

# UGANDA

## TECHNICAL NOTE ON ADVANCING THE NATIONAL ADAPTATION PLAN PROCESS.

May 2016

Citation: **EMLI** (2016). UGANDA – Technical Note on Advancing the National Adaptation Plan Process. Environmental Management for Livelihood Improvement Bwaise Facility. Kampala, Uganda.

This publication may be reproduced in whole or in part and in any form for educational or non-profit services without special permission from the copyright holder, provided acknowledgement of the source is made.

The views in this publication do not imply the expression of any opinion whatsoever on the part of Australian Aid, Action Aid Uganda and EMLI.

EMLI Bwaise Facility  
Plot 1725 bwaise-nabweru road  
Kampala - Uganda  
Tel: 0414 692 153  
Email: emli.uganda@gmail.com

[www.bwaisefacility.org](http://www.bwaisefacility.org)



## ACRONYMS

CAADP	Comprehensive Africa Agriculture Development Programme
CAF	Cancun Adaptation Framework
CBA	Cost Benefit Analysis
CC	Climate Change
CCAFS	Climate Change, Agriculture and Food Security
CCD	Climate Change Department
CEA	Cost Effectiveness Analysis
CHAI	Climate Change Information and Communications Technology
COP	Conference of Parties
CSAP	Climate Smart Agriculture Program
DSIP	Development Strategy and Investment Plan
EMLI	Environmental Management for Livelihood Improvement Bwaise Facility
FAO	Food and Agricultural Organization
GDP	Gross Domestic Product
ICTs	Information and Communication Technologies
INDC	Intended Nationally Determined Contribution
IPCC	Inter-governmental Panel on Climate Change
LDCs	Least Developed Countries
LEG	Least Developed Countries Expert Group
LGs	Local Governments
M&E	Monitoring and Evaluation
MAAIF	Ministry of Agriculture, Animal Industry and Fisheries
MCA	Multi-Criteria Analysis
MDAs	Ministries, Departments and Agencies
MDGs	Millennium Development Goals
MEAs	Multilateral Environmental Agreements
MEMD	Ministry of Energy and Mineral Development
MoES	Ministry of Education and Sports
MoH	Ministry of Health
MoLG	Ministry of Local Government
MoLHUD	Ministry of Lands, Housing and Urban Development
MoTIC	Ministry of Trade, Industry and Cooperatives
MWE	Ministry of Water and Environment
NAADS	National Agriculture Advisory Services
NAC	National Adaptive Capacity
NAPA	National Adaptation Programme of Action
NAPs	National Adaptation Plans
NARO	National Agricultural Research Organization
NCCP	National Climate Change Policy
NDP	National Development Plan
NEMA	National Environment Management Authority
NGOs	Non-governmental Organizations
OPM	Office of the Prime Minister
RMI	Relative Malaria Incidence
SIP	Strategy and Investment Plan
SNC	Second National Communication
UN	United Nations

UNDP	United Nations Development Program
UNFCCC	United Nations Framework Convention on Climate Change
UNMA	Uganda National Meteorological Authority
USAID	United States Agency for International Development
USD	United States Dollar
WRI	World Resources Institute

## **Abstract**

Adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities also known as adaptation is becoming a necessary strategy at all levels. This is so because adaptation can improve well-being outcomes while at the same time reduce vulnerability to future impacts by increasing the ability of actors to withstand change and cope with adverse effects associated with climate change.

Uganda is vulnerable to climate change due to the fact that her current development gains are hugely dependent on natural resources e.g. primary sectors such as agriculture, water and energy and yet such sectors are highly vulnerable to impacts of climate change. The recent concluded study on the economic assessment of the impacts of climate change indicated that without proper adjustments in adaptation efforts, climate change is likely to increase overall losses for food crops by 2050 to approx. USD1.5 billion.

In light of the above, Uganda is undertaking the process to formulate and implement National Adaptation Plans (NAPs) with the overarching objective of reducing vulnerability, increasing resilience and facilitating the integration of climate change adaptation in development planning processes and strategies. However, such a process should be built around certain principles that provide a basis from which integrated actions to adapt to climate change is accentuated.

In this context, this technical note communicates to adaptation actors and guides on the options and/or steps for dealing with some of the elements of the national adaptation plan process in line with the least developed countries expert group technical guidelines for the national adaptation plan process (2012) while describing an appropriate approach based on Uganda's national circumstances.

The note concludes that ecosystems including humans especially women, children and the elderly are the most at risk. The note observes that temporal and spatial variations in climate have a direct influence on the variability of available soil moisture which in turn affects plant growth and crop productivity consequently affecting soil potential to sequester carbon and retain water.

Further it highlights adaptation measures in the vulnerable sectors and recommends that decision making with regard to the prioritization of adaptation options be based on multi-criteria analysis (incorporating cost, effectiveness and expert judgment).

With regard to stakeholder engagement, the model involving 9 major groups and stakeholders such as academia, think tanks, and faith based communities should be followed while ensuring open and transparent procedures during consultations and engagement.

Moving forward to reduce vulnerability, enhance adaptive capacity and strengthen resilience, Uganda should undertake low-regret adaptation options in the medium term and no-regret options in the long term which will provide adaptation benefits in a broad range.

It is imperative to develop an overall national adaptation framework to guide the formulation of sectoral adaptation plans.

## 1.0 Introduction

Many reasons have been advanced to explain the vulnerability of systems and communities to climatic shocks ranging from socio-economic, institutional, and environment-related factors. Developing countries and Least Developed Countries in particular, are most vulnerable to climate change mainly due to heavy reliance on climate-sensitive sectors like agriculture. The situation is exacerbated by limited adaptive/coping abilities, as well as absence of viable institutional frameworks to spur action in terms of identifying effective adaptive responses.

One of the expected results of climate change is increasing climatic variability whereby; even if mean rainfall is not projected to change; there is a likelihood of significant drought occurrences and more significant extreme precipitation events<sup>1</sup>. These changes, coupled with pressure from, *inter alia*: invasive species, crop pests and diseases, are expected to increase threats to food security through post-harvest losses; making most low-income countries like Uganda to face a decline in economic growth due to heavy dependence on agriculture for socio-economic development<sup>2</sup>.

However, countries most at risk of climate change have devised mechanisms to enhance the resilience of communities and ecosystems to climate risks. For instance, LDCs developed the NAPA to respond to the most urgent and immediate adaptation needs. Indeed, the NAPAs have in most LDCs raised awareness on climate change and imparted hands-on experience in implementing concrete adaptation projects on the ground, and at the same time increased collective knowledge on adaptation to climate change at the national, regional and international levels. Similarly, the NAPA process was a good exercise for LDCs to understand the issues connected to vulnerability, bridge institutional barriers, identify immediate and urgent adaptation needs at different levels and serve as a starting point for further elaboration of adaptation needs and plans. Being action or project-oriented, NAPAs have created the base for some countries to move to more sophisticated, long-term strategic responses on adaptation as evidenced in Bangladesh and Ghana<sup>3</sup>.

On the downside however, the NAPA approach was often regarded and designed as a "one shot option", which did not intend to create an iterative process, establish national planning cycles on adaptation, or integration into other strategic plans or planning processes like in national budget cycles and policies. It also rarely included systematic and targeted support of institution building and development, therefore not

---

<sup>1</sup> IAASTD, 2009; Vermeulen et al. 2012.

<sup>2</sup> IPCC, 2012

<sup>3</sup> Klein et al., 2007.

always meeting institutional sustainability criteria. In Uganda, even though noticeable progress has been made in undertaking various adaptation measures at different scales, a lot of challenges particularly regarding inadequate financing and limited technical capacity still exist.

Cognizant of the fact that Uganda's urgent and immediate adaptation needs are dynamic and change with location and time<sup>4</sup>, rigorous and pragmatic approaches to build on existing programmes and activities are very critical.

In this regard, this technical note has generated knowledge on NAP preparation phase (element A: *Laying the ground work and addressing gaps* and element B: *Preparatory elements*)<sup>5</sup>, including documenting best practices and lessons learned on NAP preparation elsewhere, so as to assist Uganda in advancing her NAP process which will, *inter alia*: provide updates to capture new and emerging climatic shocks, consolidate adaptation interventions to create synergies, increase impact, and guard the country against future climate vulnerabilities and extreme shocks.

The UNFCCC in its COP Decision 5/CP.17<sup>6</sup>, acknowledged that adaptation planning can enable all developing countries and LDCs to assess their vulnerability, mainstream climate change risks and address adaptation. The decision also recognized the need to address adaptation planning in the broader context of sustainable development planning, bearing in mind that climate change risks magnify development challenges for least developed countries. The objectives of the NAP process are:

- a) To reduce vulnerability to the impacts of climate change, by building adaptive capacity and resilience;
- b) To facilitate the integration of climate change adaptation, in a coherent manner, into relevant new and existing policies, programmes and activities, in particular development planning processes and strategies, within all relevant sectors and at different levels, as appropriate.

A set of guiding principles have been designed to help facilitate enhanced action on adaptation. The principles state that enhanced action on adaptation should:

- Be undertaken in accordance with the convention (UNFCCC);
- Follow country-driven, gender-sensitive, participatory and fully-transparent approach, taking into consideration vulnerable groups, communities and ecosystems;
- Be based on and guided by the best available science and, as appropriate, traditional and indigenous knowledge, and by gender-sensitive approaches, with a view to integrating adaptation into relevant social, economic and environmental policies and actions, where appropriate;

---

<sup>4</sup> EMLI, 2015.

<sup>5</sup> See LEG Technical guidelines for the National Adaptation Plan process (2012)

<sup>6</sup> UNFCCC Decision 5/CP.17, paragraph 1

- Not be prescriptive, nor result in the duplication of efforts undertaken in-country, but facilitate country-owned and country-driven action.

For some countries, NAPs may not represent a significant shift from current practice, but for the majority of the countries, NAPs might provide important means of focusing climate change adaptation planning and response measures. Countries are increasingly responding to current and projected climate change impacts by developing national adaptation strategies and plans. These strategies set out overarching government approaches to adaptation (often as part of national climate change policies), while adaptation plans go further by setting out concrete adaptation plans, such as sectoral adaptation policies, adaptation projects and programmes and specific measures to address identified vulnerabilities<sup>7</sup>. Interestingly, the LEG Technical Guidelines have helped to frame the process to formulate and implement NAPs basing on four elements.

<b>TABLE 1. STEPS UNDER EACH OF THE ELEMENTS OF THE FORMULATION OF NATIONAL ADAPTATION PLANS, WHICH MAY BE UNDERTAKEN AS APPROPRIATE<sup>3</sup></b>	
<b>ELEMENT A. LAY THE GROUNDWORK AND ADDRESS GAPS</b>	
1.	Initiating and launching of the NAP process
2.	Stocktaking: identifying available information on climate change impacts, vulnerability and adaptation and assessing gaps and needs of the enabling environment for the NAP process
3.	Addressing capacity gaps and weaknesses in undertaking the NAP process
4.	Comprehensively and iteratively assessing development needs and climate vulnerabilities
<b>ELEMENT B. PREPARATORY ELEMENTS</b>	
1.	Analysing current climate and future climate change scenarios
2.	Assessing climate vulnerabilities and identifying adaptation options at the sector, subnational, national and other appropriate levels
3.	Reviewing and appraising adaptation options
4.	Compiling and communicating national adaptation plans
5.	Integrating climate change adaptation into national and subnational development and sectoral planning
<b>ELEMENT C. IMPLEMENTATION STRATEGIES</b>	
1.	Prioritizing climate change adaptation in national planning
2.	Developing a (long-term) national adaptation implementation strategy
3.	Enhancing capacity for planning and implementation of adaptation
4.	Promoting coordination and synergy at the regional level and with other multilateral environmental agreements
<b>ELEMENT D. REPORTING, MONITORING AND REVIEW</b>	
1.	Monitoring the NAP process
2.	Reviewing the NAP process to assess progress, effectiveness and gaps
3.	Iteratively updating the national adaptation plans
4.	Outreach on the NAP process and reporting on progress and effectiveness

Source: LEG Technical Guidelines, 2012

<sup>7</sup> Mullan et al., 2013.



## 1.1 National circumstances

Uganda, one of the LDCs is vulnerable to climate change, however her average degree of vulnerability has not been assessed. The country's vulnerability is attributed to the current huge dependency on natural resources especially, primary sectors e.g. agriculture, water, energy and fisheries, and yet these sectors are highly vulnerable to impacts of climate change<sup>8</sup>. In addition, limited funding, poor coordination among institutions and overall low levels of adaptive capacity to implement various climate change adaptation interventions widen the adaptation gap.

The most vulnerable population to climate extremes in Uganda are particularly the poorest rural communities more so the women and children, and other disadvantaged groups, due to their low adaptive capacities and lack of resources to ably cope with various climatic events. As a result, such vulnerable people have continuously adopted ad hoc and survival response strategies that are not sustainable in the medium to long-term situations. In addition, Uganda's most vulnerable sectors to climate risk include; agriculture, water, energy and health<sup>9</sup>.

Although strides have been undertaken in the country towards implementing numerous adaptation activities, a lot of frustration particularly arising from limited financing and inadequate technical and institutional capacity still exist. Subsequently, the most vulnerable communities have remained unable to adopt effective adaptation measures but instead relied on options such as migration including selling of assets; and yet such options are not sustainable.

---

<sup>8</sup> Uganda INDC, 2015

<sup>9</sup> Ibid

## **2.0 Approach and Method**

The technical note has been developed through a "desk-review" approach. A considerable amount of secondary data sources that include; policy and legal documents, project files, previous analytical, evaluative surveys were used. In addition, key informant interviews were conducted with selected officers from MDAs such as CCD, MWE, UNMA, MAAIF, MEMD, MoH, Academia, and Development Partners active in adaptation planning and implementation such as UNDP and FAO, as well as experts to provide in-depth insight on how to undertake the NAP process for Uganda.

The development of the note has been guided by an expert team<sup>10</sup> of adaptation specialists through a number of face to face meetings and online discussions. The note identifies climate vulnerabilities to food/soils, water, energy resources and human health; takes stock of adaptation options; highlights adaptation options that strengthen resilience, reduce vulnerability and enhance adaptive capacity; and identify and document best practices and lessons learned of NAPs preparation.

In a nutshell, the technical note communicates to adaptation actors such as Climate Change Department of the Ministry of water and Environment as well as other actors involved in climate change adaptation and it guides on the options and/or steps for dealing with some of the elements of the NAP process while describing an appropriate approach based on Uganda's circumstances; that would assist the country in formulating climate change adaptation measures.

---

<sup>10</sup> See List of Expert team in Annex 3

### 3.0 Findings

#### 3.1 Assessment of climate vulnerabilities in Uganda

Uganda is one of the world's most vulnerable countries to climate change. Even though it is difficult to ascertain the degree to which changes in climate variables and hazards are part of a broader trend due to relatively weak historical data collection, significant changes are being observed in the country's climate. For example, available meteorological data indicates that country-wide, mean annual temperatures have risen by 1.3°C since 1960, averaging a 0.28°C increase per decade. The number of average hot days and hot nights has increased significantly, whereas that of cold nights has decreased. Although an increase in temperatures is evident, minimum temperatures have to some extent increased more than maximum temperatures<sup>11</sup>. The increase in temperature is particularly remarkable in January and February averaging a 0.37°C increase per decade mostly in the Southwestern part of the country<sup>12</sup>.

In terms of precipitation, annual and seasonal rainfall has decreased significantly across the country since 1960. Rainfall has become more unpredictable and unevenly distributed; with onset and cessation events becoming progressively erratic. In other circumstances however, rains have been heavier and more violent in recent years as observed in Eastern Uganda, where there has been an increase of approximately 1500mm of precipitation in the December to January rainy season<sup>13</sup>. Other key manifestations of climate change in Uganda are; melting of the Rwenzori mountain glaciers (by about 83% since 1912), declining water levels in major water bodies, increase in temperatures, as well as proliferation of crop pests and diseases<sup>14</sup>. Equally, harsh climatic events such as droughts, floods, and landslides are also increasing in frequency and intensity.

The above changes in the climate are already threatening Uganda's ecosystems including humans<sup>15</sup>, with the poorest rural communities especially women, children and the elderly being the most at risk. Compared to other marginal groups however, women are more vulnerable to climate change (mainly in terms of food insecurity, water shortage, and fuel wood scarcity) owing to the existing gender inequalities<sup>16</sup>. Children are also predominantly vulnerable to climate change impacts due to illnesses exacerbated by low immunity,

---

<sup>11</sup> MWE 2014.

<sup>12</sup> Twinomuhangi, 2012.

<sup>13</sup> Ibid

<sup>14</sup> Op.cit

<sup>15</sup> Hepworth and Goulden, 2008.

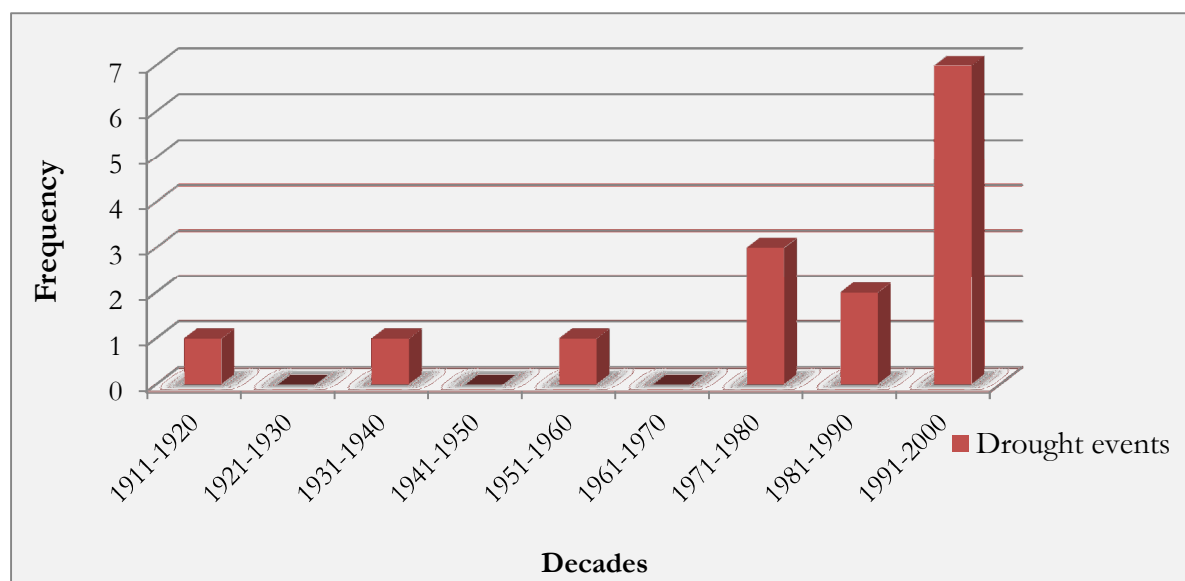
<sup>16</sup> National Climate Change Policy, 2015

poor nutrition, and playing in dirty, cold or dusty environments<sup>17</sup>. The vulnerabilities of food, water, energy resources, and human health to climate change are given in the discussion below;

### 3.1.1 Food

Generally, climate change affects agriculture in context of food production in a number of ways, *inter alia*: rising temperature threatens suitability for production; declining soil fertility reduces yields and makes crops more vulnerable to climatic stresses; poor moisture retention capacity of soils increases vulnerability to precipitation variability; pests and diseases increasing with rising temperatures; high temperatures and unseasonable rains promote rapid spoilage and threaten quality; shortages of disease-free planting materials, exacerbated by unreliable precipitation; extreme precipitation and flooding make transport costly and difficult affecting perishable crops, and increasing variability of precipitation and extreme events threatens suitability for production.

Uganda's overall agricultural production has greatly been affected by climate change mainly in terms of droughts and floods that have led to serious reductions in crop yields. For example, between 1990 and 2011, Uganda encountered 16 major flooding events and the most destructive floods associated with El Niño episode (the highest of its kind in Uganda's history for the past 50 years occurred in 1997/1998), causing acute effects on crops and other properties mostly in the Eastern region.



Source: Uganda National Meteorological Agency (formerly Department of Meteorology).

In 1999/2000, however, there was a serious La Niña phase (dry spell) that caused insurmountable losses in crop production which later translated into serious food shortages<sup>18</sup>. Today, droughts, floods, and

<sup>17</sup> Muhanguzi et al., 2012.

<sup>18</sup> Nkalubo, 2011.

landslides have become a common occurrence, causing damage to natural resources, especially soils, and destroying crops; culminating into food insecurity, famine, loss of income and livelihood options, and poverty.

Currently, Uganda's rainfall pattern continues to be intermittent and highly unreliable characterized by late onset and early cessation events; gradually translating into frequent droughts. Within the last 20 years since 1990 for example; Uganda has experienced about 8 to 10 severe droughts<sup>19</sup>, and the most severe drought occurred in 2010/11 causing losses in food and cash crop productivity including livestock estimated at about USD 470 million; equivalent to approximately 16% of the total value of the above commodities in GDP for the year 2011<sup>20</sup>.

The drought cycles were more frequent in 2002, 2004, 2006, 2008, and 2009 especially in the Karamoja region; causing serious crop failures, competition over scarce resources (water and pasture land), and increased cattle raiding to pay for food<sup>21</sup>. Lately, the situation has even worsened because the region (Karamoja) continues to experience relentless drought episodes in a period of at least every 2 to 3 years compared to the past trends of approximately every 5 years. This has subsequently jeopardized the food security situation of the local population since it takes an estimated timeframe of 2 years to recover from each of those droughts<sup>22</sup>. The most affected food crops include; plantain/matooke, beans, rice, sorghum, sweet potatoes, and cassava.

Without proper adjustments in adaptation efforts, it is projected that the impact of climate change on Uganda's agriculture will increase overall losses for food crops by 2050 to approx. USD 1.5 billion which is around 0.2% of GDP<sup>23</sup>. This will undeniably make the attainment of food security and economic growth in the country remain between hope and despair, since agriculture provides employment opportunities to most citizens and generates revenue in terms of GDP.

### **3.1.2 Soils**

Concerning soils, temporal and spatial variations in climate have a direct influence on the variability of available soil moisture<sup>24</sup>. Rainfall levels and distribution are expected to decline in many places and occur intensely in others, while erratic and evaporation/transpiration rates are also expected to increase.

---

<sup>19</sup> CRED, 2014.

<sup>20</sup> OPM, 2012.

<sup>21</sup> GoU 2007; IGAD 2010.

<sup>22</sup> USAID, 2011.

<sup>23</sup> MWE, 2015.

<sup>24</sup> Tolla TD, 2004

These changes will reduce and affect the availability of soil moisture for plant growth and crop productivity<sup>25</sup>. Higher temperatures on the other hand will increase the rate of decomposition of soil organic matter, particularly near the soil surface hence affecting the soil's potential to sequester carbon and retain water<sup>26</sup>.

### **3.1.3 Water**

Uganda is endowed with abundant water resources in form of lakes and rivers. However, climate change is already causing stress on existing water sources in a number of ways, *inter alia*: higher temperatures increase melting of glaciers as seen on Rwenzori mountain thus temporarily increases stream flows and flooding, and subsequently the melting of ice will reduce stream flows and endanger water supply in water catchments in the Rwenzori region; climate change causes drying up of wetlands as a result of reduced water tables giving way to change in land use such as cultivation and settlements; higher temperatures, evaporation and persistent drought lead to water stress, higher demands and water conflicts; droughts and prolonged dry spells lead to receding water levels thereby disturbing habitats, and affecting nutrient cycling which in turn reduces fishing grounds, causing loss of fish species and reduction in fish catch and fish quality, and yet fish is one of the largest export earners for Uganda, and changes in onsets of rainy seasons change surface flow regimes.

Given the above impacts, projections show that in absence of ameliorative actions, Uganda's total unmet water demand will increase to 1,651MCM/y by 2050 owing to increase in demand and potential reductions in supply. In most months, water shortages will be enormous; and a conventional approximation anticipates a cost of around USD 5.5 billion by 2050. The largest economic losses are expected to be in L. Victoria, Albert, and Kyoga watersheds<sup>27</sup>.

### **3.1.4 Energy resources**

Fuel wood is the most commonly used source of energy in Uganda's residential and commercial sectors purposely for heating, lighting, and cooking. Consistently, wood is also the major source of energy in the industrial sector, even though the use of wood and charcoal for the majority of energy demand in these sectors represents significant burdens in form of deforestation and indoor air pollution. In terms of vulnerability to climate change, the energy resources in Uganda are mainly affected by droughts which cause changes/drop in water levels thereby reducing flows available for hydro power generation, resulting

---

<sup>25</sup> Zizinga et al., 2015.

<sup>26</sup> Charman Pev & Robert MM

<sup>27</sup> MWE 2015.

into higher energy costs and energy poverty. For instance, in 2005/06, production of hydroelectricity significantly declined and led to a serious power crisis<sup>28</sup>. The overall cost of the 2005/06 and the 2010/2011 droughts reached USD 250 million and USD 1,174 million respectively, with an average annual damage per drought event in the last decade of USD 237 million<sup>29</sup>.

Additionally, droughts have also resulted into decrease in welfare due to reduced water generation and supply, thereby affecting livelihoods in terms of increased cost of energy, decreased food production, and health problems<sup>30</sup>. It is projected that by 2050, climate change will increase the energy deficit by around 26 percent due to reduction in precipitation that will almost certainly reduce biomass availability and affect alternative sources of energy such as hydro power<sup>31</sup>.

### **3.1.5 Human Health**

The impact of climate change on human health in Uganda is mainly due to induced temperature increases that are causing altitudinal shift in vector habitats-an issue that has led to many cases of widespread vector-borne diseases such as; malaria, cholera, hepatitis E, and dysentery. For example, malaria is spreading widely into new previously malaria-free geographical areas, flooding has multiplied incidents of water-related diseases like cholera, while prolonged dry spells have heightened respiratory diseases. More so, cases of human health deterioration in form of malnutrition are on the rise owing to reduced food production that is associated with widespread famine caused by drought and floods<sup>32</sup>.

According to the International Disaster Database, about 5.25 million people in Uganda have been affected by climate change-related disasters since 1970<sup>33</sup>. In terms of cost, it is estimated that the damages caused by extreme climatic events are currently between USD 20-130 million per year.

In future, the impact of climate change on human health is projected to increase whereby for example, Relative Malaria Incidence (RMI) is expected to gradually rise from the 2020s to 2070s and double by 2090s across the three major sub-climatic zones of the country, but the western region will experience the highest RMI<sup>34</sup>.

---

<sup>28</sup> Twinomuhangi, 2012.

<sup>29</sup> MWE, 2015.

<sup>30</sup> Garcia and Markandya, 2015.

<sup>31</sup> Op. cit.

<sup>32</sup> MWE, 2014.

<sup>33</sup> Ibid.

<sup>34</sup> Ibid.

### 3.2 Climate Change Adaptation Options

Uganda's efforts to adapt to climate change emanate from the fact that it is vulnerable to climate change, and also because it is a party to the UNFCCC and its Kyoto Protocol; hence mandated to take action towards enhancing the resilience of her citizens to withstand climate change today and in the future. The attempt by Uganda to tackle climate change dates back in the 90's with signing of various UN conventions, but prominently, much recognition was in 2002 when Uganda ratified the Kyoto Protocol, followed by developing the NAPA in 2007; which aimed at addressing urgent and immediate national adaptation needs and concerns in relation to adverse climate change effects.

Today, even though perfection is not yet attained, Uganda continues to exhibit in a consistent, clear, and coherent manner, national policy articulation by incorporating climate change issues in the country's programmes and processes. Among these include; the second national communication to the UNFCCC, the National Climate Change Policy (2015), NDP I & II (2010/11-2014/15 and 2015/16-2019/20) respectively, the Uganda Vision 2040 among others.

In addition to the policy framework, efforts have also been made in research, systematic observation, education, training, public awareness and institutional strengthening. Furthermore, progress is also noticeable in undertaking adaptation measures by different stakeholders operating at various levels<sup>35</sup>. For example, at the national and district levels, agricultural extension and advisory service providers assist farmers to address some of the underlying issues geared towards increasing farmers' adaptive capacity. Local governments on the other hand, provide advice on crop varieties, methods, pest and disease management, pre and post-harvest approaches to avoid losses, including soil and water conservation techniques. National research institutes, community-based organizations and local government offices work with farmers to develop new crop varieties through research and on-farm trials.

---

<sup>35</sup> See Annex



### **3.3 Adaptation options that strengthen resilience, reduce vulnerability and enhance adaptive capacity**

The Government of Uganda, in collaboration with development partners is undertaking various climate change adaptation responses geared towards enhancing the resilience of vulnerable communities especially farmers to ensure high agricultural productivity. It is important to highlight that the choice of various adaptation strategies like those identified in the NAPA, was guided by the need to; achieve millennium development goals (MDGs) such as; eradicate hunger, ensure environmental sustainability and gender equity and combat major diseases.

Although the country does not base its ranking on decision making tools such as cost benefit analysis or cost effectiveness analysis because a number of adaptation interventions are donor supported. It is anticipated that prioritizing and ranking of adaptation activities has being guided by: development priorities and MDGs; environmental concerns; and equity and gender issues taking into consideration disadvantaged groups, community/ecosystem level priorities like enhancing resilience, multiple benefits, replication, sustainability, cost-effectiveness and cultural acceptance and urgency and immediacy, security and intensity.

Based on the survey carried out during the development of this technical note, the following are potential adaptation options meant to strengthen resilience, reduce vulnerability and enhance adaptive capacity in Uganda.

#### **a) Adoption of new agricultural technologies, modern crop varieties and use of fertilizers**

Since 2003, NARO has developed up to 218 improved varieties, breeds, and prototypes for increased yields<sup>36</sup> with an emphasis to ensure high productivity, maintain food security, and enable farmers to obtain stable incomes amidst un-favourable climatic conditions.

#### **b) Strengthening of early warning and weather information systems**

In the past decades, most Ugandan farmers used to rely heavily on traditional knowledge practices to predict seasons and forecast weather. With today's changing climate however, much of the traditional knowledge is rendered ineffective and unreliable. Thus, to increase preparedness to climate-related shocks among farmers, development partners such as Global Environment Facility through the Ministry of Water

---

<sup>36</sup> SID, 2012.

and Environment - Uganda National Meteorological Authority (UNMA) is strengthening climate information and early warning systems in Uganda<sup>37</sup>.

### **c) Strengthening Agriculture through DSIP**

Implemented through MAAIF, the Agriculture Sector Development Strategy and Investment Plan (DSIP, 2010/11-2014/15), puts emphasis on meeting the goals of the NDP and CAADP<sup>38</sup>. This is because the DSIP was adopted as Uganda's Strategy under CAADP, while the NDP has development objectives of increasing rural incomes and livelihoods as well as improving household food and nutrition security. In agriculture, efforts have focused on strengthening state and local government capacity, promoting sustainable land management including the development of the Strategic Investment Framework for Sustainable Land Management 2010-2020 and it is mainstreaming in the work of NAADS, gathering and effectively employing indigenous knowledge, and improving productivity.

### **d) Building infrastructure to improve water and soil conservation**

With this approach, much focus is on promoting water harvesting for small-scale supplementary irrigation, rehabilitation of existing water storage facilities and irrigation schemes, and building capacity for integrated planning at national and district levels especially in the agriculture sector. The government has for example through MWE developed the "Water for production Strategy and Investment Plan" as a blue print for broadening the use of irrigation, aimed at transforming the average Ugandan farmer from a purely small-scale subsistence farmer to a more commercial-oriented farmer.

Similarly, most smallholder farmers have also taken up innovative measures to boost farm productivity among which include; water harvesting (collection of runoff from rooftops into storage structures), impoundment of surface runoff into reservoirs, deep tillage to prevent overflow, and use of percolation furrows in horticultural crops to enhance in-situ replenishment of soil moisture. In addition, integrated watershed management has been promoted, valley dams and water tanks have been constructed, and initiatives on the Nile Basin and L.Victoria are already addressing climate change adaptation.

---

<sup>37</sup> See GEF/UNDP/UNMA Project Inception Report, 2014

<sup>38</sup> CAADP is a continental growth-oriented development agenda to increase economic growth in Africa through greater investment in the agricultural sector, aimed at increasing agriculture growth rates of 6% per year, and creating wealth needed for rural communities and households to prosper.

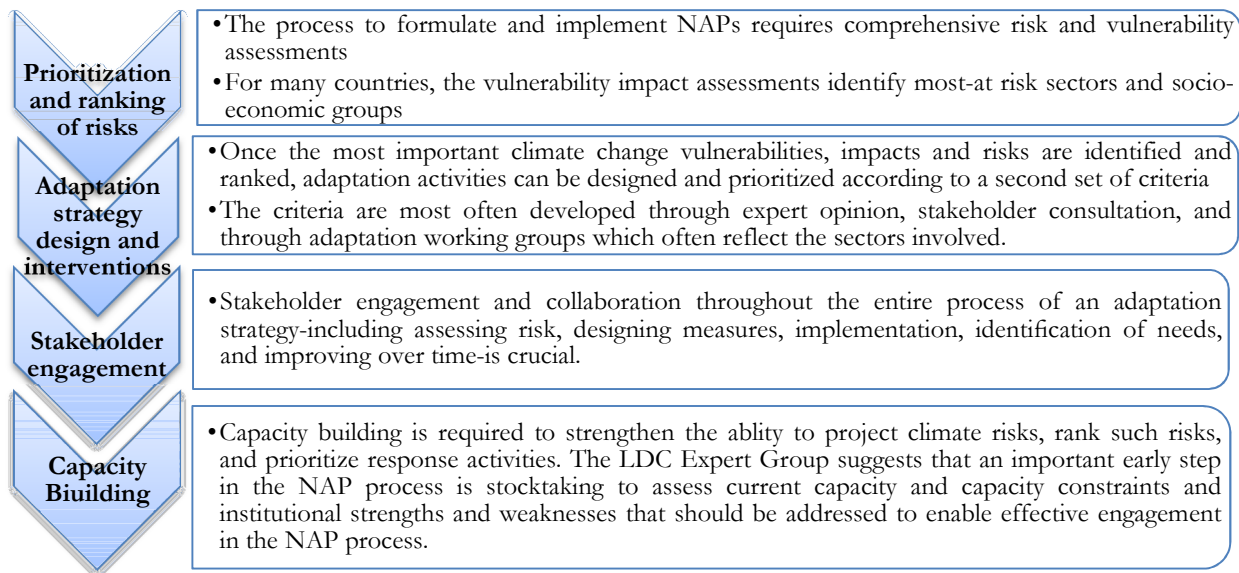
In addition to the above adaptation strategies, the National Climate Change Policy, INDC, and NDP II have also prioritized numerous activities in various sectors to guide Uganda's medium to long-term adaptation efforts to reduce vulnerability and increase resilience<sup>39</sup>.

---

<sup>39</sup> See Annex for the NDP II Priority Interventions

### 3.4 Best Practices and Lessons Learned on NAPs Preparation

A number of countries both in Africa and Asia like Ethiopia, Kenya, India, and Bangladesh among others; have already embarked on the NAP process. The experiences and lessons learned in laying the ground work for the NAP process in these countries therefore, provide guidance to Uganda in advancing her NAP process as discussed below;



#### Box 1. Case studies on risks & vulnerability Assessment

In **Burkina Faso**, the vulnerability assessment identified the four (4) most vulnerable sectors such as agriculture, water resources, animal resources, forestry/biodiversity, and the most vulnerable groups being the rural poor, including women, youth, and small-scale farmers.

In **Nepal**, experience with spatial outputs is based on their climate change vulnerability assessments conducted at district levels to identify the most vulnerable districts, which produced climate risk/exposure maps, sensitivity maps and adaptive capacity maps.

**Ghana, Ethiopia and Bangladesh** based on national data, disaggregated to more local and sector levels, which compare a no-climate change baseline that reflects existing development plans with climate change scenarios.

#### Adaptation strategy design and interventions

Once the most important climate change vulnerabilities, impacts and risks are identified and ranked, adaptation activities can be designed and prioritized according to a second set of criteria. The criteria are most often developed through expert opinion, stakeholder consultation, and through adaptation working groups which often reflect the sectors involved. Criteria are developed with national

objectives in mind, including the availability of financial, technical and human resources. A cross or multi-sectoral analysis to prioritize adaptation actions is critical even though many countries have difficulties performing such studies. A prioritization of measures is needed to optimize efficacy, as well as to determine the availability of financial, technical and human resources.

### **Box 2. Examples on Adaptation Strategy Design and Interventions**

**Ghana** has created the "Akpropong Approach" a method for analysis that results in a cross-sectoral project plan. Here, a logical framework analysis is used to identify problems and policy solutions, and then a **multi-criteria analysis** is performed to identify overall preferences among alternative options i.e. to identify and rank relative importance of activities. Out of the analysis, 10 adaptation projects, of which several (including improved land use management and agricultural diversification), were directly related to agriculture and food security, were identified and packaged into programmatic adaptation plan, which fed into Ghana's National Adaptation Strategy.

**Niger** derived priorities and ranking through **expert consultations** and participatory decision-making where surveys to determine impacts of climate change were conducted, and then classified and prioritized based on field missions conducted among vulnerable populations.

**Mali** used a participatory approach but based its priority projects on **successful past and current practices**. For example, some of the adaptation solutions proposed in the area of land use management are those already being widely practiced due to their positive impact on agriculture yields like use of appropriate crop yields.

### **Stakeholder engagement**

Stakeholder engagement and collaboration throughout the entire process of an adaptation strategy development-including assessing risk, designing measures, implementation, identification of needs, and improving over time-is critical. Stakeholders are individuals or groups who have the current and past experience of coping with, and adapting to, climate variability and extremes. The principal resource for responding to climate change impacts is people themselves, and their knowledge and expertise. Through an ongoing process of negotiation, they can assess the viability of adaptive measures. Together, the research community and stakeholders can develop adaptive strategies by combining scientific or factual information with local knowledge and experience of change and responses over time as well. The CCAFS East Africa regional synthesis report notes that private sector and media involvement are critical in supporting adaptation even though they are often

forgotten<sup>40</sup>. The report further suggests that the private sector is needed to identify opportunities and the link between adaptation and their investments, and media for increased and effective awareness-creation.

### **Box 3. Experiences on stakeholder engagement**

In **Ethiopia**, national consultation for the review of the draft NAP was conducted in 2010, drawing participants from sectoral federal government agencies, regional governments, research organizations, institutions of higher education, religious institutions, national NGOs and the private sector. The following was done after the general consultation:

- Consultation at regional, zonal, district and local Kebele (village) level. In the process, each one of them developed respective adaptation programmes.
- Both bottom-up and top-down iterative processes were used to continuously improve national and sub-national adaptation plans.

**Nepal** provides a model of inclusiveness in its support for local level adaptation programmes in the most climate vulnerable districts of the mid and far-western regions of the country. Nepal's approach is in line with;

- The LEG technical guideline with regard to participation of stakeholders from different sectors particularly vulnerable local communities, while ensuring inclusiveness and gender-sensitivity.

It is important to consider robust and effective participation of relevant stakeholders when assessing and ranking risks, as well as during designing and prioritizing adaptation measures. Building capacity for integrating climate change adaptation into national and sectoral planning, as well as at other levels, is equally important and should developed and enhanced.

---

<sup>40</sup> Orindi and King'uyu, 2013.

## **4.0 Conclusion and Recommendations**

### **4.1 Conclusion**

It is factual that climate change continues to adversely impact Uganda's most vulnerable communities and their property, and will continue doing so in the foreseeable future once coherent adaptation action is not sustained. It is worth noting that past adaptation options have not attained resilient communities because of limited funding, and addressing adaptation issues largely at the project level. Since urgent and immediate needs for Uganda are dynamic changing with location and time, the process to formulate and implement NAPs will strengthen the foundation for integration of adaptation objectives, strategies, policies, measures or operations such that they become part of the national development policies, processes and budgets at all levels and stages.

Promisingly, Uganda is not starting from zero, the existence of the climate change mainstreaming guidelines serves as an entry point for mainstreaming climate adaptation for specific sectors. Since the NAP process is continuous and needs to be informed regularly, adaptation measures should be evaluated within the same policy context as measures introduced to reduce poverty, and foster sustainable development.

### **4.2 Recommendations**

In addition to lessons learned from elsewhere, while adjusting to LEG technical guidelines, Uganda should consider the following recommendations when advancing her NAP process:

- a. There is need for an overall national adaptation framework to guide the development of sectoral adaptation plans. This should be led by the Climate Change Department and National Planning Authority in close cooperation with key sector planning and budgeting departments.
- b. Strengthening the capacity of numerous stakeholders to identify, project and rank climate risks, prioritize response activities, including understanding of the economic impacts of climate risks. Capacity building must look beyond government, and include the full suite of all actors and interest groups in adaptation, including local communities.

- c. Undertake a comprehensive national climate vulnerability assessment to identify current and plausible future impacts of climate change, assess exposure, sensitivity, and adaptive capacity of people, sectors and ecosystems. Such assessment should build on existing sectoral and local governments risk, hazard and vulnerability assessments. In this context, it is imperative to recognize that information other than scientific information on climate change needs to be collected to conduct risk and vulnerability assessments, for example, information on local and traditional knowledge for disaster management and socio-economic information. For efficacy, information management systems/hubs with updates on climate risks and vulnerabilities, gaps, challenges, existing or planned interventions need to be in place so as to provide baselines for future interventions and to guard against duplication of similar projects. Nepal for instance created a web-based platform for knowledge management and learning, publicly available, hosted by Nepal Academy of Science and Technology.
- d. In prioritizing adaptation actions, it is unlikely that a single method will be sufficient to arrive at an appropriate prioritization. Hence, a cross or multi-criteria analysis is critical and should be adopted since it allows adaptation options to be ranked against a number of criteria.
- e. Given that climate change affects various social groupings (women, men, the elderly and young) disproportionately, gender-specific values, need to be considered in designing adaptation interventions. In addition, for effectiveness, vulnerability indices need to be developed, and mechanisms like "theories of change" need to be adopted so as to ascertain the vulnerabilities and adaptive capacities of vulnerable communities as well as ecosystems.
- f. Stakeholder engagement in the NAP process is very essential. This is largely because engagement and collaboration among stakeholders like local communities, think tanks, faith based communities individuals, civil society, NGOs, academia, development partners, and the private sector in addition to relevant government ministries and agencies; especially during assessment and design of adaptation plans facilitates and strengthens national adaptation planning and implementation. There is no best model to ensure multi-stakeholder engagement, however, the Agenda 21, model that drew upon the formalized nine sectors of society as the main channels through which broad participation can be facilitated serves a



better model. The model commonly referred to as the major groups i.e. Women; Children and Youth; Indigenous Peoples; Non-Governmental Organizations; Local Authorities; Workers and Trade Unions; Business and Industry; Scientific and Technological Community and Farmers. Additionally, involvement of the private sector helps in identifying investment opportunities and linking them with adaptation, the media is key in increasing awareness, the academia and civil society are needed for research and advocacy purposes respectively, while development partners can assist in providing financial and technical support by tapping from other countries' expertise. In selecting stakeholders however, open and transparent procedures should be followed to identify who to choose and why.

g. Periodic monitoring and evaluation should be adopted at all stages of the NAP process to assess the progress of the process not necessarily the outcome. This can be supplemented by performance measurement frameworks/periodic assessments to determine the effectiveness of certain adaptation interventions, thereby capitalizing on good practices and also providing room for inclusion of innovative practices and new ideas into existing and ongoing activities. This will subsequently guide effective up scaling and replication of best activities in other areas.

h. Uganda needs to undertake low-regret adaptation options in the medium term and no-regret options in the long term which will provide adaptation benefits in a broad range of plausible circumstances. For example, Uganda should exhibit the highest level of commitment by developing legislation for climate change. Such legislation could provide for integrated budgeting and planning for climate change adaptation in all sectors.

Elsewhere, “no regrets” such as Social Protection Floor Initiative has adopted a basic needs approach as a means to increase resilience.

The initiative guarantee a set of basic social rights, services and facilities e.g. food security, health, nutrition, education, water and sanitation, employment and/or pension/disability payments. This can be replicated by merging of the Ministry of Gender Labour and Social Development, social protection initiative known as Social Assistance Grant for Empowerment Programme (SAGE), with Prime Minister’s disaster risk management measures and Climate Change Department of Ministry of Water and Environment’s climate change adaptation

measures. Such a merger could result into ‘adaptive social protection’ which will manage hazards/risks, improve institutional capacities, and decrease vulnerability and build resilience thence promote poverty-reducing sustainable growth.

- i. Given that climate change issues are cross-cutting, there is need for strengthening inter-sectoral coordination through strengthening and facilitating the available structures and platforms such as the national climate change advisory committee, thematic negotiating groups and climate change learning alliance while providing room for learning by doing and replication of best practices.
- j. Uganda should formulate sector specific adaptation plans so as to foster integration of climate change adaptation in sectoral plans and ensure consequent budgeting and implementation.

## Annex 1: An overview of Priority Adaptation Options

Sector	Ongoing programmes, projects and activities	Priority interventions for integration in NDP II and implementation sectors and agencies
Agriculture (Crops)	<p>MAAIF has established a climate change taskforce to spearhead climate-proofing and mainstreaming of climate change in the agricultural sector. The Ministry is implementing a project on Developing National Early Warning System to provide timely information on crop production, livestock, fisheries and national food security, to policy makers, farmers and other stakeholders.</p> <p>MAAIF with its agencies like NARO is also engaged in sustainable land management projects; research on climate change resilient crop varieties; climate change risk and vulnerability assessment for crop sector; establishing field trials of climate-resilient cropping patterns in association with water management systems; promoting agriculture conservation practices such as agro-forestry and water management; supporting farmers to undertake irrigation activities through exposure and access to technologies; and rehabilitating of irrigation schemes; development of water tanks by MAAIF's heavy earth-moving equipment; supporting appropriate food storage systems and value chain improvement to mitigate rising post-harvest losses.</p>	<ul style="list-style-type: none"> <li>⊕ Establish and maintain climate change-related information and early warning systems for agriculture</li> <li>⊕ Strengthen sustainable land management, integrated soil fertility management, conservation agriculture and ecologically- compatible cropping systems</li> <li>⊕ Upscale and strengthen the breeding and distribution of drought/flood-tolerant and high value crop varieties and cultivars.</li> <li>⊕ Strengthen water harvesting and small scale irrigation farming to build resilience to droughts</li> <li>⊕ Mainstream climate change into agricultural extension</li> <li>⊕ Diversify agricultural practices at household, community and national levels in order to build climate change resilience</li> <li>⊕ Develop appropriate food storage systems and value addition to agricultural climate products and chains</li> <li>⊕ Heighten the control of crop pests and diseases in order to increase resilience of crop sub-sector to the impacts of climate change</li> <li>⊕ Develop innovative insurance schemes to protect farmers against crop failure due to extreme weather-related events</li> </ul> <p><i>Key implementation sectors and agencies: MAAIF (lead agency), MWE, NARO, UNMA, MoLG, MoTIC, LGs, Universities and Research Institutions.</i></p>

Water	<p>The MWE has conducted a study on vulnerability assessment and adaptation of the water resources sector in Uganda; developed a Climate Change Vulnerability Assessment, Adaptation Strategy and Action Plan for the Water Resources Sector in Uganda in 2010; developed a framework for Integrated Catchment-based Water Resources Management framework.</p> <p>MWE is engaged in a programme to develop water for production involving design, construction and development of new water for production facilities. Ongoing is the construction of valley dams and water tanks with complete abstraction systems for animal watering, and for micro-irrigation systems.</p>	<ul style="list-style-type: none"> <li>⊕ Develop a national water security plan that caters for water storage and harvesting, water conservation, efficient irrigation and other water efficient technologies</li> <li>⊕ Strengthen water conservation efforts including protection, rehabilitation and restoration of watersheds, water catchment areas, river banks and water bodies</li> <li>⊕ Implement water for production initiatives to ensure availability of water for irrigated agriculture, livestock production and energy generation</li> <li>⊕ Develop and implement appropriate water storage and harvesting techniques and efficient water utilization for households, communities and institutions</li> <li>⊕ Increase clean and safe urban and rural domestic water supplies as a way of ensuring climate-resilient water supplies and combating water-borne diseases</li> <li>⊕ Support and effectively participate in trans-boundary water resources management.</li> <li>⊕ Conduct water resources assessment, monitoring, documentation and dissemination of necessary information to stakeholders.</li> </ul> <p><i>Key implementation sectors and agencies: MWE(lead agency), MAAIF, MEMD, NEMA, Universities and Research Institutions</i></p>
Energy Infrastructure	<p>The MEMD is diversifying energy sources and promoting climate-resilient energy like mini-hydro and solar and promoting efficient cook stoves. With assistance from the French Development Agency (AFD), MEMD is engaged</p>	<ul style="list-style-type: none"> <li>⊕ Diversify energy sources by supporting alternatives that are less-sensitive to climate change (solar for homes, institutions and street lighting; geothermal and wind)</li> <li>⊕ Increase small hydropower generation plants to provide</li> </ul>

	<p>in energy and climate change capacity building initiatives including training of energy staff in climate change and mainstreaming climate change in sectoral plans and budgets.</p>	<p>electricity to large numbers of local community members and businesses in the rural setting to enable job creation</p> <ul style="list-style-type: none"> <li>⊕ Promotion of energy efficiency programmes to reduce demand for energy generation to save the environment (e.g. efficient cook stoves, energy saving bulbs, smart grids etc.)</li> <li>⊕ Participate effectively in water catchment protection as part of climate smart hydro-electric power infrastructure development</li> <li>⊕ Consider geothermal resources development as a measure of resilience to the uncertainty in the climate-sensitive hydrology.</li> </ul> <p><i>Key implementation sectors and agencies: MEMD (lead agency), MWE, MAAIF, NEMA, LGs</i></p>
<p>Health</p>	<p>The MoH has integrated climate change in the health policy but still needs to play a leading role in adaptation actions to increase climate resilience in health systems.</p>	<ul style="list-style-type: none"> <li>⊕ Assess and document the impacts of climate change on human health and wellbeing</li> <li>⊕ Increase the health workforce’s awareness of the relationship between climate change and human health.</li> <li>⊕ Strengthen public health systems to be able to deal with climate risk-related health outbreaks and challenges</li> <li>⊕ Develop early warning systems and heighten the surveillance of disease outbreaks in order to provide rapid responses to control epidemics</li> </ul> <p><i>Key implementation sectors and agencies: MoH (lead agency), MWE, UNMA, MoES, MoLHUD, MoLG, LGs.</i></p>

**Annex 2: The following are some of the practiced climate change adaptation options**

	<b>Sector</b>			
	<b>Health</b>	<b>Agriculture</b>	<b>Water</b>	<b>Energy</b>
<b>Adaptation Options</b>	<ul style="list-style-type: none"> <li>• Conducting vulnerability assessments of the health sector</li> <li>• Assessing the impacts of climate change on human health and well-being</li> <li>• Improving early warning systems for disease outbreaks</li> <li>• Putting in place contingency plans to develop climate change-resilient health systems</li> <li>• Strengthening public health systems and supplying them with medicine, equipment and well-trained personnel</li> <li>• Making provision for a safe water chain and sanitation facilities</li> <li>• Improving the capture, management, storage and dissemination of health information</li> <li>• Heighten the surveillance of disease outbreaks</li> <li>• Increasing the health workforce’s awareness of the relationship between climate change and human health</li> <li>• Developing further support action plans against HIV/AIDS.</li> </ul>	<ul style="list-style-type: none"> <li>• Expanding extension services</li> <li>• Promoting and encouraging highly adaptive and productive crop varieties and cultivars</li> <li>• Expanding climate information and early warning systems</li> <li>• Expanding Climate Smart Agriculture-a 10-year CSAP (2015-2025)</li> <li>• Intensifying diversification of crops</li> <li>• Expanding value addition, post-harvest handling and storage</li> <li>• Increasing research on climate resilient crops</li> <li>• Promoting and encouraging conservation agriculture.</li> <li>• Promoting irrigated agriculture</li> <li>• Promote and encourage agricultural diversification</li> </ul>	<ul style="list-style-type: none"> <li>• Improving water efficiency</li> <li>• Expanding small scale water infrastructure</li> <li>• Ensuring water supply to key economic sectors,</li> <li>• Managing water resource systems, including wetlands</li> <li>• Promote and encourage water harvesting and efficient water utilization</li> <li>• Ensuring availability of water for production in water-dependant sectors</li> <li>• Promote and strengthen the conservation and protection against degradation of watersheds, water catchment areas, river banks and water bodies</li> <li>• Promote integrated water resources management (including underground water resources),</li> <li>• Ensuring that all guidelines for infrastructure/hydraulic works mainstream climate change</li> <li>• Improve and strengthening trans-boundary cooperation regarding water resources management</li> <li>• Strengthening water resource monitoring networks and flood warning systems</li> </ul>	<ul style="list-style-type: none"> <li>• Increase the efficiency in the use of biomass in the traditional energy sector</li> <li>• Promote renewable energy and other energy sources</li> <li>• Increasing efficiency in the modern energy sector, mainly of electricity</li> <li>• Promote and participate in water resource regulation and catchment protection</li> <li>• Diversify energy sources by promoting the use of alternative renewable energy sources (such as solar, biomass, mini-hydro, geothermal and wind) that are less-sensitive to climate change</li> <li>• Promoting energy-efficient firewood cook stoves and solar including liquefied petroleum gas (LPG) cookers</li> </ul>

### **Annex 3: Members of the Expert Team**

1. Climate Change Department of Ministry of Water and Environment (MWE)
  - a) Mr. Chebet Maikut
  - b) Mr. Semambo Muhammad
2. Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)
  - a) Ms. Annunciata Hakuza
3. Environmental Management for Livelihood Improvement Bwaise Facility (EMLI)
  - a) Mr. Bakiika Robert
4. Makerere University-College of Natural Sciences (MUK)
  - a) John Baptist Kaddu (Prof.)
5. Save the Children
  - a) Mr. Vian Musika
6. Parliamentary Forum on Climate Change (PFCCC)
  - a) Ms. Christine Kaaya
7. Oxfam/Climate Action Network Uganda
  - a) Mr. Anthony Wolimbwa
8. Action Aid Uganda
  - a) Mr. Mathias Mulumba
9. African Women Policy Network (AWEPON)
  - a) Ms. Kasule Florence
10. Advocates Coalition for Development and Environment (ACODE)
  - a) Anna Amumpiire
11. United Nations Development Program (UNDP)
  - a) Ms. Sarah Mujabi
12. National Planning Authority (NPA)
  - a) Mr. Ronald Kaggwa
13. Kampala Capital City Authority (KCCA)
  - a) Najib Lukooya Bateganya (Ph.D)
14. National Environment Management Authority (NEMA)
  - a) Mr. Onyai Fred
15. Africa Climate Change Resilience Alliance (ACCRA)
  - a) Ms. Tracy Consolate Kajumba

16. Water Aid Uganda
  - a) Mr. Ceaser Kimbugwe
  
17. Least Developed Countries Environment Centre (LEC).
  - a) Mr. Philip Gwage
  
18. Environmental Alert
  - a) Zake Joshua (Ph.D)



## REFERENCES

- A. Zizinga, M. M. Tenywa, J. G. M. Majaliwa, M. Mugarura, P. Ababo, A. Achom, G. Gabiri, Y. Bamutaze, L. Kizza and E. Adipala (2015):** Potential Climate Change Adaptation and Coping Practices for Agricultural Productivity in the Mountain Areas of South Western Uganda.
- ACCRA (2010):** Uganda's disaster risk reduction and climate change adaptation: Status Report, ACCRA Kampala, Uganda.
- Adegoke, J and Wright, C.Y. (2013):** Climate Vulnerability: Understanding and Addressing Threats to Essential Resources. Elsevier.
- Agrawal A, Perrin N, Chhatre A, Benson C, and Kononen M. (2009):** Climate Policy Processes, Local Institutions, and Adaptation Actions: Mechanisms of Translation and Influence. Social development Papers. Social Dimensions of Climate Change. Paper No. 119/June 2009 World Bank; Washington DC:
- Allison, E.H., Perry, A.L., Badjeck, M.-C., Neil Adger, W., Brown, K., Conway, D., Halls, A.S., Pilling, G.M., Reynolds, J.D., Andrew, N.L., & and Dulvy, N.K. (2009):** Vulnerability of national economies to the impacts of climate change on fisheries. *Fish and Fisheries*, 10: 173-196.
- Charman PEV, Roper MM. (2000):** Soil organic matter (SOM) In P.E.V. Charman and B.W. Murphy, eds. *Soils: Their Properties and Management*. 2nd Ed. Oxford University Press. 2000;260–270.
- CRED (2014):** Centre for Research on the Epidemiology of Disasters, EM-DAT: The International Disasters Database-Uganda. [www.emdat.be](http://www.emdat.be).
- EMLI (2015):** Progress of implementation of the National Adaptation Programmes of Action (NAPA) for Uganda Report. Environmental Management for Livelihood Improvement Bwaise Facility. Kampala, Uganda.
- Garcia, Jon and Anil Markandya (2015):** Economic Assessment of the Impacts of Climate Change in Kampala.
- GoU (2007):** Climate change: Uganda National Adaptation Programmes of Action. Kampala, Uganda.
- Hepworth, N., & Goulden, M. (2008):** Climate Change in Uganda: Understanding the implications and upraising the response. Pgs 47. LTS International Edinburgh.
- IAASTD (2009):** International Assessment of Agricultural Sciences and Technology for Development. Island Press. [www.agassessment.org](http://www.agassessment.org).
- IGAD (2010):** Intergovernmental Authority on Development (IGAD), Environment Outlook.
- IPCC (2007):** Climate Change 2007: The physical science basis. In S. Solomon, D. Qin, Manning. M., Z. Chen, M. Marquis, K.B. Averyt, M. Tignor & H.L. Miller (Eds.), *Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 996p.
- IPCC (2012):** Summary for policy-makers. In C.B.Field, V.Barros, T.F. Stocker, D. Qin, D.J. Dokken, K.L.Ebi, M.D.Mastrandrea, K.J.Mach, G.-K.Plattner, S.K.Allen, M. Tignor & P.M. Midgley (Eds.),

*Managing the risks of extreme events and disasters to advance climate change adaptation pp. 1-19. A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change.* Cambridge, UK, and New York, USA, Cambridge University Press.

**Klein, R.J.T., Eriksen, S.E.H., Naess, L.O., Hammill, A., Tanner, T.M., Robledo, C., & O'Brien, K.L. (2007):** Portfolio screening to support the mainstreaming of adaptation to climate change into development assistance. *Climatic Change*, 84(1),23–44. doi:10.1007/s 10584-007-9268.

**Least Developed Countries Expert Group (2012):** National Adaptation Plans. Technical guidelines for the national adaptation plan process. Bonn: UNFCCC secretariat. Bonn, Germany. December 2012. Available at <<http://unfccc.int/NAP>>.

**Muhanguzi, Florence Kyoheirwe; Kabonesa, Consolata and R.D. Muhanguzi (2012):** Gender and Climate Change. Assessing impacts and strategies for mitigation and adaptation to climate change in Uganda. Kampala: Uganda Climate Change Department, Icelandic International Development Agency, Royal Norwegian Embassy and Danish International Development Agency.

**Mullan M, Kingsmill N, Kramer AM and Agrawala S. (2013):** National Adaptation Planning: Lessons from OECD Countries, OECD Environment Working Papers, No. 54, OECD Publishing. <http://dx.doi.org/10.1787/5k483jpfpsq1-en>.

**Mungai C, Radeny M, Thiong'o O (2012):** Climate Smart Agriculture: Research Needs and Priorities in Uganda. Ministry of Agriculture, Animal Industry and Fisheries and CCAFS. National Planning Workshop Report: 27 March 2012, Kampala, Uganda.

**MWE (2015a):** Uganda National Climate Change Policy. Ministry of Water and Environment, Kampala, Uganda.

**MWE (2014):** Uganda Second National Communication to the United Nations Framework Convention on Climate Change. Ministry of Water and Environment, Kampala-Uganda.

**MWE (2015b):** Economic Assessment of the Impacts of Climate Change in Uganda. Final Study Report. Ministry of Water and Environment, Kampala-Uganda.

**Nkalubo, M.S.Z. (2011):** La Niña alert Uganda: Department of Meteorology. Network of climate journalists of the greater Horn of Africa: APS/102/0 <http://www.necjogha.org/news/2011-01-02/la-nina-alert-uganda>.

**NPA (2013):** Uganda Vision 2040, National Planning Authority, Kampala-Uganda.

**OPM (2012):** The 2010-2011 integrated rainfall variability impacts, needs assessment and drought risk management strategy. Office of the Prime Minister, Kampala Uganda.

**Orindi V and King'uyu SM.(2013):** Evaluation of the status of NAPA/NAP in Ethiopia, Tanzania, Uganda and Kenya. Report. CCAFS.

**SID (2012):** Society for International Development. The State of East Africa: Deepening Integration, Intensifying Challenges. Society for International Development. Regional Office for Eastern Africa. Nairobi, Kenya.

**Tolla, T.D (2004):** Effects of moisture conditions and management on production of cashew: a case study in the Lower Limpopo basin, Mozambique. MSc. Thesis, ITC. The Netherlands; Available: [http://www.itc.nl/library/Papers\\_2004/msc/nrm/teshome\\_demissie\\_tolla.pdf](http://www.itc.nl/library/Papers_2004/msc/nrm/teshome_demissie_tolla.pdf).

**Twinomuhangi Revocatus (2012):** National Climate Change Policy Background Paper Adaptation.

**UBoS (2014):** Uganda Bureau of Statistics, 2014 Statistical Abstract.

**UNFCCC (2011):** United Nations Framework Convention on Climate Change; Glossary of climate change acronyms, "Adaptation."

**UNFCCC (2012a):** Compilation of case studies on national adaptation planning processes. Note by the Secretariat. Subsidiary Body for Scientific and Technological Advice. FCCC/SBSTA/2012/INF.6.

**UNFCCC (2012b):** Synthesis report on the support for the national adaptation plan process for the least developed countries. Note by the Secretariat. Subsidiary Body for Implementation. FCCC/SBI/2012/8.

**USAID (2011):** Climate Change and conflict in Uganda: The cattle corridor and Karamoja, African and Latin American Resilience to Climate Change Project (ARCC), Discussion paper for Office of Conflict Management and Mitigation.

**Vermeulen, S.J., Aggarwal PK, Ainslie A, Angelone C, Campbell BM, Challinor AJ, Hansen JW, Ingram JSI, Jarvis A, Kristjanson P, Lau C, Nelson GC, Thornton PK., & Wollenberg, E. (2012):** Options for support to agriculture and food security under climate change. *Environmental Science and Policy*, 15, 136-144.