, Agriculture and Food Security	Led by the International Center for Tropical Agriculture and Earth First	Assessment; capacity building; knowledge communication; and community-based adaptation	Agriculture; climate information	2011–unknown	Global Bangladesh, India, Nepal, Ethiopia, Kenya, Tanzania, Uganda, Burkina Faso, Ghana, Colombia, Guatemala, Honduras, Nicaragua, Vietnam, Laos, Cambodia
Economic Assessment of the Impacts of Climate Change in Uganda	The project is developing an economic model, disaggregated at the national, sectoral, and district levels, to assess the economic impact of climate change on climate-sensitive sectors and areas of the economy. Outcomes of the project are expected to inform investment decisions as the GOU implements the country's NCCP, helping to direct budgetary allocations to districts and sectors at greater risk. It will also raise	DFID and the Netherlands through the Climate and Development Knowledge Network £350,000	Baastel (lead organization) with Makerere University, Metroeconomica, the Centre for International Development and Training, and the University of Wolverhampton	Research; knowledge communication; policy formation and integration	Government	December 2013–June 2015	National

	awareness among decision-makers regarding the economic case for investment in climate-compatible development.						
Enhancing Adaptation to Climate Smart Agriculture Practices in the Farming Systems of Uganda	The project aims to scale up sustainable land management practices to increase the productivity of the land in five target districts in eastern Uganda. It will increase the number of farmers using climate-smart agricultural practices, build the capacities of farmers and local extension officers, and improve the economic sustainability of farmers though better input supply and product markets. The outcome is expected to be a more resilient society.	European Union, DFID, Government of Norway US$740,000	UNDP (lead organization) with MAAIF; the National Agricultural Research Organisation; MWE; the Ministry of Trade, Industry and Cooperatives; and participating district local governments	Capacity building; community-based adaptation	Agriculture	June 2014–December 2015	National
Enhancing Resilience in Karamoja Uganda	The project aims to increase the resilience of communities in semi-arid Karamoja, in northeastern Uganda, to extreme climate and weather events. It will work to improve food security through livelihood diversification and intensifying production, improve basic social services, establish predictable safety nets, and support strong disaster risk management.	UK Aid £25,627,578	FAO, United Nations World Food Programme	Capacity building; field implementation	Agriculture; pastoralism; disaster risk management; social protection	October 2013–March 2017	National
Global Ecosystems Based Adaptation in Mountains Programme	The objective of this program is to strengthen the capacities of local communities and governments to reduce their vulnerability to climate change through the use of ecosystem-based adaptation measures in fragile mountain ecosystems. In Uganda, the project is focused on the Mount Elgon ecosystems, while in Nepal it is active in Panchase. The project is testing ecosystem-based adaptation methods and tools, monitoring and evaluating	German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety €11.5 million	UNDP, UNEP, International Union for Conservation of Nature In Uganda: MWE	Research; assessment; capacity building	Ecosystem conservation; ecosystem restoration; government	2011–2015	Global Nepal, Uganda, Peru

	ecosystem resilience, and enhancing the knowledge and capacities of involved stakeholders.						
Joint Water and Environment Sector Support Programme	The objective of the project is to help the water and environment sector achieve its MDG and NDP targets and improve its efficiency through a consistent, harmonized support program that is aligned to government objectives, policies, and delivery modalities. Specifically, the project focuses on support for rural water provision and sanitation through the local governments in all of Uganda's districts. The program has eight components, one of which focuses on weather, climate, and climate change. Its planned outcomes include increasing institutional capacities for climate change management and establishing a knowledge base on climate change adaptation.	Governments of Denmark, Austria, and Germany; European Union; African Development Bank; FAO US$45.1 million	MWE	Capacity building; knowledge communication; policy formation and integration; field implementation	Watershed management; freshwater supply; climate information; government	2013–2018	National
Northern Uganda: Transforming the Economy through Climate Smart Agribusiness	The project aims to increase the climate resilience and incomes of poor, smallholder farmers and agricultural labourers in northern Uganda. It will achieve this goal by working with agriculture businesses to supply farmers with better, less expensive, and more varied agricultural inputs and services. It will also work to strengthen markets.	UK Aid £43.2 million	Unknown	Capacity building; community-based adaptation	Agriculture; private sector	November 2014–March 2022	National
Partners for Resilience	The project aims to increase citizens' resilience against natural disasters, climate change, and the deterioration of ecosystems through various intervention strategies: stimulating sustainable economic developments; strengthening the capacity of local	Government of the Netherlands €40 Million	Netherlands Red Cross (secretary), Red Cross/Red Crescent Climate Centre, CARE Netherlands, Cordaid, Wetlands	Capacity building; knowledge communication; policy formation and integration; field	Agriculture; freshwater supply; disaster risk management; government; civil society;	2011–2015	Global India, Ethiopia, Kenya, Uganda, Mali, Guatemala,

	organizations and authorities by creating a risk assessment framework, natural disaster risk management plans, and warning systems, among other things; and promoting advocacy and stimulating knowledge sharing between governments, civil society, knowledge institutes, and the private sector in the fields of natural disaster reduction and climate adaptation.		International	implementation	social protection		Nicaragua, Indonesia, the Philippines
Planning for Resilience in East Africa through Policy, Adaptation, Research and Economic Development	This project aims to mainstream climate-resilient development planning and programming into the development agendas of the East African Community and its partner states. The program addresses three key development challenges of the East African Community: (1) increasing resiliency to climate change; (2) managing transboundary freshwater biodiversity conservation; and (3) improving access to drinking water supply and sanitation services. This will be done by strengthening regional climate change policy; accessing global climate change adaptation funds by accrediting the secretariat as a regional implementing agency; managing East Africa's biologically significant transboundary freshwater ecosystems; and facilitating sustainable water supply, sanitation, and wastewater treatment services in the Lake Victoria Basin.	USAID East Africa US$40 million	East African Community Secretariat's Climate Change Coordination Unit, Lake Victoria Basin Commission, the Intergovernmental Authority on Development's Climate Prediction and Applications Centre, Regional Center for Mapping of Resources for Development, East African Community Partner States, Tetra Tech ARD	Capacity building; knowledge communication; policy formation and integration	Ecosystem conservation; freshwater supply; human health	2012–2016	Regional Kenya, Tanzania, Uganda, Burundi, Rwanda
Private Sector Investment in a Changing Climate: Resilient rice value chain development	The project is exploring the role of domestic private sector investments in building the resilience of agricultural value change. The study focuses on understanding options	IDRC	International Institute for Sustainable Development	Research; capacity building	Agriculture; private sector	January 2014–June 2016	Uganda

in Uganda	along rice value chains in Uganda. Outcomes are expected to include identification of policy options for encouraging climate risk management activities by small and medium-sized enterprises, such as seed companies, and domestic commercial banks.						
Reducing Vulnerability of Banana Producing Communities to Climate Change through Banana Value Added Activities: Enhancing food security and employment generation	To support vulnerable communities in western Uganda to better adapt to the effects of climate change by supporting banana value addition activities that will lead to income generation, poverty reduction, and food security. Planned activities include mainstreaming climate change adaptation into national agriculture-focused policy documents, sensitizing farmers to strategies that build climate resilience, diversifying incomes away from banana production, improving production practices, and disseminating information.	LDCF, United Nations Industrial Development Organization, Government of Uganda, Agro Genetic Technologies Ltd. US$10,657,533	United Nations Industrial Development Organization with the MAAIF and the Ministry of Trade, Industry and Cooperatives	Capacity building; community-based adaptation; policy formation and implementation	Agriculture	September 2015–unknown	National
Reform of the Urban Water and Sanitation Sector	The project aims to reform the water sector so as to improve the preconditions for pro-poor, sustainably performing provision of urban water and sanitation in Uganda. It focuses on the provision of sanitation services, wastewater management, water resources management, and climate adaptation.	German Federal Ministry for Economic Cooperation and Development	MWE in partnership with the National Water and Sewerage Corporation and KCCA	Capacity building; knowledge communication; policy formation and integration; field implementation	Freshwater supply; urban areas; government	2014–2017	National
Regional Capacity Building for Sustainable Natural Resource Management and Agricultural Productivity under a Changing Climate	The project's overall goal is to strengthen the human and institutional capacities of southern institutions to better respond to climate change for improved agricultural productivity and livelihoods. Its objectives are to review and strengthen academic	Norwegian Agency for Development Cooperation through the Norwegian Programme for Capacity	Makerere University, University of Juba (South Sudan), Addis Ababa University (Ethiopia), Norwegian	Research; capacity building	Agriculture; post-secondary education	2013–2018	Regional Ethiopia, Uganda, South Sudan

	programs with respect to climate change and natural resource management in the three partner institutions in the south; to strengthen research capacities in climate change and natural resource management; to generate knowledge of and technologies for development and policy formulation; to improve educational and research management capacity at the doctoral and post-doctoral levels to strengthen research and teaching infrastructure, specifically for the University of Juba; and to strengthen north–south and south–south linkages through staff exchange, joint collaborative research, and outreach activities.	Development in Higher Education and Research for Development 18 million kr	University of Life Sciences				
Strengthening Climate Information and Early Warning Systems in Africa to Support Climate Resilient Development and Adaptation to Climate Change	The project aims "[t]o strengthen the weather, climate and hydrological monitoring capabilities, early warning systems and available information for responding to extreme weather and planning adaptation to climate change in Uganda" (Global Environment Facility, n.d.-b). This will be achieved through the transfer of technologies for climate and environmental monitoring, and the integration of climate information into development plans and early-warning systems.	LDCF, GOU, Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH, Joint Water and Environment Sector Support Programme, World Bank, Agency for Technical Cooperation and Development, UNDP US$27.764 million	UNDP; MWE Department of Meteorology; Department of Disaster Preparedness and Management, Office of the Prime Minister	Capacity building; field implementation ; policy formation and integration	Disaster risk management; climate information	September 2013–2017	National

8. References

AfricaAdapt. (n.d). About AfricaAdapt [Web page]. Retrieved from http://www.africa-adapt.net/en-us/about/

African Development Bank. (2015). Uganda. Retrieved from http://www.afdb.org/en/countries/east-africa/uganda/

African Development Bank. (2016, January 18). Uganda awarded grant to prepare transformational strategic program for climate resilience [News release]. Retrieved from http://www.afdb.org/en/news-and-events/article/uganda-awarded-grant-to-prepare-transformational-strategic-program-for-climate-resilience-15298/

African Development Bank & World Bank. (2015). Pilot program for climate resilience and forest investment program: Scoping mission October aide memoire. Retrieved from https://www-cif.climateinvestmentfunds.org/sites/default/files/meeting-documents/uganda_-_joint_fip_and_ppcr_technical_mission_-october_19-232015_-aide_memoire.pdf

Agaba, V., & Nassuna, E. (2015, March 28). Uganda launches work plan on climate change deal. New Vision. Retrieved from http://www.newvision.co.ug/news/666393-uganda-launches-work-plan-on-climate-change-deal.html

Building Resilience and Adaptation to Climate Extremes and Disasters. (n.d.). PROGRESS: Building resilient governance, markets and social systems. Retrieved from http://www.braced.org/about/about-the-projects/project/?id=b34bef40-1170-4503-b51b-1bb2c1fd179d

Butaleja District Local Government. (2009). District environment policy. Retrieved from http://www.nemaug.org/district_policies/Butaleja_District_Environment_Policy.pdf

Caffrey, P., Finan, T., Trzaska, S., Miller, D., Laker-Ojok, R., & Huston, S. (2013). Uganda climate change vulnerability assessment report. Retrieved from https://www.climatelinks.org/resources/uganda-climate-change-vulnerability-assessment-report

Climate Change, Agriculture and Food Security. (2015). Climate-smart villages. Retrieved from https://ccafs.cgiar.org/climate-smart-villages#.VZ7OYvlVikq

Christensen, J.H., Krishna Kumar, K., Aldrian, E., An, S.-I., Cavalcanti, I.F.A., de Castro, M., … Zhou, T. (2013). Climate phenomena and their relevance for future regional climate change. In T.F. Stocker, D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, … P.M. Midgley (Eds.), Climate change 2013: The physical science basis. Working group I contribution to the fifth

assessment report of the Intergovernmental Panel on Climate Change. Cambridge, UK: Cambridge University Press.

Climate Change Department (CCD). (n.d.-a). Actors landscape. Retrieved from http://www.ccu.go.ug/index.php/resources-publications/2014-08-13-12-58-23

Climate Change Department (CCD). (n.d.-b). CHAI climate change adaptation and ICT. Retrieved from http://www.ccu.go.ug/index.php/projects/chai

Climate Change Department (CCD). (2015). Section adaptation [Web page]. Retrieved from http://www.ccu.go.ug/index.php/adaptation/49-section-adaptation

Climate System Analysis Group. (2015). ASSAR: Adaptation at scale in semi-arid regions. Retrieved from http://www.csag.uct.ac.za/assar-adaptation-at-scale-in-semi-arid-regions/

Danish International Development Assistance. (2013). Danish support for water and sanitation in Uganda (2013–2018). Retrieved from http://uganda.um.dk/en/danida-en/water-and-sanitation/

Dekens, J., Dion, J., Kutegeka, S., Nyombi, K., Nakangu, B., Bagyenda, R., … McCandless, M. (2013). Climate risk management for sustainable crop production in Uganda: Rakai and Kapchorwa Districts. New York, NY: United Nations Development Programme (UNDP), Bureau for Crisis Prevention and Recovery. Retrieved from http://www.iisd.org/pdf/2013/crm_uganda.pdf

Department for International Development (DFID). (n.d.). Enhancing resilience in Karamoja Uganda. Retrieved from http://devtracker.dfid.gov.uk/projects/GB-1-203603/

Department for International Development (DFID). (2006). Social protection in poor countries. Social protection briefing note series, number 1. Retrieved from GSDRC website: http://www.gsdrc.org/docs/open/SP17.pdf

Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH. (2015). Adapting agricultural cultivation methods of the Karimojong to climate change in the Karamoja sub-region. Retrieved from http://www.giz.de/en/worldwide/19253.html

Drunet, N. (2014, October). Supporting low carbon and climate resilient development strategy — Regional project: Ugandan component. PowerPoint presentation made at the Second Round-Table on Climate Resilience in East Africa, Kampala, Uganda. Retrieved from http://www.ambafrance-ug.org/IMG/pdf/2._presentation_-_adetef-kcca_rev_nicolas.pdf

Few, R., Satyal, P., McGahey, D., Leavy, J., Budds, J., Assen, M., … Bewket, W. (2015). Vulnerability and adaptation to climate change in semi-arid regions of East Africa [ASSAR working paper]. Retrieved from http://www.assar.uct.ac.za/sites/default/files/image_tool/images/138/RDS_reports/EAST-AFRICA/East%20Africa%20RDS%20full%20report%20-%20revised.pdf

Food and Agriculture Organization of the United Nations (FAO). (n.d.). Integrating agriculture in national adaptation plans (NAP-Ag): Uganda. Retrieved from http://www.fao.org/in-action/naps/partner-countries/uganda/en/

Fund for Peace (FFP). (2014). Fragile states index 2014. Retrieved from http://fsi.fundforpeace.org/rankings-2014

Funk, C., Rowland, J., Eilerts, G., & White, L. (2012). A climate trend analysis of Uganda. Retrieved from https://pubs.usgs.gov/fs/2012/3062/FS2012-3062.pdf

Global Climate Change Alliance. (2012). Adaptation to climate change in Uganda. Retrieved from http://www.gcca.eu/national-programmes/africa/gcca-uganda

Global Environment Facility. (n.d.-a). Reducing vulnerability of banana producing communities to climate change through banana value added activities — Enhancing food security and employment generation. Retrieved from https://www.thegef.org/gef/project_detail?projID=5603

Global Environment Facility. (n.d.-b). Strengthening climate information and early warning systems in Africa to support climate resilient development and adaptation to climate change [Web page]. Retrieved from https://www.thegef.org/project/strengthening-climate-information-and-early-warning-systems-africa-support-climate-resilient

Government of Canada. (2014, February 28). Partnership for advancing human development in Africa and Asia [News release backgrounder]. Retrieved from http://news.gc.ca/web/article-en.do?nid=820639

Government of Uganda (GOU). (2007). Climate change: Uganda national adaptation programmes of action. Retrieved from http://unfccc.int/resource/docs/napa/uga01.pdf

Government of Uganda (GOU). (2010). National development plan (2010/11–2014/15). Retrieved from http://www.usaid.gov/sites/default/files/documents/1860/National_Development_Plan_2010_11-2014_15.pdf

Government of Uganda (GOU). (2011). The national policy for disaster preparedness and management. Retrieved from http://www.ug.undp.org/content/dam/uganda/docs/UNDPUg2014-National%20Disaster%20Policy%20Nov%202013_FINAL.pdf

Government of Uganda (GOU). (2013). Uganda vision 2040. Kampala: Government of Uganda. Retrieved from http://npa.ug/uganda-vision-2040/

Government of Uganda (GOU). (2015). Second national development plan (NDPII) 2015/16–2019/20. Retrieved from http://npa.ug/wp-content/uploads/NDPII-Final.pdf

Higgins, K. (2009). Regional inequality and primary education in northern Uganda [Briefing paper]. London: Overseas Development Institute. Retrieved from https://www.odi.org/publications/2504-regional-inequality-primary-education-northern-uganda

Hepworth, N. (2010). Climate change vulnerability and adaptation preparedness in Uganda. Nairobi, Kenya: Heinrich Böll Stiftung. Retrieved from https://www.boell.de/sites/default/files/assets/boell.de/images/download_de/worldwide/Uganda_Climate_Change_Adaptation_Preparedness.pdf

Hove, H., Echeverría, D., & Parry, J. (2011). Review of current and planned adaptation action: East Africa. Retrieved from https://www.iisd.org/pdf/2011/East_Africa_Adaptation_Action.pdf

Intergovernmental Panel on Climate Change (IPCC). (2001). Annex B. Glossary of terms. In Climate change 2001: Impacts, adaptation and vulnerability. Retrieved from http://www.ipcc.ch/pdf/glossary/tar-ipcc-terms-en.pdf

Isabirye, P. (2014, April). Session 6: Element D: Reporting, monitoring and review — Experience and lessons learnt from the NAPA and the NDP process of the Republic of Uganda. PowerPoint presentation made at the NAP-GSP Africa Regional Training Workshop, Addis Ababa, Ethiopia. Retrieved from http://www.undp-alm.org/projects/uganda-nap-process

Kampala Capital City Authority (KCCA). (2015). Kampala climate change action: Energy and climate profile. Retrieved from http://www.kcca.go.ug/uDocs/Energy%20and%20Climate%20Profile.pdf

Maikut, C. (n.d.). National climate change policy — Overview [PowerPoint slides]. Retrieved from http://news.mak.ac.ug/sites/default/files/downloads/Maikut_IPCC_AR5_Climate%20Change%20Policy.pdf

Maikut, C. (2014, April). Status of climate change policy development, implementation, NAPA and NAMA in Uganda. PowerPoint presentation made at the Uganda NAPA stakeholder consultation meeting, Kampala, Uganda. Retrieved from http://www.slideshare.net/cgiarclimate/mc-presentation-ccafs29-april-2014

Masindi District Local Government. (2009). District environment policy. Retrieved from http://www.nemaug.org/district_policies/Masindi_District_Env_Policy.pdf

McSweeney, C., New, M., & Lizcano, G. (2010). Uganda. UNDP climate change country profiles series. Retrieved from http://www.geog.ox.ac.uk/research/climate/projects/undp-cp/index.html?country=Uganda&d1=Reports

Ministry of Agriculture, Animal Industry and Fisheries (MAAIF). (2010). Agriculture for food and income security: Agriculture sector development strategy and investment plan 2010/11–2014/15. Retrieved from http://agriculture.go.ug/userfiles/Agricultural%20Sector%20Development%20Strategy%20and%20Investment%20Plan(2).pdf

Ministry of Finance, Planning and Economic Development. (2013). Millennium development goals report for Uganda 2013. Kampala: Government of Uganda. Retrieved from http://www.ug.undp.org/content/uganda/en/home/library/human_development/UgandaMDGProgressReport2013.html

Ministry of Health. (2010a). Health sector strategic plan III 2010/11–2014/15. Retrieved from http://www.health.go.ug/docs/HSSP_III_2010.pdf

Ministry of Health. (2010b). The second national health policy. Retrieved from http://apps.who.int/medicinedocs/documents/s18426en/s18426en.pdf

Ministry of Health. (2011). Health sector quality improvement framework and strategic plan 2010/11–2014/15. Retrieved from http://health.go.ug/docs/HSQIFS.pdf

Ministry of Water and Environment (MWE). (2009). Strategic sector investment plan for the water and sanitation sector in Uganda. Retrieved from http://www.mwe.go.ug/index.php?option=com_docman&task=doc_download&gid=151&Itemid=223

Ministry of Water and Environment (MWE). (2013). The national forest plan 2011/12–2021/22. Retrieved from http://www.mwe.go.ug/index.php?option=com_docman&task=doc_download&gid=537&Itemid=223

Ministry of Water and Environment (MWE). (2014). Uganda second national communication to the United Nations Framework Convention on Climate Change. Retrieved from http://www.ccu.go.ug/index.php/resources-publications-2/132-second-national-communication-snc

Ministry of Water and Environment (MWE). (2015a). Uganda national climate change policy. Retrieved from http://ccd.go.ug/images/Publications/Final%20Uganda%20National%20Climate%20Change%20Policy%20April%202015%20final.pdf

Ministry of Water and Environment (MWE). (2015b). Uganda's intended nationally determined contribution (INDC). Retrieved from http://www4.unfccc.int/Submissions/INDC/Published%20Documents/Uganda/1/INDC%20Uganda%20final%20%2014%20October%20%202015,%20minor%20correction,28.10.15.pdf

Ministry of Water, Lands and Environment. (1999). A national water policy. Retrieved from http://library.health.go.ug/publications/leadership-and-governance-governance/policy-documents/national-water-policy

Mwebaze, S.M.N. (n.d.). Uganda. Country pasture/forage resources profiles series. Rome, Italy: Food and Agriculture Organization of the United Nations. Retrieved from http://www.fao.org/ag/agp/agpc/doc/counprof/PDF%20files/Uganda_English.pdf

Mwebembezi, L. (n.d.). Status of catchment based water resources management in Uganda [PowerPoint slides]. Retrieved from https://cmsdata.iucn.org/downloads/status_of_catchment_based_iwrm_in_uganda_.pdf

Nakasongola District Council. (2009). District environment policy. Retrieved from http://www.nemaug.org/district_policies/Nakasongola_Dist_Env_Policy.pdf

National Environment Management Authority. (2003). Guidelines for district state of environment report (DSOER) preparation in Uganda. Retrieved from http://www.nemaug.org/district_reports/Guidelines_for_DSOER.pdf

National Environment Management Authority. (2010). State of environment report for Uganda 2010. Kampala: National Environment Management Authority. Retrieved from http://www.nemaug.org/reports/national_state_report_2010.pdf

Nations Online Project. (n.d.). Political Map of Uganda. Retrieved from http://www.nationsonline.org/oneworld/map/uganda-map.htm

Norwegian Agency for Development Cooperation. (2015). Regional capacity building for sustainable natural resource management and agricultural productivity under changing climate. Retrieved from http://www.norad.no/en/front/funding/norhed/projects/regional-capacity-building-for-sustainable-natural-resource-management-and-agricultural-productivity-under-changing-climate/

Notre Dame Global Adaptation Index (ND-GAIN). (2015). Uganda. Retrieved from http://index.gain.org/country/uganda

Nyangoma, B. (2015, April 30). Uganda to improve climate resilience in Elgon region. Uganda Radio Network. Retrieved from http://ugandaradionetwork.com/story/uganda-to-improve-climate-resilience-in-elgon-region#ixzz3fWBOrcAC

Oxfam. (2015). Africa climate change resilience alliance. Retrieved from http://policy-practice.oxfam.org.uk/our-work/climate-change-drr/accra

PanAfrican Climate Justice Alliance. (n.d.). About us [Web page]. Retrieved from http://www.pacja.org/index.php/en/about-us

Partners for Resilience. (2015). Partners for resilience — Uganda. Retrieved from http://www.partnersforresilience.nl/countries/uganda

Transparency International. (2014). Corruption perceptions index 2014: Results. Retrieved from http://www.transparency.org/cpi2014/results

Tumushabe, G., Muhumuza, T., Natamba, E., Bird, N., Welham, B., & Jones, L. (2013). Uganda national climate change finance analysis. Retrieved from http://www.odi.org/sites/odi.org.uk/files/odi-assets/publications-opinion-files/8622.pdf

United Nations Development Programme (UNDP). (n.d.). Supporting Uganda to advance their NAP process. Retrieved from http://adaptation-undp.org/projects/uganda-nap-process

United Nations Development Programme (UNDP). (2013a). Improving policies and strategies for sustainable environment, natural resources and climate risk management project. Retrieved from http://www.ug.undp.org/content/uganda/en/home/operations/projects/SustainableInclusiveEconomicDevelopmentProgramme/improving-policies-and-strategies-for-sustainable-environment--n.html

United Nations Development Programme (UNDP). (2013b). Ecosystem based adaptation in mountain ecosystems. Retrieved from http://www.unep.org/climatechange/adaptation/EbA/EcosystemBasedAdaptationinMountainEcosystems/tabid/51980/Default.aspx

United Nations Development Programme (UNDP). (2014). Human development report 2014: Sustaining human progress: Reducing vulnerabilities and building resilience. Retrieved from http://hdr.undp.org/en/content/human-development-report-2014

United Nations Entity for Gender Equality and the Empowerment of Women. (n.d.). Gender mainstreaming: Concepts and definitions. Retrieved from http://www.un.org/womenwatch/osagi/conceptsandefinitions.htm

United Nations Environment Programme (UNEP). (2007). Glossary. In Global environment outlook 4. Retrieved from http://www.unep.org/geo/geo4/report/Glossary.pdf

United Nations Institute for Training and Research. (2013, June 28). Minister of Water and Environment launches national climate change learning strategy of Uganda [Press release]. Retrieved from http://www.unitar.org/minister-water-and-environment-launches-national-climate-change-learning-strategy-uganda

United Nations International Strategy for Disaster Reduction (UNISDR). (2009). 2009 UNISDR terminology on disaster risk reduction. Retrieved from http://unisdr.org/files/7817_UNISDRTerminologyEnglish.pdf

United States Agency for International Development (USAID). (2013). Environment & climate change. Retrieved from http://www.usaid.gov/documents/1860/support-planning-resilience-east-africa-through-policy-adaptation-research-and

World Bank. (2014). The little green data book 2014. Washington, DC: World Bank. Retrieved from http://documents.worldbank.org/curated/en/806881468340846245/The-little-green-data-book-2014

World Bank. (2015). Indicators [Databank]. Retrieved from http://data.worldbank.org/indicator

World Health Organization (WHO). (n.d.). Frequently asked questions. Retrieved from http://www.who.int/suggestions/faq/en/index.html

IDRC | CRDI

International Development Research Centre
Centre de recherches pour le développement international

Canada

IISD
International Institute for Sustainable Development