NILE RIVER BASIN

Climate Change Adaptation Capacities in the Nile River Basin

UNEP

SWEDEN

NILE BASIN INITIATIVE
Initiative du Bassin du Nil

Table of Contents

List of figures & tables

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Acronyms & abbreviations

AAS	Africa Academy of Science
ACCCA	Advancing Capacity for Climate Change Adaptation
ACCPF	African Climate Change Fellowship Program
ACPC	African Climate Policy Centre
ACTS	African Centre for Technology Studies
AEGOS	African-European Georesources Observation System
ADB	African Development Bank
AFREPREN	African Energy Policy Research Network
AHBFI	Africa Harvest Biotech Foundation International
AIACC	Assessments of Impacts of Adaptation to Climate Change
ALM	Adaptation Learning Mechanism
AMCOW	African Ministerial Council on Water
AMCEN	African Ministerial Conference on the Environment
ARC	Agricultural Research Corporation
AMESD	African Monitoring of the Environment for Sustainable Development
ASARECA	Association for Strengthening Agricultural Research in Eastern and Central Africa
ATP	Applied Training Project
ATPS	African Technology Policy Studies Network
AU	African Union
AUC	African Union Commission
AWF	African Water Facility
CAADP	Comprehensive Africa Agricultural Development Program
CARPE	Central African Regional Program for the Environment
CCA	Climate Change Adaptation
CCAA	Climate Change Adaptation in Africa
CCAFS	Climate Change, Agriculture and Food Security
CC DARE	Climate Change and Development Adapting by Reducing Vulnerability
CEN-SAD	Community of Sahel-Saharan States
CI	Conservation International
CGIAR	Consultative Group on International Agricultural Research
CIDA	Canadian International Development Agency
CLACC	Capacity strengthening in the Least Developed Countries for Adaptation to Climate Change

COMESA	Common Market for Eastern and Southern Africa
CRM	Climate Risk Management
CSAG-UCT	Climate System Analysis Group of the University of Cape Town
DANIDA	Danish International Development Agency
DEFRA	Department of Environment- Food and Rural Affairs
DFID	Department for International Development
ECA	Economic Commission for Africa
ECBI	European Capacity Building Initiative
ENDA	Environmental Development Action in the Third World
ESSP	Earth System Science Partnership
EU	European Union
EUMETSAT	European Meteorological Satellite Organisation
FAO	Food and Agricultural Organisation
GCCA	Global Climate Change for Africa
GDP	Gross Domestic Product
GEF	Global Environment Facility
GGWSS	Great Green Wall for the Sahara and Sahel
GIS	Geographic Information System
GTZ	Gesellschaft für Technische Zusammenarbeit
GWP	Global Water Partnership
ICPAC	IGAD Climate Prediction Centre
ICT	Information Communication Technologies
ICRAF	World Agroforestry Centre
IDRC	International Development Research Centre
IFPRI	International Food Policy Research Institute
IGAD	Intergovernmental Authority on Development
IPCC	Intergovernmental Panel on Climate Change
IIED	International Institute for Environment and Development
IRA	Institute of Resource Assessment
IST	Information Society Technology
IUCN	International Union for Conservation of Nature
IWMI	International Water Management Institute

JGI	Jane Goodall Institute
HRS	Hydraulic Research Station
KBO	Kagera Basin Organisation
KS	Knowledge Sharing
LDCs	Least Developed Countries
LULUCF	Land Use, Land Use Change and Forestry
LVBC	Lake Victoria Basin Commission
MEA	Multilateral Environmental Agreements
MDGs	Millennium Development Goals
NAP	National Action Programmes
NAPA	National Action Programmes on Adaptation
NASA	National Aeronautics and Space Administration
NBI	Nile Basin Initiative
NBTF	Nile Basin Trust Fund
NCAP	Netherlands Climate Change Programme
NGOs	nongovernmental organizations
NEPAD	New Partnership for Africa's Development
OSS	Sahara and Sahel Observatory
PAP	Pan African Parliament
PIWA	Panos Institute West Africa
RAP	Regional Action Programmes
REDD	Reducing Emissions from Deforestation and Forest Degradation
RCMRD	Regional Centre for Mapping of Resources for Development
RUFORUM	Regional Universities Forum for Capacity Building in Agriculture
SEA-START	Southeast Asia START Regional Centre
SEI-Oxford	Stockholm Environment Institute-Oxford Office
SI	Smithsonian Institute
SIDA	Swedish International Development Cooperation Agency
SIDS	Small Island Developing Countries
SRAP	Sub-Regional Action Programmmes
STI	Science, Technology and Innovation
TEA-START	Temperate East Asia START Regional Centre
TWAS	Third World Academy of Sciences
UMD	University of Maryland

UNCBD	United Nations Convention on Conservation of Biodiversity
UNCCD	United Nations Convention of Combating Desertification
UNECA	United Nations Economic Commission for Africa
UNFCCC	United Nations Framework Convention on Climate Change
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNISDR	United Nations International Strategy on Disaster Reduction
UNITAR	United Nations Institute for Training and Research
URC	UNEP Risoe Centre
USAID	United States Agency for International Development
USDA	United States Department of Agriculture
USFS	United States Forest Service
WB	World Bank
WCD	World Commission on Dams
WCS	Wildlife Conservation Society
WMO	World Meteorological Organisation
WRI	World Resources Institute
WWF	World Wildlife Foundation

Executive summary

The effects of climate change are felt in the Nile Basin, just like other parts of Africa and already it threatens the attainment of Millennium Development Goals and in particular poverty eradication and sustainable development. The projections from the regional models prove beyond reasonable doubt that changing climate now affects and will continue to affect developmental sectors in the Nile Basin countries; Burundi, Democratic Republic of Congo, Egypt, Ethiopia, Eritrea, Kenya, Rwanda, Sudan, Tanzania, and Uganda. Therefore, these countries need to enhance their capacity to address the impacts of climate change not only for current but also for the future. The main objective of this study was to assess the existing national and regional capacities, the needs and the modalities to tackle the needs identified in order to fast-track climate change adaptation within the basin. To achieve the above objective, four specific objectives were considered: a) a stock taking exercise on the institutional landscape and existing strategies for policy and institutional support within the basin; b) Identification and characterization of capacity needs of selected stakeholders across different levels in the context of climate change adaptation c) Identification of policy and institutional gaps in conceptualizing and implementing adaptation initiatives within the basin; and lastly, d) the establishment of the impact of transboundary water resources management issues on adaptation measures and strategies including vulnerability assessments.

The methodology and approach for this study was based on a participatory process with detailed consultations at national and sub-regional levels. The range of tools and methods for data collection included networks analysis, web-based and online databases, desk studies and participatory approaches through telephone interviews, competency mapping, and questionnaires. The results of the assessment revealed that experts from different professional background ranging from the environmentalists, meteorologists, hydrologists, climate change specialists, sociologists, soil scientists and agrometereologists were actively involved on climate change adaptation within the basin. Besides, all these experts had experience of working in the water sector. In addition, the field of interventions of their respective institutions ranged from environment, water, land, wildlife, natural resource management, agriculture and environment. These institutions had mandates in water resource management either singly or in combination of two or more other themes such as environment, natural resources, agriculture and food security, health, infrastructure among others.

This assessment noted that the institutions involved on adaptation within the basin were limited to government departments and international research organizations with limited participation of the non-governmental organisations such as the civil society and community based organisations. Besides, due to limited sharing of information and coordination among the existing initiatives and institutions, thus duplication of efforts and consequently conflict of interests and uneconomic use resources. Moreover, most of the stakeholders involved in capacity building were not well known and the likely explanation was their limited ability to adequately communicate their capacity building initiatives. The stakeholders involved in capacity building were grouped into global, regional and sub-regional/East and Central Africa, though many many initiatives were implemented active across sub-regional to global levels. The existing capacities for climate change adaptation were noted at the national level and were in the field of forest conservation and afforestation, agricultural adaptation, carbon trading, adaptation methods and vulnerability assessment. Although these capacities were considered available, they were in limited numbers and require further strengthening.

The capacity building efforts should target local, national and regional levels with emphasis on practitioners learning and community workers and academia. The capacity needs identified in the basin include: sustainable energy sources including conservation of forests and reforestation; soil conservation; Climate modeling; agriculture adaptation; early warning information; agriculture; education and awareness; vulnerability and impact assessment, planning and monitoring and evaluation; dissemination of information, data and information; infrastructure for storage; Institutional, technical and human and financial resources; cross-sectoral cooperation; adaptation scenarios and strategies; and knowledge management and coordination. Of

these listed capacity needs, modelling, awareness creation, development of adaptation scenarios and strategies were the top priority needs in a descending order. The recommendations on addressing these capacity gaps were: training at national level using local data, exchange programmes, workshops and short courses and sharing of good practises; project development and training; investment in infrastructure, knowledge and information management; and strengthening of cooperation and collaboration through the NBI platform, improved harmonisation and coordination and research. The proposed areas for research includes; carbon trading, adaptation methods and vulnerability assessments. All these recommendations could be achieved through framework of south-south and or north-south partnerships. Similarly, cross-sectoral coordination, transboundary communication, negotiation and conflict resolution skills, partnerships and networking, and specific technical areas remain paramount. The capacities in technical or thematic areas were needed in hydrology, climatology; energy and nature conservation; health; and agriculture and land use. However, capacity in hydrology was ranked the highest, followed by Agriculture, land use and food security, climatology and energy and nature conservation in that order.

The assessment concluded that institutional arrangements for implementation and coordination of climate change capacity building already exists at both national and regional levels, what is required is there strengthening. For instance, at national level climate change focal points exit in all the Nile Basin states; also, at regional level, the Nile Basin Initiative provides a platform for the harmonization and coordination of capacity building and knowledge management. In addition, future initiatives need to build on existing ones such as the NAPAs. The capacity building plan is therefore recommended to be programmatic, systemic and consistent in order to cope up with the ever emerging challenges in water and climate change.

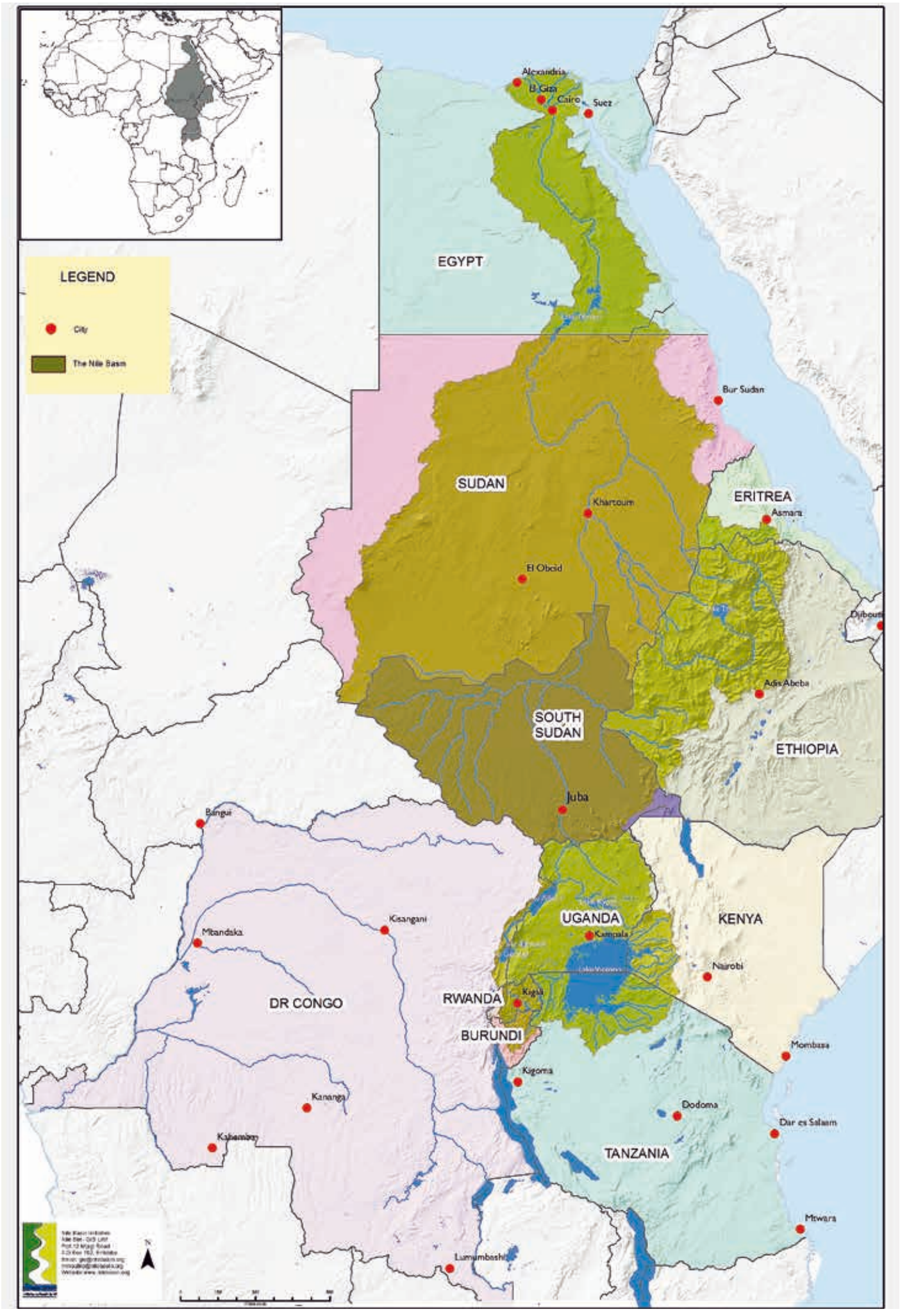

Figure 1: The Nile River Basin & its member countries

Chapter One: Introduction

1.1 Background

Today, the effects of climate change are felt all over Africa and the rest of the world; and climate change is no longer a theory or a meteorological model that interests only a few people. Because of the scientific work that has been done, more people now understand how human activities are hastening it. There is also more and more recognition that climate change seriously threatens the attainment of Millennium Development Goals and in particular poverty eradication and sustainable development. The predictions from the regional models prove beyond reasonable doubt that changing climate now affects and will continue to affect agriculture and food security, water resources, energy, human health, coastal zones and physical infrastructure (AMCEN, 2010). Taking the impacts of climate change on water resources as an example, already the supply and management of fresh water for the world's billions of inhabitants remains one of the most daunting challenges of the coming century. For countries that share river basins with others, questions of how best to use and protect precious water resources always become entangled in complex political, legal, environmental, and economic considerations (Urama, 2010), the case of Nile Basin is not an exception.

Climate change further complicates the picture. At a time when global warming threatens to make Africa's rivers even less reliable for economically feasible large hydro projects, and their waters more precious for other uses, donors and governments should be looking to sustainable water management protocols. As at now, climate change experts believe that dry parts of Africa will see further reductions in precipitation. Literature notes that in the NB, drought has contributed to a reduction in run-off by 20% to the between 1972 and 1987; significantly interrupting livelihoods and hydropower generation (Intergovernmental Panel on Climate Change (IPCC), 2001). Furthermore Stolberg (2005) noted that among the major rivers worldwide, Nile River experienced the most severe change due to climate change impacts. Thus, the Nile Basin states have great potentials and opportunities to devise alternative pathways to safe guard the river's ecosystem from further long–term harm, and provide needed energy as well as reduce vulnerability of water resources. One of this potential rests with enhancement of capacity to understand and better manage resources within the basin.

For more than three decades the Nile Basin just like other parts of Africa, has been building capacity to enhance their adaptation to climate change. Despite the many remarkable achievements in

capacity development, more still remains to be done. This is attributed to the uncertainty of the impacts of climate change on water resources, thus requires consistent and continuous capacity building in order to cope up with ever emerging challenges. It is in this context that United Nations Environment Programme (UNEP) in collaboration with relevant stakeholder groups commissioned an assessment of the climate change capacities in the Nile Basin with the aim of developing a baseline for future studies as well as developing a framework for the next plan of action with respect to capacity development in the Basin. The central questions that need to be answered are; what capacities do currently exist in the NB? What capacities are missing and how can they be acquired? Responses to these questions will provide useful insights to guide the development of capacity development plan. The capacity development plan will maximize the existing capacities by utilizing and strengthening them while also building new capacities as appropriate.

1.2 Description of the Nile River Basin

The name Nile originated from the Greek word "Nelios ", meaning River Valley. The Nile is one of the world's great assets. Throughout history, the river has nourished livelihoods, an array of ecosystems, and a rich diversity of cultures. Ten countries share the Nile: Burundi, Democratic Republic of Congo, Egypt, Ethiopia, Eritrea, Kenya, Rwanda, Sudan, Tanzania, and Uganda (Figure 1). From Lake Victoria to the Mediterranean Sea the length of the Nile is 5584 km (3470 mi) (Karyabwite, 2000). From its remotest headstream, the Ruvyironza River in Burundi, the river is 6671 km (4145 mi) long. The basin encompasses an area of 3 million square kilometers - one tenth of Africa's total land mass—and the countries of the Nile serve as home to an estimated 300 million people, of which 140 million people out of them live outside the boundaries of the Nile Basin and use water resources including groundwater (Taher et al., 2004). Despite the basin's natural endowments, its people face considerable challenges. Today, the region is characterized by poverty, instability, rapid population growth, and environmental degradation (http://www.unep.org/gc/gcss-viii/KenyaNile%20countries%20IWRM.pdf). For instance, four of the Nile Basin states are among the world's 10 poorest countries (Karyabwite, 2000).

For the ten countries which make up the Nile River Basin, some of these countries have only a small part of their area within the basin, whilst others are virtually entirely within the Basin. For some countries such as Democratic Republic Congo; the Nile water is only a small part of their total water resources while for Burundi, Rwanda, Uganda, Sudan and Egypt are completely dependent on the Nile River for their water resources. While all the water in Burundi and Rwanda is generated inside the countries, most of the water resources of Sudan and Egypt originate outside their borders. All these countries contribute differently to the basin and have different needs for the water and other resources of the basin.

The NB constitutes one of the most complex of all major river basins due to its size and variety of climates and topographies. The river is distinguished from other great rivers of the world by the fact that half of its course flows through countries with no effective rainfall. Almost all the water of the Nile is generated on an area covering only 20% of the basin; while the remainder is in arid or semi-arid regions where the water supply is minimal and evaporation and seepage losses are very large. The Nile has two tributaries namely the White Nile and Blue Nile. The former flows though Uganda, Sudan, and Egypt. The Blue Nile starts in Ethiopia, Democratic Republic of Congo, Kenya, Tanzanian, Rwanda, and Burundi all have tributaries, which flow into the Nile or into Lake Victoria Nyanes. The major dams on the Nile are Owen Falls, Roseires Dam, Sennar Dam and Aswan High Dam. Its flow rate or average discharge rate is about 300 million cubic meters per day. The Blue Nile starts at Lake Tana in Ethiopia and flows into Sudan from the south east. The northern section of the river flows almost entirely through desert, from Sudan into Egypt, and ends in a large delta that empties into the Mediterranean Sea. In addition, it is the source of most of the water and fertile soils. The White Nile is longer and rises in the Great Lakes Region of Central Africa, with most distant source in central Burundi. It flows north through Rwanda, Tanzania, Lake Victoria, Uganda and southern Sudan. The Nile River gets its water from three catchments namely: The Plateau of Equatorial lakes, Bahr EL Ghazal and Ethiopian highlands.

1.3 Climate change induced water stress in the Nile River Basin

Climate change remains a reality that can no longer be ignored given its massive influence on the national, regional and international development pathways, especially its role in the development sectors in Africa. These fundamental sectors include water resources, agriculture and food security, prevalence and distribution of human diseases, plant pests ecosystems and biodiversity, sea level rise and inundation coastal zones (IPCC, 2001; 2007). These extreme climate events have great potentials to jeopardize efforts on sustainable development and attainment of the Millennium Development Goals (MDGs) (AMCEN, 2010; Thornton et al., 2006; Stolbog et al., 2003). The 2010 World Development Report warns that if Africa adopts a 'business as usual scenario', climate change will ultimately cause a decrease in her annual gross domestic product (GDP) by 4% (World Bank, 2009). Climate change induced water stress will affect socio-economic welfare through complex causal pathways including drought or flood induced crop failure, loss of livestock, and epidemics of infectious diseases such as malaria, cholera and Rift Valley Fever (Thornton et al., 2006).

> The Blue Nile starts in Ethiopia while countries such as Democratic Republic of Congo, Kenya, Tanzanian, Rwanda, Burundi & Uganda all have tributaries, which flow into Lake Victoria or the Nile River itself

The impact of climate change on water resources is an unprecedented threatening life, livelihoods, and life-supporting systems. Even if most stringent mitigation measures were put in place today, these impacts would continue in many centuries to come. Thus the exigency of addressing climate change in the context of immediate, mid-term and long term implementable adaptation actions remain paramount. However, significant barriers and constraints on adaptation persist, especially in the Nile Basin as in any other shared water resources in Africa and include lack of finances, inappropriate policies and technology and limited capacities. These are further compounded by the fact that climate forecasting in the Nile Basin region is imperfect and complex; projections reveal increases in average annual temperature, erratic intra-annual weather patterns coupled with more frequent and more severe extreme weather events. Rainfall and river flow records during the 20th century show high levels of inter-annual and inter-decadal variability. Moreover, significant fluctuations in rainfall have occurred in the humid highlands of East Africa and Ethiopia (headwaters of the Nile) over decadal timescales with marked consequences for Nile flows.

Warming temperatures are projected to cause frequent and extreme weather events, such as heavy rainstorms, flooding, and El Nino events (IPCC, 2001). Extreme rainfall and subsequent flooding damage will also have serious effects on agriculture and land degradation (erosion of topsoil and leaching of nutrients from the soil). The edaphic and topographic characteristics of some parts of the Nile Basin make them vulnerable to flooding. For example the flood plains of rivers Nyando, Sondu and Nzoia that are all part of the upper Nile are prone to flooding. Similarly, the Khartoum plains, the

flood plains of Atbara and the main Nile in the Sudan are susceptible to flooding. The impacts of flooding include loss of human life, crops, livestock, increased risk of disease transmission (Rift Valley Fever, malaria, cholera) and damage to physical infrastructure, especially roads. Another example is the coastal zone of the Nile Delta in Egypt that is vulnerable to the impacts of climate change; not only because of the impact of sea level rise, but also because of the impacts on fresh water resources, agricultural resources (land and irrigation infrastructure), tourism and the human settlements in the major cities. For instance, sea level rise between 0.5 and 1 meter would cost Egypt's economy $35 billion (AMCEN, 2010). More importantly, the impacts of climate change will add to the many economic and social challenges already confronting countries of the Nile Basin (UNEP, 2003).

In an attempt to adapt to impacts of climate change, for more than a decade, there have been several efforts undertaken to address the climate change in the Nile Basin but not limited to;

- Vulnerability and adaptation assessments,
- Trainings, workshops, conferences and seminars,
- Implementation of programmes and projects-examples include: The 1967 HYDROMET Project, Lake Victoria Environmental Management Project, 1996: the Nile basin regional power project, confidence and stakeholder involvement project, socio-economic development and benefit project, Kagera Basin Organization (KBO) just to mention a few,
- Creation of technical and political institutions, technical committees, networks and associations,
- Development of the NAPAs by the Least Developed Countries such as Democratic Republic of Congo, Ethiopia, Rwanda, Tanzania, and Uganda, and
- Development of national strategies to combat climate change-the middle –income countries such as Egypt and Kenya and are in the process of implementing them.

All the above mentioned platforms, frameworks and initiatives have contributed to the growing knowledge on climate change adaptation and its links with development. Besides, they have enhanced networking and partnerships; created fora for exchange of experiences and best practices. Despite all these remarkable trends in addressing climate change adaptation, more still needs to be done especially with regards to promoting capacity development as a tool for fostering sustainable NB management. To fill this gap, its critical to develop and or enhance the capacity of Nile Basin member countries to generate scientific evidence, coordinate and harmonize the various initiatives in the basin.

1.4 Objectives & scope of the assessment

The main objective of this study was to assess national and regional capacity needs within the Nile River Basin with the aim to propose modalities to tackle the needs identified to fast-track climate change adaptation within the basin. To achieve the above objective, four specific objectives were considered: a) a stock taking exercise on the institutional landscape and existing strategies for policy and institutional support within the basin; b) Identification and characterization of capacity needs of selected stakeholders across different levels in the context of climate change adaptation c) Identification of policy and institutional gaps in conceptualizing and implementing adaptation initiatives within the basin; and lastly, d) the establishment of the impact of transboundary water resources management issues on adaptation measures and strategies including vulnerability assessments. Since only a sample of the possible countries could participate in the assessment, the issue of representativeness was critical issue and a potential key limitation of the assessment. The other limitations of the study relates to limited information sharing between and among the experts within the same institution. For the five countries visited only one expert was designated as the focal point for the NB. In the event that this expert was absent from their work stations, other experts had limited information or awareness on adaptation of the NB.

Also, during the country visits, many of the experts who were involved in climate change activities within the basin were out of office and most of the experts left in-charge seemed not well versed with the subject of discussion. On the other hand, some of these experts considered themselves to have no mandate to provide the information required. This led to very poor response of the questionnaires. For instance, of the more than 70 questionnaires distributed, only 19 stakeholders responded and most of the questions were left unanswered.

> The impacts of climate change will add to the many economic & social challenges already confronting countries of the Nile Basin

Chapter two: Methodology

2.1 General approach

The methodology and approach of this study was based on a range of tools and methods for data collection, including (i) networks analysis, (ii) web-based and online databases, (iii) desk studies, (iv) participatory approaches that involved consultation of information providers through telephone interviews, competency mapping, and questionnaires.

The whole assessment was undertaken in a participatory manner with detailed consultations at all levels including national and sub-regional levels. To this end the consultants liaised with the UNEP Organizational Unit for guidance on:

- The best protocol to approach the various member countries;
- Which countries to be included in the sample;
- The highest and lowest level of consultation to be adopted;
- The type of data collection tool for different stakeholders;
- The size of the sample including number of questionnaires that were administered for each country; and
- Provisional list of interviewees and their contacts.

2.2 Literature review

A detailed review of project documents and other relevant climate literature was carried out to place the study in context of the prevailing situation. The project document "Adapting to climate change induced water stress in the Nile River Basin" and other relevant UNEP and Nile Basin literature were reviewed to identify the critical issues.

2.3 Questionnaire survey

A draft questionnaire was developed and incorporated comments from the UNEP, NBI and project technical committee (see annex 4).

2.4 Pre-Testing of questionnaires

First, a pre-test of the questionnaire was conducted to a sample of five experts, who were not included in the sample size were randomly selected from relevant institutions in the five selected countries to gauge the length and suitability of the questionnaire in eliciting stakeholder responses. After the pre-test, appropriate adjustments were made, after which the questionnaire was administered both electronically and physically.

2.5 The sampling design

The sampling design for this study was purposive. The Nile basin was classified into three strata, namely upper, middle and lower Nile. Then the countries within each of the stratum were grouped based on the level of economic development, geographical representation and political contexts. The countries selected include Uganda, Tanzania, Ethiopia and Rwanda. In addition to the four countries, Kenya was also considered given that it was the operational base for the study; hence there was no extra cost involved. For each country, five to ten experts per country were selected for administration of questionnaire using a

stakeholders list from the various UNEP Consultative meetings and workshops and with the help of the Nile Basin national Offices.

2.6 Country visits & introductory session in countries

The introductory session was carried out to facilitate the interaction between the consultants and the various actors active in the Nile Basin. This involved making formal visits to five selected countries namely Kenya, Uganda, Rwanda, Tanzania and Ethiopia to consult widely with the Nile Basin administration and technical experts to understand details of the capacity strengths and needs within the basin as a prerequisite for successful climate change adaptation for the basin. This also ensured that all relevant authorities were well informed about the study and consultative meetings that were held to solicit advice, opinions, views and expectations including how to make the findings of the assessment valuable to the different levels of decision making. Visits were be made to five of the Nile Basin Countries – Uganda, Ethiopia, Rwanda, Kenya and Tanzania to administer the questionnaire as well as undertake targeted follow-up interviews. The selection of the counties was based on a stakeholder analysis that took into consideration all the actors in climate change adaptation at national and sub-regional levels within the Nile Basin. This was based on selecting a representative sample of countries within the basin – 5 of the 10 Nile Basin countries. In addition, questionnaires were sent electronically to those countries where visits were not be made.

2.7 Data analysis

Data analysis involved all the gathered information from the activities relating to documents review, questionnaire, interviews and stakeholder analysis, which were analyzed using descriptive statistics. It focused on undertaking a situational and gap analysis in order to establish the baseline capacity in undertaking vulnerability assessments and implementation of adaptation measures in relation to transboundary water resources at national and regional levels. Each question was analyzed depending on the responses received from respondents.

2.8 Report writing

Report writing was guided by assessing the capacity building needs for all stakeholders and partners at individual, institutional and systemic levels within the Nile River Basin as well as identifying the obstacles to assessing vulnerability and implementing adaptation measures.

Chapter three: Findings

3.1 Introduction

The results of this assessment were based on the interpretation of information gathered from literature review and the perceptions of stakeholders interviewed or those that responded to the questionnaire survey and takes into consideration the limitations outlined above 1.5. The documents reviewed tended to present climate change or general water issues in general and there were very limited documentation specifically focusing on Climate Change induced water stress in the Nile Basin. In addition, it outlines the nature of stakeholders interviewed and the existing initiative across different levels. Finally, it identifies the existing climate change adaptation capacity, the needs and modalities for addressing these needs.

The respondents interviewed had varied professional background ranging from the environmentalists, meteorologists, hydrologists, climate change specialists, sociologists, soil scientists and agrometereologists. The field of intervention of their respective institutions ranged from environment, water, land, wildlife, natural resource management, agriculture and environment. They however all had experience in working in the water sector. It is worth noting that the institutions had mandates in water resource management either singly or in combination of two or more other themes such as environment, natural resources, agriculture and food security, health, infrastructure among others. The institutions sampled were mostly government entities (53.3%); followed by regional organisations and international research organisations, with limited participation of the non-governmental including the civil society and community based organisations. Table 1 below shows the distribution of the respondents based on their organisational types.

Table 1: Distribution of respondents by Organisation types

Organisation type	% of respondents
Government environment department	53.4
Government research	13.3
International research	13.3
Regional organisation	20.0
Total	100

3.2 Climate change adaptation stakeholders in the Nile River Basin

From the stock taking exercise conducted by UNEP (2010), it is clear that there are many institutions implementing initiatives in the Nile Basin (annex 1). However the types of the institutions tend to be limited to Government departments. For instance, of the continental organizations mapped, majority (83%) were government institutions leaving the representation of non-governmental organizations at about 17%. Similarly at the sub-regional levels the institutions reported includes, the Common Market for Eastern and Southern Africa, Intergovernmental Authority on Development, East Africa Community and Lake Victoria Basin commission, of which are intergovernmental entities.

3.3 Capacity building stakeholders

There are several programmes; initiatives and organisations that have contributed or are expected to contribute to building adaptation capacity in the Nile Basin. These are summarised in annex 1 and is based on the findings of this assessment and the UNEP stocktaking exercise (UNEP 2010). However, due to inadequate information sharing, coordination and collaboration between and among the various initiatives, there tends to be duplication of efforts or conflicts of interests that often leads to uneconomic use of the scarce resources. This assessment revealed most of the capacity building stakeholders are not well known. Also it noted that most of stakeholders were not very strong in communicating their capacity building initiatives. For instance most of the stakeholder institutions do put the learning programmes on their website and when asked to describe their capacity building approaches, most of them had lots of difficulty and were more of "piece meal'' activities This section presents some programmes, projects and organisation that have contributed or were expected

to contribute to climate change adaptation capacity building. The list is by no means exhaustive but provides a selection of examples that clear illustrates the range of stakeholders available in the Nile Basin that are a potential source of capacity building experiences and knowledge. The stakeholders have been grouped into global, regional and sub-regional/East and Central Africa. In this study, global initiatives refer to programmes and projects being carried out in Africa and other continents. Regional initiative involves programmes and projects that are undertaken in Africa and Sub-regional are initiatives and organisations active in East and Central Africa (where the Nile Basin is found). However, it should be noted that many initiatives were active across different levels – sub-regional to global.

3.3.1 Global adaptation initiatives

Table 2a illustrates the initiatives, programmes and projects being carried out in Africa and other continents (global).

Table 2a: Global climate change capacity building stakeholders

Institution Name	Type of Entity	Nile Basin	Capacity Building	Contacts	Remarks
Advancing Capacity to support Climate Change Adaptation	United Nations Institute for Training and Research project	Ethiopia, Kenya and Tanzania	Capacity building for understanding, managing and communicating climate change risks; through execution of pilot actions	www.acccaproject.org	Emphasizes climate change adaptation in the Nile Basin
Capacity Development for Adaptation to Climate Change and GHG Mitigation (C3D+)	Networking and capacity building programme (for Centers of excellence)	No information	Reinforces the network's ability to deliver targeted training and capacity development at the national and regional levels with for improved participation of developing countries in the UNFCCC process, a timely implementation of the UNFCCC and Kyoto Protocol by developing countries and a better coordination and integration of national climate policies into sustainable development policies		Not specifically to water
Global Climate Change for Africa (GCCA)	USAID's Africa bureau supported research project	Democratic republic of Congo	Development of African expertise in international Climate Change policy discussions	www.c3d-unitar.org www.worldwidelife.org.bsp/bcn/learning/african/gcc1	

Institution Name	Type of Entity	Nile Basin	Capacity Building	Contacts	Remarks
EuroAfrica-Information Communication technologies (ICT) Initiative	Project supported by the European commission and coordinated by sigma orionis	No information	Supports policy dialogue and strengthens science and technology cooperation in ICT between Europe and sub-Saharan Africa	www.Euroafrica-ict.org	Addresses issues of climate change adaptation including the Nile Basin (NB)
European Capacity Building Initiative (ECBI)	A seven year programme (2005 – 2012) implemented by International Institute for Environment and Development (IIED)		Enhances negotiating capacities in targeted groups of developing countries while increasing the understanding of developing country positions among European negotiators and decision-makers	www.Europecapacity.org	
Assessments of Impacts and Adaptations to Climate Change (AIACC) in Multiple Regions and Sectors	A multilateral cooperation project.		Supported funding, training, and mentoring developing country scientists to undertake multi-sector, multi-country research priorities of developing countries.	www.aiaccproject.org	
PICOTeam	Consulting Company	Kenya, Tanzania, Uganda, Rwanda	Offers "Leadership for Climate Change"	www.picoteam.org	
Adaptation Learning Mechanism (ALM) Knowledge sharing	Collaborative Programme of the United Nations Development Programme, World Bank, Global Environment Facility, Swiss Agency for Development and Cooperation, Institut de l'Énergie et de l'Environnement de la Francophonie		Provided stakeholders with a common platform for sharing and learning and supported a wide range of adaptation knowledge networks and initiatives	www.adaptationlearning.net	Addresses issues of climate change adaptation including the Nile Basin (NB)
Capacity strengthening in the least developed countries for adaptation to climate change (CLACC)	Global support programme working in the least developed countries (LDCs) to strengthen their efforts to adapt to the impacts of climate change.	Kenya, Sudan, Tanzania and Uganda	Strengthens civil society to enable them to participate effectively in the climate change initiatives, including government led processes such as the National Adaptation Programmes of Action (NAPA)	www.clacc.net	

Institution Name	Type of Entity	Nile Basin	Capacity Building	Contacts	Remarks
International Water Management Institute		Kenya, Sudan, Tanzania and Uganda	Cross cutting activities in climate change related themes. Do not seem to have explicit Learning Programmes	www.iwmi.cgiar.org	
ICRAF's Global research project on climate change (GRP 5)	A project of the International Centre for Research in Agroforestry	Ethiopia, Kenya, Tanzania, Sudan	Contributes to vulnerability assessment, adaptation measures and raising adaptive capacity, and research and governance and institutions in the context of rewards for environmental services	www.WorldAgro-forestrycentre.org	
African-European Georesources Observation System (AEGOS)	Project coordinated by Bureau de Recherches Géologiques et Minières, France (BRGM)	No information	Broadcast to Africa, through GEONETCast, geophysical related data	www.aegos-project.org	
Meteoblue	Private Company	No information	Has competences and offers training on modeling based on "No hydrostatic Meso-Scale Modeling Technology	www.meteoblue.com	

3.3.2 Regional or continental initiatives

Climate Change adaptation institutions, initiatives, programmes and projects operational in Africa are summarized in Table 2b.

Table 2b: Regional/continental climate change capacity building stakeholders

Institution Name	Type of entity	Nile Basin	Capacity Building	Contacts
African Monitoring of the Environment for Sustainable Development (AMESD)	Programme is being implemented by the AU in partnership with the European Union	All	Training of experts to able to manage meteorological stations upgraded by the programme.	www.amesd.org
Great Green Wall for the Sahara and Sahel (GGWSS) Initiative	Plan of action for the implementation of existing continental frameworks like CAADEP	All	Strengthens coordination of activities	www.eldis.org
The Programme of Action for the Implementation of the African Regional Strategy on Disaster Risk Reduction	Ten year African Union programme	All	Capacity development is one of priority programme areas	www.Africa-union.org

Institution Name	Type of entity	Nile Basin	Capacity Building	Contacts
Climate Change Adaptation in Africa	A five year (01/05/2006-30/04/2011) research and capacity development programme supported by Canada's International Development Research Centre (IDRC) and the Department for International Development United Kingdom (DFID UK)	All	Focused on the strengthening of the capacity of African scientists, organisations, decision makers and others to contribute to adaptation to climate change through action research	www.idrc.ca/ccaa/
Community Based Adaptation to Climate Change in Africa	A three year project (02/13/2008-02/13/2011) implemented by the African Centre for Technology Studies (ACTS) through the financial support of IDRC/CCAA	Kenya, Sudan, Tanzania & Uganda	Carries out climate change adaptation pilot projects in communities by emphasising on a learning-by-doing approach, identifying ways of communicating climate change information to poor communities, and from communities to other stakeholders	www.iied.or/climate change
Climate Change Adaptation in Africa: Scoping Exercise	A scoping project comprised of five studies	Whole of East Africa	Results served as a knowledge base for thematic areas within CCAA to facilitate the identification of priorities	www.idrc.ca/ar/ev
African Climate Change Fellowship Programme (ACCPF)	A project jointly implemented by Pan African committee of The Global change SysTem for Analysis, Research and Training (START), Institute of Resource Assessment (IRA), University of Dar Es Salaam, Africa Academy of Science (AAS), national and regional institutions	Whole region	Supported learning, education, research and training opportunities to African professionals, researchers and graduate students building their capabilities for advancing and applying knowledge for climate change adaptation in Africa	www.accf.pass-africa.org
Knowledge Sharing Project	A three year project (April 2008-2011) run by a consortium of partners that include collaborating institutions include ENDA-Tiers Monde, Forum for Agricultural Research in Africa, Intergovernmental Authority for Development (IGAD) Climate Predictions and Applications Centre, Institute of Development Studies	No information	Enhanced and built skills in communicating research and sharing knowledge amongst vulnerable groups, researchers, policy makers and civil and society organisations	www.africa-adapt.net

Institution Name	Type of entity	Nile Basin	Capacity Building	Contacts
Climate for Development in Africa (ClimDev- Africa) Programme)	A ten year collaboration project of AUC, African Development Bank (AfDB) and United Nations Economic Commission for Africa (UNECA), World Meteorological Organisation (WMO) and DFID-UK	The whole NB	Development of capacity for improved availability & use of quality climate information & services addressing needs of local, national & regional scale decision makers in critical climate-sensitive sectors & areas	www.afdb.org
Climate, Water and Agriculture: Impacts and Adaptation of Agro-ecological Systems in Africa	A three years project building upon the work of the IPCC in other regions	Egypt, Ethiopia & Kenya	Aimed to improve national and regional capacity for the assessment of the economic impact of climate change on the agricultural sector of selected countries in Africa by determining the economic value of various adaptation options	www.ceepa.co.za
Climate and Africa –an assessment of Africa policy options and responses	A project undertaken by a network of African research institutions to identify policy options	African Energy Policy Research Network (AFREPREN) of Kenya & Makerere University of Uganda	Focused on conducting studies on national, regional and African responses to climate change	www.unep.org
The Central African Regional Program for the Environment (CARPE)	The multi-donor programme supported by the African Wildlife Foundation, Conservation International (CI), International Union for the Conservation of Nature (IUCN), Jane Goodall Institute (JGI), National Aeronautics and Space Administration (NASA) , Smithsonian Institute (SI), University of Maryland (UMD), US Department of Agriculture (USDA), US Forest Service (USFS), Wildlife Conservation Society (WCS), World Resources Institute (WRI) and World Wildlife Foundation (WWF)	Democratic Republic of Congo, Rwanda, Burundi	CARPE works to reduce the rate of forest degradation & loss of biodiversity by supporting increased local, national, & regional natural resource management capacity	Http://carpe.umd.edu

Institution Name	Type of entity	Nile Basin	Capacity Building	Contacts
Supporting Integrated & Comprehensive Approaches to Climate Change Adaptation in Africa	A United Nations Development Programme (UNDP) implemented project supported through a grant from the Government of Japan	No information	Strengthens capacity to access expanded financing options expanded to meet national adaptation costs at the local, national, sub regional and regional levels and the incorporation of knowledge on climate change risks and opportunities to adjust national development processes	www. adaptationlearning.net
Climate Change and Development Adapting by Reducing Vulnerability (CC DARE)	A sub.saharian project jointly implemented by UNEP, UNDP, UNEP Risoe Centre (URC) & UNEP-DHI Centre for Water & Environment through the financial support of Danish Ministry of Foreign Affairs	Ethiopia, Rwanda, Tanzania & Uganda	Enhanced the knowledge, skills & partnerships that has allowed systematic mainstreaming of climate change issues; stronger technical & institutional capacities for identifying, analyzing, prioritizing, & implementing cost-effective adaptive measures	www.ccdare.org
Integrating Vulnerability & Adaptation to Climate Change into Sustainable Development Policy Planning & Implementation in Eastern & Southern Africa	A project aimed to contribute to the mainstreaming of adaptation to climate change into development planning and implementation in southern & eastern African countries	Kenya and Rwanda, Tanzania	Strengthened capacity to mainstream adaptation at the project or field level as well as through integration of broader policies related to development priorities	www.adaptatiolearning.net
Climate change agriculture and food security (CCAFS)	A 10-year research challenge program on Climate Change, Agriculture & Food Security (CCAFS)	Ethiopia, Kenya, Tanzania & Uganda	Seeks to strengthen ways to overcome the threats to agriculture & food security in a changing climate, exploring new ways of helping vulnerable rural communities adjust to global changes in climate	www.ccafs.cgiar.org
Sahara and Sahel Observatory (OSS)	A work programme of OSS in arid, semi arid & sub-humid areas in North, West & East Africa including long-term observations & networks focusing on land degradation issues		Focus on enhancing African capacities to produce, manage, share and disseminate information applicable to sustainable natural resource management	
One World Consultant	A competence centre for Climate Change Adaptation	Available for the whole NB. Have done vulnerability assessment work in Uganda	Provide competence development centre for Climate Change Adaptation – including the different aspects of finance, institutional arrangements, policy & regulatory environment & evidence	www.oneworldgroup.com.za

3.3.3 East Africa & Central Africa Sub-regional initiatives & organizations

Climate Change adaptation institutions, initiatives, programmes and projects operational in East Africa sub-regions are summarized in Table 2c.

Table 2c: Sub-regional (East & Central Africa) climate change capacity building stakeholders

Institution Name	Type of entity	Nile Basin	Capacity Building	Contacts
IGAD Climate Prediction Centre (ICPAC)	Interstate regional Implementation Centre of IGAD	Potential the whole basin	Foster sub-regional & national capacity for climate information, prediction products & services, early warning, & related applications for sustainable development in the sub-region	http://www.icpac.net/
Advancing Capacity to Support Climate Change Adaptation	A project	Ethiopia, Kenya & Tanzania	Mobilizes scientists and all the other actors concerned to inform political decision-making by conducting pilot projects in rural & urban areas	www.acccaproject.org
Regional Center for Mapping of Resources for Development (RCMRD	An inter-governmental organization established under the auspices of the United Nations Economic Commission for Africa and the African Union	Burundi, Ethiopia, Kenya, Rwanda, Sudan Tanzania and Uganda	Provide quality Geo-Information and allied ICT products and services in environmental and resource management for sustainable development in member countries and beyond	www.rcmrd.org
Regional Universities Forum for Capacity Building in Agriculture (RUFORUM)	An initiative by a consortium of 12 universities in east and southern Africa	Burundi (National University of Burundi) Ethiopia (Haramaya, Mekele), Kenya (Egerton, Jomo Kenyata, Kenyata, Moi), Rwanda (National University of Rwanda), Sudan (Kordofan University of Gezira, Juba), Tanzania (Sokoine University), Uganda (Makerere, Gulu, Kyambogo, Uganda matyrs)	Ddevelops and strengthens human resource capacity for interdisciplinary problem-solving through grant programmes to support research and to address rural (agricultural) development issues	www.ruforum.org
African Technology Policy Studies Network (ATPS)	A multi-disciplinary network of researchers, practitioners & policy makers with a regional secretariat in Nairobi that promotes science, technology & innovation (STI) policy research, dialogue & practice	Ethiopia, Kenya, Tanzania & Uganda	Focuses on mainstreaming climate change in integrated water resources management & has training programs on climate change adoption for policymakers, researchers and the private sector	www.atpsnet.org

Institution Name	Type of entity	Nile Basin	Capacity Building	Contacts
African Centre for Technology Studies' (ACTS)	A non-state institute	Kenya	Its capacity building activities include training in the areas of biodiversity and environmental governance; energy and water security; agriculture and food security	www.acts.or.ke
institute of Resource Assessment (IRA), University of Dar Es Salam	A research and training institute at the University of Dar Es Salaam	Tanzania mainly	supports the capacity building of African community on climate change adaptation through specialised training courses in related fields (educational and training) early to mid-career conservation researchers and practitioners; masters-level graduate students; and university educators	www.ira.udsm.ac.tz
African Climate Change Policy Centre	An ECA-based African Climate Policy Centre (ACPC)	The Whole Nb	A capacity development hub to generate, assemble and administer an adequate base of knowledge to strengthen efforts and capacities of African countries to address the challenge that climate change poses for sustainable development in the continent	www.uneca.org/acpc/
Applied Training Project (ATP)	A project of the Nile River Basin Initiative	The whole NB	Capacity development of water professionals and institutions in the Nile region	www.nilebasin.org/atp
The Association for Strengthening Agricultural Research in Eastern & Central Africa (ASARECA			Agricultural research for food security with focus on new crop varieties through crop breeding to produce crops resilient to current variability	www.asareca.org
Nile Basin and East Africa Office of IWMI	Sub-regional office of a CGIA centre	Whole NB	Implements projects on water resources, hydrology, and irrigation management	http://www.iwmi.cgiar.org/Africa/East

3.3.4 National climate change capacity building stakeholders

Table 2d: National climate change capacity building stakeholders

National institution	Country	Capacity building related areas	Contact
University of Burundi, Institute Des Sciences	Burundi	Water Resources Management and Engineering	http://www.ub.edu.bi/
Agronomiques du Burundi (ISABU	Burundi		http://www.isabu-bdi.org
University of Kinshasa, Centre Regional d'Etudes Nucleares de Kinshasa (CREN-K)	DRC		http://www.unikin.cd/
Regional Training Center, Ministry of Water Resources and Irrigation Cairo University Hydraulic Research Institute	Egypt Egypt Egypt	Water Resources Management and Engineering; Hydraulics and River Engineering	http://www.rctws.com http://www.cu.edu.eg/english/ http://www.hri-egypt.org/
Arbaminch Water Technology Institute Addis Ababa University Alemya University	Ethiopia Ethiopia Ethiopia	Water Resources Management and Engineering; Hydraulics, Hydrology, Water Supply and Sanitation; Irrigation & Drainage	http://www.arbaminch-univ.com http://www.aau.edu.et/ http://www.alemayau.edu.et/
University of Nairobi	Kenya	Water Resources Management; Meteorology, Hydrology	http://www.uonbi.ac.ke/
Institute for Meteorological Training and Research	Kenya	Water Resources Management; Meteorology, Hydrology	www.meteo.go.ke/imtr/
Kenya Water Institute	Kenya		www.kwi.or.ke
National University of Rwanda: Faculty of Science Kigali Institute of Science, Technology and Management (KIST) Institute of Agronomic Science	Rwanda Rwanda Rwanda	Water Resources Management and Engineering; (Could collaborate with Burundi); Science and Technology programs; Agricultural Sector, Water & Soil Conservation	www.nur.ac.rw/ www.kist.ac.rw/ www.isar.rw/
University of Khartoum, Institute for Water and Irrigation The Hydraulic Research Station, Wad Medani	Sudan Sudan	Water Resources Management and Engineering; Water Sector Assessment; Hydrology and Hydrogeology, Irrigation and Drainage	www.uofk.edu/ www.muse.jhu.edu/
University of Dar-es-Salaam Department of Research & Development Institute of Resources Assessment	Tanzania	Water Resources Management; Soil and Water Management; Hydrology; Natural Resources Management	www.udsm.ac.tz/
Makerere University: Department of Civil Engineering	Uganda	Water Resources Management and Engineering; Livestock and Fisheries	www.mak.ac.ug/
Agriculture Engineering and Appropriate Technology Research	Uganda		www.naro.go.ug/technologies/aeatritechn.htm/

3.4 Individual & institutional capacities available

There are already a number of adaptation initiatives taking place in the Nile basin. There are therefore some adaptation capacities available. According to the questionnaire survey, capacities are available in: Forest conservation, and afforestation, Agricultural adaptation, Carbon trading, Adaptation methods and Vulnerability assessment. Climate change planning capacities are considered to be available but require strengthening. Most of these climate change adaptation capacities were mostly (71.8%) at the national level with few respondents (18.2%) stating that capacity was available at all the three levels; local, national and international. This probably because most adaptation initiatives were being carried out at the National levels. During the country visits, it was emphasized that all initiatives should aim to built on existing capacities and put in a place a ''trainer of trainers'' programme to strengthen adaptation capacities in the Nile Basin. For example, it was clear that when few experts directly involved in the Nile Basin were away, those left in-charge had no better understanding of the capacity issues in the Nile Basin.

3.5 Individual & institutional capacities needs

The respondents' interviewed, 28.6% each proposed that the levels of capacity building needs should be at practitioners learning and community workers and academic level (primary, secondary, university, postgraduate). The least priority levels (with 14 % each) were primary, secondary and community worker levels (see Table 3).

Table 3: Levels of capacity building needs

Levels of capacity	% Respondents
Primary, secondary, university, post graduate level & practitioners learning	28.6
Practitioners learning & community workers	28.6
Primary, secondary, Community Workers	14.3
Community workers and locals	14.3
Total	100.0

On whether capacity building should focus on local, national or regional the levels, about 57.1% of the respondents felt that the capacity building efforts should target all three levels; local, national and regional while 14.3% felt it should be done only at national and regional levels. Those who proposed the focus to be national or regional level in isolation were 7.1% each respectively. Those who proposed focus at local, national and international; and local and international were 7.1 % each.

The capacity needs for CCA in the Nile Basin include:

- sustainable energy sources including conservation of forests and reforestation
- soil conservation
- modeling
- agriculture adaptation
- early warning information
- agriculture
- education and awareness
- vulnerability and impact assessment, planning and monitoring and evaluation;
- dissemination of information, data and information
- infrastructure for storage
- Institutional, technical and human and financial resources
- cross-sectoral cooperation,
- adaptation scenarios and strategies,
- knowledge management and coordination

Of these listed capacity needs, modelling, awareness creation, adaptation scenarios and strategies were the most commonly cited capacity needs by respondents. When asked on how these capacity gaps could be addressed, the following were some of their recommendations: training in forest conservation and reforestation; agricultural adaptation; climate change adaptation; and strengthening of climate planning. In addition they also recommended improved coordination and organization. Research and carbon trading, adaptation methods and vulnerability assessments were deemed the most critical areas to focus on. However, the majority of the respondent's ear marked that it is not that capacity is lacking but rather limited, given that they are not adequate to cater for the future extreme climatic events, especially as regards to droughts and famine.

According to the respondents, the missing capacities could be addressed through:

- Training at national level using local data
- Project development and training

- Training and sharing of good practices
- Capacity strengthening and training, exchange programmes
- Trainings and exchange programmes, south-south-north cooperation trainings through workshops and short courses trainings through workshops and short courses
- Investment in infrastructure, financing of institution at all levels and training
- Investment in infrastructure, financing of institution at all levels and training
- Funding, building capacities, knowledge and information, institutional anchor
- Strengthening of cooperation & collaboration among the NB through the NBI framework training, climate prediction centres.

All the respondents agreed that cross-sectoral coordination was very critical. Currently the many different sectors are housed under different ministries that rarely collaborate with each other, thus resulting in conflicting mandates and duplication of efforts. Besides some of the activities of these institutions duplicate from each other, thus loss of time and financial resources. The main reason cited for the dire need for sectoral coordination was attributed to sectoral overlaps. For example, it was apparent that considering agriculture a sector without water was impractical. In addition, others reasons mentioned why cross-sectoral coordination was important include: enhance implementation of mitigation and adaptation activities; promote integrated management of related sectors for effective planning more cooperation between and among Ministry of Agriculture, Ministry of Irrigation and other relevant ministries.

3.5.1 Transboundary communication

This is very critical in ensuring that all the basin users have the necessary information needed to efficiently utilise and manage the basin resources for the current generation without jeopardising the future generations from meeting their needs. All the respondents agreed that capacities in transboundary communication were very important and crucial for the basin. This was supported at various degrees, where approximately 81.3% of the respondents stated that it was strongly needed with the remaining 18.7% stating it as needed. Some of the challenges noted in the context of transboundary communication were: lack of and/or regional early warning systems, limited data and information sharing protocols, limited monitoring and evaluation methods which were noted to be very diverse; thus making comparisons intricate. Given all these challenges, the respondents noted that transboundary communication has great potentials of promoting basin wide early warning systems, developing data and information sharing protocols and harmonisation and standardization of data management process as well as monitoring and evaluation systems.

3.5.2 Negotiation & conflict resolution skills

Negotiation skills were noted to very important to a region such as Africa that is most vulnerable to impacts of climate change, yet the worst hit and suffers the most. The international negotiations take place under the conference of parties held annually under the auspice of United Nations Framework Convention on Climate Change (UNFCCC). The respondents who saw the strong need for the negotiation skills remarked that currently negotiation skills were still very low and limited and this coupled with lack or limited data and information have greatly hampered the basin and Africa in clearly stipulating their positions at the international fora.

3.5.3 Partnerships & networking

Partnership and networking was very important in the basin as it helps build on strengths and weaknesses of various institutions while maximising their comparative advantages. This was clearly supported by the respondents, though at two varying degrees. About 88.2% of the respondents interviewed stated that partnership and networking was strongly needed while the remaining 11.8% stating it as needed.

3.5.4 Thematic capacity needs

The respondents interviewed unanimously agreed that for the technical or thematic areas, capacities in hydrology, climatology; energy and nature conservation; health; and agriculture and land use were all from needed to needed. Hydrology capacities were however ranked highest priority, followed by Agriculture, land use and food security, climatology and energy and nature conservation in that order as summarized in Table 4 below.

Within each thematic area, the sub-themes were further ranked in terms of priority. In hydrology, the top priority sub-theme was ground water, followed by floods, droughts and the least priority being run off regimes (Table 5). Under climatology, top priority sub-theme capacity needs were for weather forecasts, followed by precipitation, weather extremes, and climate regimes while under sustainable agriculture, biodiversity was top priority followed by conservation agriculture with deforestation and soil erosion ranked least. Under the water management theme,

Table 4: Distribution of respondents based on the specific capacity needs in various themes

Thematic capacity needs	Extent of the capacity need		Total
	Strongly needed	Needed	
Hydrology	100.0	0.0	100.0
Climatology	81.2	18.8	100.0
Energy and nature conservation	68.7	31.3	100.0
Health	81.20	18.8	100.0
Agriculture, land use and food security	93.3	6.7	100.0

priority ranking from the most important to the least was as follows: water supply, water demand and water pollution, water allocation, policy and legal instruments, integrated water resource management and lastly water quality and institutional roles. For water use, irrigation and conservation agriculture were top priority while rain water harvesting was ranked lowest priority. For climate change induced water stress, vulnerability assessment and resilience and integrated landscape management were the top priority followed by adaptation opportunities, international climate change politics, conflict clarification, international climate change research, co-management of natural resources, management of protected areas, mitigation strategy, and least priority biodiversity conservation.

Table 5: Priority ranking of thematic areas & sub-themes

Theme	Priority	Sub-theme & priority ranking
Hydrology	Very very high	1. Ground Water
		2. Floods
		3. Droughts
		4. Runoff regimes
Climatology	Very high	1. Weather forecasts
		2. Precipitation
		3. Weather extremes
		4. Climate regimes
Sustainable agriculture	High	1. Biodiversity
		2. Conservation Agriculture
		3. Deforestation
		4. Soil Conservation agriculture
Water management	High	1. Water supply
		2. Water demand
		3. Water pollution
		4. Water allocation
		5. Policy and legal instruments
		6. Integrated water resource management
		7. Water quality
		8. Institutional roles
Agricultural water use	High	1. Irrigation
		2. Conservation agriculture
		3. Rain water harvesting
Climate change water stress		1. Vulnerability assessment and resilience
		2. Integrated landscape Mgt
		3. Adaptation Opportunities
		3. International climate change politics
		4. Conflict clarifications
		5. International Climate change research
		6. Integrated watershed Mgt
		7. Co-management of Natural resources
		8. Management of protected areas
		9. Mitigation strategies
		10. Biodiversity conservation

Chapter four: Conclusions & recommendations

The institutional arrangements for implementation and coordination of climate change capacity building exists at both National and regional level. At national level climate change focal points exits in all the Nile basin countries. At regional level, the Nile Basin initiative provides the most appropriate coordination mechanisms for the coordination of capacity building and knowledge management. This study concludes that as a result of several initiatives that have taken place or are on-going in the Nile Basin, some climate change adaption capacity exist and therefore initiatives like this project should built on such capacities and focus on scaling up through training of trainers programmes. Capacity needs are in both technical (hard skills) and organisational (soft skills) and have identified in the NAPAs and other national adaptation programmes. The capacity building plan is therefore recommended to be systemic and focus on addressing gaps already identified as in the case of the NAPAs.

4.1 Policy & institutional environment

The Nile Basin Initiative (NBI) has a strong coordination and knowledge management role in the Nile Basin. It therefore recommended that this project should closely coordinate with the other Nile Basin Initiative programmes. It is recommended that key lessons from the activities of all the stakeholders identified should be distilled and shared widely. Knowledge management capacity in the Nile Basin should be strengthened as part of this project.

4.2 Climate change adaptation interventions

This assessment recommends that this project should give priority to assisting countries to address gaps in their NAPAs and national climate change strategies All NB least developed countries such as Burundi, DRC, Rwanda, Uganda, Ethiopia, Tanzania, Eritrea and Sudan have all completed and submitted their NAPAs to the UNFCCC. These eight LDC countries have identified 97 priority NAPA projects. The proportion of these projects were as follows; sectoral planning and implementation accounting for the highest number of project (37.1%), building economic and social resilience (23.7 %), capacity building (15.5%), disaster risk reduction (14.4%), Energy (7.21%) with REDD and Carbon market registering the least, 1% each. However, none of the LDC countries registered LULUCF, Finance and technology projects. Besides, the Country NAPAs failed to take into consideration transboundary resources such as the Nile Basin that is shared by these countries. Likewise, only very few projects have been funded and implementation begun. NAPAs have progressed and remain good starting points for implementation of priority adaptation areas identified by countries but have not fully met their objectives. The gaps identified in the NAPAs include:

- The failure to clearly define the scale of implementation of the projects i.e., whether at the national, local community, trans-boundary or sub-regional levels.
- Limited progress on efforts to integration of e climate change into development and sectoral planning processes and even sub-regional initiatives.
- Limited attention to take into consideration trans-boundary and/or sub-regional-wide issues.

In addition, the NB middle income countries such as Kenya and Egypt have also detailed their actions to address climate change. For Kenya, it has developed its National Climate Change Response Strategy that has eight sub-components, of which sub-component 3 (national adaptation plan) exclusively focuses on adaptation. The primary objective of the national adaptation actions and strategies was to identify short, medium and long-term actions and to address the impacts climate change and variability within the context of economic development priorities. Other sub-components focuses on long-term low carbon development pathway, enabling policy and regulatory frameworks, national appropriate mitigation actions (NAMAs), research and development and technology transfer, national performance and benefit management, knowledge management and capacity development, and Finance. Similarly Egypt has developed its Climate Change Action Plan, National Communication on Climate Change, the National Energy Efficiency Strategy, and the National Strategy for Solid Waste Management as part of its roadmap to manage its climate change activities.

Priority capacity needs are in water management and climate induced water stress. Specific water management interventions are recommended in water supply, water demand and water pollution, water allocation, policy and legal instruments, integrated water resource management and water quality and institutional roles. Under agricultural water use, irrigation and conservation agriculture were recommended as priority interventions. For second priority area, climate induced water stress, vulnerability assessment and resilience, and integrated landscape management are recommended as top priority areas followed by adaptation opportunities, international climate change politics, conflict clarification, international climate change research, co-management of natural resources, management of natural resources, mitigation strategy, biodiversity conservation in decreasing order of importance.

4.3 Capacity building plan/approach/ concept

It is recommended that capacity building programmes should emphasise on:

- Knowledge and information management: This should involve generation, management and dissemination of information relevant to climate change adaptation. The sub-components of these programmes would be: In depth regular and updates on vulnerability assessments; a regional coordination mechanisms to strengthen trans-national and sub-regional information sharing of experiences and best practices on cross border vulnerabilities and early-warning data and information on agriculture and natural resources, among other things;
- Research and development programmes : context specific case studies should be carried out in areas with overlapping vulnerabilities, i.e. 'hot spots' to form the baselines for the decision making;
- Education and awareness creation and training on climate change through the formal and informal to the relevant stakeholders both in the public and private sector, the government administration, academic institutions. This entails;
- Revision and development of education curriculum to incorporate climate change issues at primary, secondary, college and university levels;
- Refresher courses and programmes on various aspects of adaptation such as sectoral planning and implementation, disaster risk reduction, building social and economic resilience. These could be through short to mid-term training programmes to the professionals in the various priority sectors of the sub-region and field days for local communities.

To strengthen capacity at individual level, a systemic competence development training approach is recommended. Capacity is more along the notion of 'competences' which means the performance for delivery in the job by individuals, teams and organisations. It is much more than qualifications or technical skills. Capacity building should be integrated in the institutional arrangements of the organisations and not be limited to the lifespan of initiatives like projects which raises the question of sustainability after the expiry of the project. Similarly, capacity building should not be limited to meetings, workshops and short-term trainings. Moreover, follow-ups in terms of monitoring and evaluation have to be carried out to determine the impacts of these trainings to decision making as well the career progression of the trainees upon completion. Capacity building should be programmatic with insights on immediate, mid-term to long term prospects. In this context, capacity building needs to embrace the following objectives:

- To enable human resource development through focused training, mentoring and learning-by-doing approaches, among other measures;
- To empower relevant institutions at various levels;
- To enhance observation, research and knowledge management;
- To strengthen communication, education and awareness-raising at all levels, especially at the local and community levels;
- To strengthen and use the regional networks of information and knowledge-sharing;
- To develop tools, methods and technologies and support their application;
- To encourage and strengthen participatory and integrated approaches in planning and decision-making, including the meaningful participation of civil society;
- To share experiences, information and best practices.
- To assess, strengthen and mobilize the capacities of existing relevant facilities and institutions in the Nile Basin.

It is recommended to adapt one of capacity building programme offered by the stakeholders listed in Table 3. The PICOTEAM leadership for Climate Change programme (annex 2) is such an example. The systemic competence development approach on which the PicoTeam leadership for climate is based has been used in more than 20 long-

term interventions in different fields with very high levels of success (Hagmann et al., 2009). For Climate Change adaptation capacity, the programme could include eight competence areas:

- Facilitation for climate change
- Designing and managing organisational processes
- Understanding Climate systematic and models
- Planning with scenarios
- Adaptation (and mitigation) in practice
- Navigation of Climate Change policies and business
- Managing self, team and unit for climate change
- Managing partnerships in climate change

These topics should be covered in a systemic competence development process (annex 2), which consists of 4 to 5 workshops over a period of 12 to 18 months. Other elements of proposed program are; Intensive practicing in the field supported by coaching and mentoring, Peer learning groups that in between the workshops, are organized in peer groups which try out the practice in the field and share/learn from each other and give each other the confidence and safety which is required when entering unknown ground and Self-learning (e.g. reading).

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Annex one

Annex 1a: Continental climate change stakeholders

Institution	Type of entity	Focal areas	Areas of intervention	Contacts	Remarks
African Ministerial Council on Water (AMCOW)	Intergovernmental	Policies and coordination	Enhance cooperation & coordination and promote the development & implementation of coherent policies & strategies for water resources management	http://www.amcow.net/	Emphasizes climate change adaptation in the Nile Basin
African Water Facility (AWF)	Intergovernmental	Financing	Mobilize resources for the financing of water infrastructure and water investment facilitating activities in Africa	http://www.africanwaterfacility.org	Not specifically to water
The African Ministerial Conference on the Environment (AMCEN)	Intergovernmental	Coordination, policy, research and capacity building	Strengthen cooperation between African governments on economic, technical and scientific activities in order to halt the degradation of Africa's environment	http://www.unep.org/roa/amcen/	Addresses issues of climate change adaptation including the Nile Basin (NB)
New Partnership for Africa's Development (NEPAD)	Intergovernmental	Coordination, policy, research & capacity building	Support African countries to meet their commitments and priorities associated with the implementation of the UNFCCC and its Kyoto Protocol	http://www.nepad.org/	Addresses issues of climate change adaptation including the Nile Basin (NB)
Joint International Development Research Centre (IDRC)	Non Governmental	Research & capacity building	Assist African countries to build their capacity to adapt to climate change in ways that benefit the most vulnerable	http://www.idrc.ca/	
Pan African Parliament	Intergovernmental	Policy and capacity building	Advance the agenda of climate change and Disaster Risk Reduction; through relevant legislation	http://www.pan-african-parliament.org/	Not specifically on adaptation in the NB
United Nations Economic Commission for Africa (UNECA)	Intergovernmental	Coordination, Policy and capacity building		http://www.uneca.org/	Not specifically on adaptation in the NB
The Nile Basin Trust Fund (NBTF)	Intergovernmental	Financing	Helps administer and harmonize donor partner support pledged to the Nile Basin Initiative (NBI)	www.nilebasin.org	Funds water issues including CCA

Institution	Type of entity	Focal areas	Areas of intervention	Contacts	Remarks
African Development Bank (AfDB)	Intergovernmental	Financing, capacity building and Research	Addresses climate change as a crosscutting corporate issue & has adopted an integrated results oriented Climate Change Action Plan that permeates all Bank operations to address mitigation, adaptation & financing	www.afdb.org	Not specifically on adaptation in the NB
Canadian International Development Agency (CIDA)	International	Financing	Facilitate cooperation among countries to resolve conflicts that could arise as a result of transboundary water basins	www.acdi-cida.gc.ca/	Not specifically on adaptation in the NB
African Centre for Technology Studies (ACTS)	Non-state	Capacity building, technology development & transfer, research	Strengthen the capacity of African countries & institutions to harness science & technology for sustainable development	www.acts.or.ke/	The activities have co-benefits to CCA
African Centre for Technology Studies (ACTS)	Non-state	Capacity building, technology development & transfer, research	Strengthen the capacity of African countries & institutions to harness science& technology for sustainable development	www.acts.or.ke/	The activities have co-benefits to CCA
African Centre for Technology Studies (ACTS)	Non-state	Capacity building, technology development & transfer, research	Strengthen the capacity of African countries and institutions to harness science and technology for sustainable development	www.acts.or.ke/	The activities have co-benefits to CCA
African Centre for Technology Studies (ACTS)	Non-state	Capacity building, technology development & transfer, research	Strengthen the capacity of African countries and institutions to harness science and technology for sustainable development	www.acts.or.ke/	The activities have co-benefits to CCA
African Centre for Technology Studies (ACTS)	Non-state	Capacity building, technology development and transfer, research	Strengthen the capacity of African countries and institutions to harness science and technology for sustainable development	www.acts.or.ke/	The activities have co-benefits to CCA
African Centre for Technology Studies (ACTS)	Non-state	Capacity building, technology development and transfer, research	Strengthen the capacity of African countries and institutions to harness science and technology for sustainable development	www.acts.or.ke/	The activities have co-benefits to CCA

Annex 1b: Global climate change stakeholders

Institution	Type of entity	Focal areas	Areas of intervention	Contacts	Remarks
World Bank	International	Financing, capacity building and research	Facilitating dialogue and knowledge sharing on international river basins and transboundary waters	www.worldbank.org/	Not specifically on adaptation in the NB
Global Environment Facility (GEF)	International	Financing, capacity building and research	Financial mechanism that finances energy efficiency, renewable energy, sustainable urban transport and sustainable management of land use, land-use change, forestry, and adaptation	www.thegef.org/	Funds activities in the NB but not related to CCA
Canadian International Development Agency (CIDA)	International	Financing	Facilitate cooperation among countries to resolve conflicts that could arise as a result of transboundary water basins	www.acdi-cida.gc.ca/	Not specifically on adaptation in the NB
United Nations Environment Programme (UNEP)	International	Coordination, policy, financing, capacity building, and research	Promotes ecosystem based adaptation to build resilience of ecosystems that are most vulnerable to climate change, and maximize ecosystem services for adaptation including water resources management	www.unep.org	Supports activities in the NB including CCA
United Nations Development Programme (UNDP)	International	Capacity building and financing	Support implementation of integrated and comprehensive adaptation actions and resilience plans that are cost-effective	www.undp.org	Not specifically on adaptation in the NB but has co-benefits on adaptation
United Nations Educational, Scientific and Cultural Organization (UNESCO)	International	Capacity building, research and policy	Conduct research, education and capacity building activities in the fields of water, environment and infrastructure	www.unesco.org	Not specifically on adaptation in the NB
Global Water Partnership (GWP)	International	Capacity building, research and policy	Support countries in the sustainable management of their water resources	www.gwp.org/	Not specifically on adaptation in the NB
International Union for Conservation of Nature (IUCN)	International	Policy, research and training	Helps implement laws, policy and best-practice by mobilizing organizations, providing resources, training people and monitoring results	http://www.iucn.org	Not specifically on adaptation in the NB

Institution	Type of entity	Focal areas	Areas of intervention	Contacts	Remarks
WorldFish Center	Non-state	Research and capacity building	Specializes in research of living aquatic resources	http://www.worldfishcenter.org/	The activities have co-benefits to CCA
The C3D+ Initiative	International	Capacity Building	C3D+ Initiative Works with seven centers of excellence in Senegal, South Africa, Laos, Thailand, Sri Lanka, China and Samoa. The training centres carry out their activity around the world, spreading their training in more than 40 countries	www.c3d-unitar.org	Not clear if activitive in the Nile Basin
PICOTeam	Consulting Company	Capacity Building	They offer different Learning Programmes including on "Leadership for Climate Change". The Learning Programmes are set up as an integrated, systemic process. Learning Programmes are adapted to the special needs of the project and wishes of the customers	www.picoteam.org	Chapter in Uganda, Kenya and Tanzania
Meteoblue	Private Company	Capacity Building	This company delivers local weather forecasts of high quality for any point on land or water. They are able to offer competences on modelling based on "Nonhydrostatic Meso-Scale Modelling Technology	www.meteoblue.com	They are able to offer competences on modelling based on "Nonhydrostatic Meso-Scale Modelling Technology

Annex 1c: Sub-regional & national climate change stakeholders

Institution	Type of entity	Focal areas	Area s of intervention	Level of intervention	Contacts	Remarks
Common Market for Eastern and Southern Africa (COMESA)	Inter-governmental	Coordination, Policy and capacity building	Achieve economic prosperity and climate change protection," by addressing climate change and its impacts in order to builds economic and social resilience for present and future generations	Southern and Eastern Africa	http://www.pan-african-parliament.org/	Not specifically on adaptation in the NB
Applied Training Project (ATP)	Non-state	Capacity building	Capacity of water professionals and institutions in the Nile region	Sub-regional	www.nilebasin.org/atp/	Not specifically on adaptation in the NB
The Association for Strengthening Agricultural Research in Eastern & Central Africa (ASARECA)	Inter-state	Research	Agricultural research for food security with focus on new crop varieties through crop breeding to produce crops resilient to current variability	Continental (Eastern and Central Africa)	http://www.asareca.org/	Carries out climate change adaptation work but not in NB
The Consultative Group on International Agricultural Research (CGIAR)	State and non-state	Capacity building, research, policy & technology	Mobilizes agricultural science to reduce poverty, foster human well-being, promote agricultural growth and protect the environment	Global	http://www.cgiar.org/	Supports activities in the NB including CCA
Nile Basin and East Africa Office of IWMI	State	Research	Implement numerous research projects on water resources, hydrology, and irrigation management	Sub-regional	http://www.iwmi.cgiar.org/Africa/East/	Have activities & projects on water, including adaptation
Ethiopian Institute of Agricultural Research (EIAR)	State	Research	Provide improved & appropriate agricultural technologies to increase agricultural productivity, food security & environmental sustainability in crops, livestock, Soil & water, forestry & pastoral & agropastoral	National	www.eiar.gov.et/	The activities have co-benefits to CCA
Kenya Marine and Fisheries Research Institute (KMFRI)	State	Coordination, policy, research and capacity building	Conduct aquatic research covering all the Kenyan waters and the corresponding riparian areas including the Kenya's Exclusive Economic Zones in the Indian Ocean waters	National (Kenya)	www.kmfri.co.ke/	The activities have co-benefits to CCA

Institution	Type of entity	Focal areas	Area s of intervention	Level of intervention	Contacts	Remarks
Mikocheni Agricultural Research Institute (MARI)	State	Research and technology	Promotes and coordinates agricultural biotechnology activities in the country	National (Tanzania)	www.costech.or.tz/	The activities have co-benefits to CCA
National Crops Resources Research Institute (NACRRI)	State	Research and technology	Promotes revolution in biotechnology that is transforming agricultural research and development worldwide	National (Uganda)	www.naro.go.ug/Institute/	The activities have co-benefits to CCA
Masinde Muliro University of Science and Technology's (MMUST)	State	Research, policy and capacity building	Promotes science & technology as a tool to responding to development needs of society through engagement in dynamic knowledge creation & application	National (Kenya)	www.mmust.ac.ke/	The activities have co-benefits to CCA
Department of Meteorology, University of Nairobi, Kenya	State	Climate predictions, research and capacity building	Provides educational & research environment to examine the dynamic, physical, & chemical processes that occur in the atmosphere including physical processes, observation and monitoring systems; & climate modeling	National (Kenya)	www.uonbi.ac.ke/departments/	The activities have co-benefits to CCA
Agricultural Research Corporation (ARC)Applied Training Project (ATP)	Non-state	Research and technologies, capacity building	Aims to develop and implement research designed to produce technologies & systems to ensure high & sustainable crop productivity, food security & export capacitycapacity of water professionals & institutions in the Nile region	National (Sudan) Sub-regional	www.arcsudan.sd/ www.nilebasin.org/atp/	Not specifically on water or the NBNot specifically on adaptation in the NB
Hydraulic Research Station (HRS) The Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA)	Inter-state	Research	Conduct research & studies which could help in the more efficient use of Sudan's available water resources. It is aiming at the increasing agricultural productivity, developing inland waterways for navigation, maximizing hydro-power generation & solving associated applied hydraulics problems. Agricultural research for food security with focus on new crop varieties through crop breeding to produce crops resilient to current variability	National (Sudan) Continental (Eastern and Central Africa)	www.oocities.com/thetropics/ http://www.asareca.org/	Carries out climate change adaptation work but not in NB

Institution	Type of entity	Focal areas	Area s of intervention	Level of intervention	Contacts	Remarks
Africa Harvest Biotech Foundation International (AHBFI)The Consultative Group on International Agricultural Research (CGIAR)	Non-state	Policy and technology, capacity building, research, policy and technology	Aims to free of hunger, poverty and malnutrition" through use of science and technology – especially biotechnology – to help the poor in Africa achieve food security, economic well-being and sustainable rural development, Mobilizes agricultural science to reduce poverty, foster human well-being, promote agricultural growth and protect the environment	National (Kenya)	www.africaharvest.org/ http://www.cgiar.org/	Not specifically on water or the NBSupports activities in the NB including CCA
IGAD Climate Prediction and Applications Centre (ICPAC) Nile Basin and East Africa Office of IWMI	Interstate	Capacity building and research	Foster sub-regional and national capacity for climate information, prediction products and services, early warning, and related applications for sustainable development in the sub-region Implement numerous research projects on water resources, hydrology, and irrigation management	Sub-regional	http://www.icpac.net/ http://www.iwmi.cgiar.org/Africa/East/	Climate data helps adaptation to current Variability including NBHave activities and projects on water, including adaptation
ALTERRA	Non-state	Capacity building and research	Aims to develop adaptive water management systems, both for infrastructure (storage and buffering capacity), and management (regime and institutions)	Sub-regional (Nile Basin)	http://www.alterra.wur.nl/UK/	Supports activities in the NB including CCA
The International Atomic Energy Agency (IAEA	Interstate	Research	Improve the management of water resources through use of isotope technologies		http://www.iaea.org/	The activities have co-benefits to CCA
Ethiopian Institute of Agricultural Research (EIAR)	State	Research and capacity building	Provide improved and appropriate agricultural technologies to increase agricultural productivity, food security and environmental sustainability in crops, livestock, Soil and water, forestry and pastoral and agropastoral	National	www.eiar.gov.et/	The activities have co-benefits to CCA

Institution	Type of entity	Focal areas	Area s of intervention	Level of intervention	Contacts	Remarks
UNESCO-IHE Kenya Marine and Fisheries Research Institute (KMFRI)	Interstate	Research and capacity building	Provides water education Conduct aquatic research covering all the Kenyan waters and the corresponding riparian areas including the Kenya's Exclusive Economic Zones in the Indian Ocean waters	National (Kenya)	http://nbcbn.com/Home.asp www.kmfri.co.ke/	The activities have co-benefits to CCA
University of Bergen Mikocheni Agricultural Research Institute (MARI)	Non-stateState	Research and technology Policy, research and advocacy Research and technology	Focuses thematically on contested resources, climate dynamics, health and socioeconomic aspects Promotes and coordinates agricultural biotechnology activities in the country	National (Tanzania)	https://nile.uib.no/ www.costech.or.tz/	Not specifically on water or the NB The activities have co-benefits to CCA
Advocates Coalition for Development and Environment (ACODE) National Crops Resources Research Institute (NACRRI)	Non-state State	Research and policy Research, policy and capacity building	Policy research and advocacy think tank in governance, trade, environment, and science and technology. Its research team is a unique blend of multi-disciplinary professionals with specialized expertise in cutting age policy research, advocacy and monitoring of public policy Promotes revolution in biotechnology that is transforming agricultural research and development worldwide	National (Uganda)	www.acode-u.org/ www.naro.go.ug/Institute/	Not specifically on water or the NB The activities have co-benefits to CCA
Centre for Energy, Environment Science and Technology Masinde Muliro University of Science and Technology's (MMUST)	Non-state State	Research and policy Research, policy and capacity building	Conducts research on energy development, environmental protection, natural resource use and management, and the development and use of science and technology in a holistic and balanced manner in order to create synergies Promotes science and technology as a tool to responding to development needs of society through engagement in dynamic knowledge creation and application	National (Tanzania) National (Kenya)	www.ceest.co.tz www.mmust.ac.ke/	Not specifically on water or the NB The activities have co-benefits to CCA

Institution	Type of entity	Focal areas	Area s of intervention	Level of intervention	Contacts	Remarks
Department of Meteorology, Kenya Department of Meteorology, University of Nairobi, Kenya	State	Research and policy	Provide climate & weather services to the Government & other stakeholders engaged in national development activities in the country Provides educational & research environment to examine the dynamic, physical, & chemical processes that occur in the atmosphere including physical processes, observation & monitoring systems; & climate modeling	National (Kenya)	www.meteo.go.ke/ www.uonbi.ac.ke/ departments/	Not specifically on water or the NB The activities have co-benefits to CCA
Lake Basin Development Authority (LBDA)	State	Research and policy	Spearheads development in the region through integrated planning and sustainable management of the resources through the participation approaches	National (Kenya)	www.lbda.co.ke/	Supports activities in the NB including CCA
Practical Action	Non-state	Research and technology	Demonstrate and advocate the sustainable use of technology to reduce poverty in developing countries	National (Kenya)	www. practicalaction. org/	Not specifically on water or the NB
OSIENALA (Friends of Lake Victoria)	Non-state	Research, policy and capacity building	Provide interventions on environmental management in the Nile Basin	National (Kenya)	www.osienala.org/	Supports activities in the NB including CCA
Horn of Africa Regional Centre Agricultural Research Corporation (ARC)	Non-state	Capacity building and technology Research and technologies	Promotes environmental awareness & deploying educational activities & pilot projects to test and disseminate innovations Aims to develop & implement research designed to produce technologies & systems to ensure high & sustainable crop productivity, food security & export capacity	Sub-regional National (Sudan)	www.recsasec.org/ www.arcsudan.sd/	Not specifically on water or the NB
Hydraulic Research Station (HRS)	State	Research	Conduct research & studies which could help in the more efficient use of Sudan's available water resources. It is aiming at the increasing agricultural productivity, developing inland waterways for navigation, maximizing hydro-power generation & solving associated applied hydraulics problems	National (Sudan)	www.oocities. com/thetropics/	

Institution	Type of entity	Focal areas	Area s of intervention	Level of intervention	Contacts	Remarks
African Centre for Technology Studies' (ACTS) Africa Harvest Biotech Foundation International (AHBFI)	Non-state	Capacity building Policy & technology	Provide training in the areas of biodiversity & environmental governance; energy & water security; agriculture & food security Aims to free of hunger, poverty & malnutrition" through use of science & technology – especially biotechnology – to help the poor in Africa achieve food security, economic well-being & sustainable rural development	Continental (Eastern and Southern Africa) National (Kenya)	http://www.acts.or.ke/ www.africaharvest.org/	Not specifically on water or the NB Not specifically on water or the NB
IGAD Climate Prediction and Applications Centre (ICPAC)	Interstate	Capacity building	Foster sub-regional & national capacity for climate information, prediction products & services, early warning, & related applications for sustainable development in the sub-region	Sub-regional	http://www.icpac.net/	Climate data helps adaptation to current Variability including NB
ALTERRA	Non-state	Capacity building and research	Aims to develop adaptive water management systems, both for infrastructure (storage & buffering capacity), & management (regime & institutions)	Sub-regional (Nile Basin)	http://www.alterra.wur.nl/UK/	Supports activities in the NB including CCA
The International Atomic Energy Agency (IAEA)	Non-state	Capacity building, policy and research	Improve the management of water resources through use of isotope technologies		http://www.iaea.org/	The activities have co-benefits to CCA
UNESCO-IHE	Interstate	Research and capacity building	Provides water education		http://nbcbn.com/Home.asp	The activities have co-benefits to CCA
University of Bergen	Non-state	Research and capacity building	Focuses thematically on contested resources, climate dynamics, health & socioeconomic aspects	National	https://nile.uib.no/	Not specifically on water or the NB
Advocates Coalition for Development and Environment (ACODE)	Non-state	Policy, research and advocacy	Policy research & advocacy think tank in governance, trade, environment, & science & technology. Its research team is a unique blend of multi-disciplinary professionals with specialized expertise in cutting age policy research, advocacy & monitoring of public policy	National (Uganda)	www.acode-u.org/	Not specifically on water or the NB

Institution	Type of entity	Focal areas	Area s of intervention	Level of intervention	Contacts	Remarks
Centre for Energy, Environment Science and Technology	Non-state	Research and policy	Conducts research on energy development, environmental protection, natural resource use and management, and the development and use of science and technology in a holistic and balanced manner in order to create synergies	National (Tanzania)	www.ceest.co.tz	Not specifically on water or the NB
Department of Meteorology, Kenya	State	Research and policy	Provide climate and weather services to the Government and other stakeholders engaged in national development activities in the country	National (Kenya)	www.meteo.go.ke/	Not specifically on water or the NB
Lake Basin Development Authority (LBDA)	State	Research and policy	Spearheads development in the region through integrated planning and sustainable management of the resources through the participation approaches	National (Kenya)	www.lbda.co.ke/	Supports activities in the NB including CCA
Practical Action	Non-state	Research and technology	Demonstrate and advocate the sustainable use of technology to reduce poverty in developing countries	National (Kenya)	www.practicalaction.org/	Not specifically on water or the NB
OSIENALA (Friends of Lake Victoria)	Non-state	Research, policy and capacity building	Provide interventions on environmental management in the Nile Basin	Sub-regional	www.osienala.org/	Supports activities in the NB including CCA
Horn of Africa Regional Centre	Non-state	Capacity building and technology	Promotes environmental awareness and deploying educational activities and pilot projects to test and disseminate innovations	Sub-regional	www.recsasec.org/	
African Centre for Technology Studies' (ACTS)	Non-state	Capacity building	Provide training in the areas of biodiversity and environmental governance; energy and water security; agriculture and food security	Eastern and Southern Africa	http://www.acts.or.ke/	Not specifically on water or the NB

Annex two: Leadership for climate programme - proposed capacity development plan/approaches

(i) Systemic competence development process versus modular training

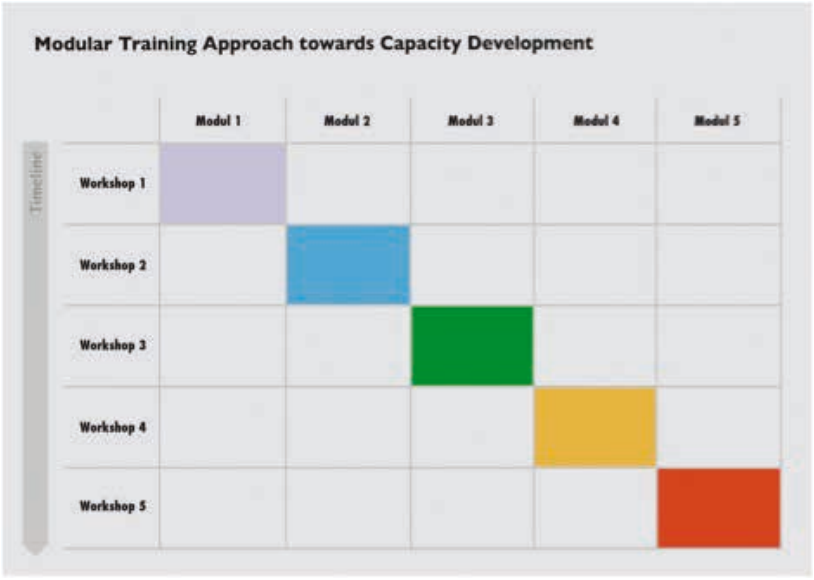
Conventional training is often organized in terms of modules – modular training (see Graphic 1). For example, workshop 1 monitoring and evaluation is covered; workshop 2 is about gender and workshop 3 is conservation agriculture or something else. These are often presented as separate and isolated issues. What is lacking is binding them to specific context. After such a training people are often excited about it. However, in many cases, they are unable to integrate these issues in their day-to-day work life. If at all they apply these, it is just one component of it, but does not address the whole system.

The capacity development approach proposed here for the Nile Basin is based on a systemic competence development process (Graphic 2) which consists of:

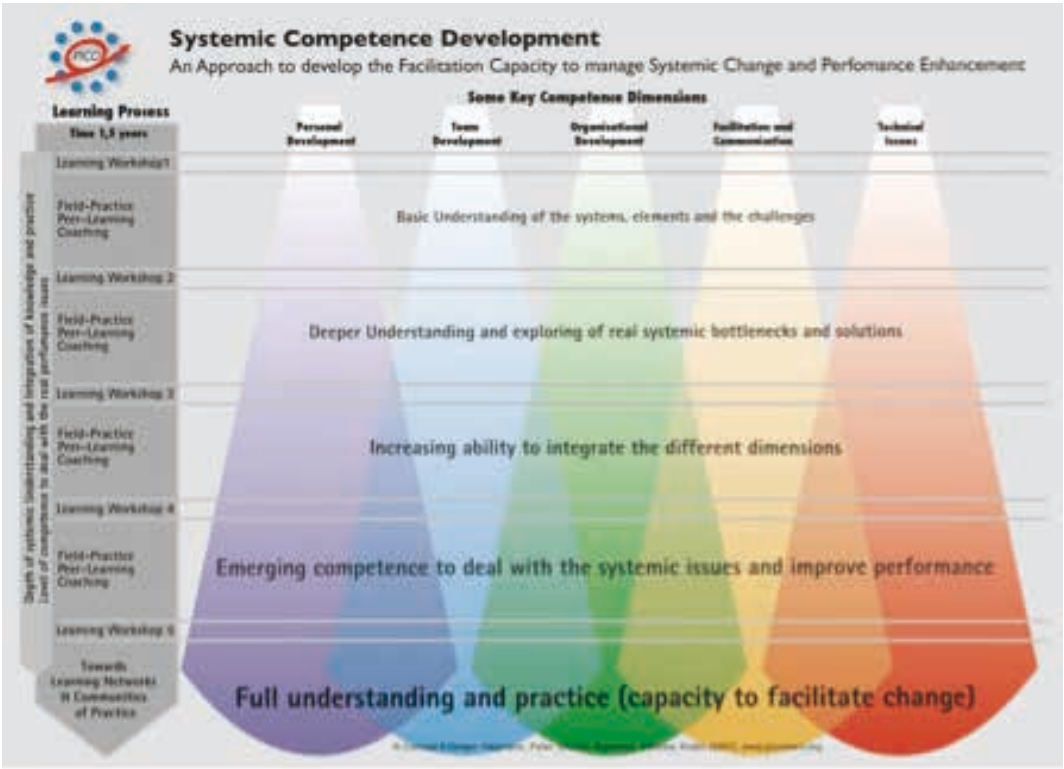
- 4 to 5 learning workshops over a period of 12 to 18 months
- Intensive practicing in the field supported by coaching and mentoring.
- Peer learning groups: In between the workshops, the learners are organized in peer learning groups which try out the platform facilitation in the field and share/learn from each other and give each other the confidence and safety which is required when entering unknown ground.
- Self-learning (e.g. reading)

It strengthens the facilitation competence of climate change stakeholders in leadership by engaging them in a learning process on how to implement adaptation interventions and strengthen their local organizational capacity. Capacity is more along the notion of 'competences' which means the performance for delivery in the job by individuals, teams and organisations. It is much more than qualifications or technical skills.

Graphic 1: Modular approach towards capacity development



Graphic 2: The systemic competence development



Key competence areas

An integrated learning program for climate change capacity development

This learning program is designed for practitioners who are faced with the challenge of providing leadership for climate change in government, at the political level, in the private sector and for civil society stakeholders. Our main principle is 'making change happens'; this is grounded on the action learning concept that we build on the practitioners' real life experiences, enabling them to gradually change their situation for the better. This, however, cannot be achieved in traditional modular training, which often does not help to facilitate effective change in practice. The design of our learning program therefore takes a different approach. It is built on the concept of 'systemic competence development', where theory, practice and coaching are integrated in one coherent learning process to support people directly in their performance on the job.

Eight key competence areas

The learning program focuses on eight key competence areas. In each of these areas, participants will gain a level of proficiency enabling them to professionalize their engagement in the broader climate change management as well as in their organisations, thus improving their overall performance as leaders and managers. The competence areas are depicted in the diagram:

The systemic competence development approach adopts an innovative way of addressing the key competence areas that people need to develop in a particular context. In the context of Climate the key areas are elaborated below:

Facilitation for change – the foundation competence	
Designing a coherent process	Visioning (process workshop, outcome, performance indicators) / learning process design / analytical flow, strategic sequencing of steps, co-management by participants) / methodological process and principles / values and guiding principles for workshops
Managing interaction	Facilitation techniques (role of the facilitator, cards, pinboards-flipcharts technique, visualisation skills, stage and crowd management, presentation skills, methods for the ´toolbox´) / negotiation concepts (Harvard business model) / dealing with conflicts
Questioning for change	The art of questioning / codes and simulation / strategic dialogue
Process observation and analysis	Observation and analysis / monitoring, documentation / reflecting, adapting, reinforcing
Group dynamics	Dealing with group dynamics, team development, feedback, listening, meta-communication, small and large group intervention techniques
Communication	Feedback culture / managing conflicts / principled negotiation
Change	Decision making / responsibility / transparency / participation

Design and management of organisational processes	
Organisational setup	Processes and structures (analyses, delivery processes, optimizing) / human resources / finance and administration
Companies culture	Core values / cooperate identity / familiarisation / innovation and creativity / continuous improvement process / ownership and commitment / acquaintance of diversity
Learning organization	Knowledge management / team learning / personal mastery / mentoring / handing over / mental models / sharing and creating knowledge
Strategic planning	Visions / strategies / operations / planning
Decision making	Rational / intuitive / interrogative
Monitoring	Process / impact / evaluation / assessment
Handover	Documentation / information / qualification / network

Managing yourself, your team and unit	
Emotional intelligence	Personal mastery and soft skills / judging yourself / basic encounter / becoming a team player / self-concept and self-confidence
Leadership competences	Leadership versus management / responsibility and accountability / incorruptibility / management styles and their meanings / getting your priorities right / personal career development / managing your boss / decision making – delegation and implementation
Communication skills	Feedback techniques / managing conflicts / principled negotiation Self-efficacy and tradition
Structures for teamwork	Allocation of tasks / team charta / administration / reflection / adjustment
Organizational change and development	Systemic leadership / systemic change management / systemic consultation / solution oriented approaches / assessing change performance
Trainee and mentoring	Empowerment / peer exchange / challenge and subsidies / trainee programs / ´old boys network´
Managing capacities and competences	Getting the right people in the right job at the right time /motivation for performance / gender and diversity / learning teams / funding and resources mobilization

Understanding climate systemics and models	
System analysis	Drivers / components / interrelations / dynamics / traditional knowledge
Natural systems	Ecosystems / natural cycles / sustainable recources
Simulations	Qualitative and quantitative modelling / reliablity of predictions
Fields of impact	Water / energy / biodiversity / agriculture / wildlife / fishery / land-use management / infrastructure / migration / displacement / gender / health / economy / form of government
Scientific community	IPCC / WMO / UNFCCC / UNEP / Re Insurances

Planning with scenarios and prognoses	
Scenario management	Concepts / possibilities / techniques
Climate scenarios	Focusing on dynamics / parameters /scenario fiction /extremes
Leading from the future	Seeing / sensing / presencing / crystallizing / prototyping / performing
Extreme weather events	Water / aridity / floods / wind / storms / coldness / heat
Risk management	Identify, characterize, and assess threats / assess the vulnerability of critical assets to specific threats / determine the risk / identify ways to reduce risks / prioritize risk reduction

Mitigation and Adaptation in Practice	
Energy	Energy efficiency / renewable energies / building design / transport
Economy	Low carbon economy / new opportunities / cost by cause principles / national GDP / regional markets / international impacts / trade
Infrastructure	Urban planning / energy / data transfer / transport
Water	Potable / industrial / agricultural / coastlines / erosion
Agricultural Productivity	Food / export / solils / land use management / drought tolerances / bio-diversity
Society	Health / gender / migration / security / displacement / form of government
Policy Development	Public policy research / governmental strategies / assessment / recommendation
Climate change communication	Making global climate change *local* and understandable / leading by example / addressing collective power / leverage approach / incorporating culture and social values

Navigation in climate change policies and business	
Regional/ national	Organisations and institutes/ strategies and plannings / support programme
Inter- governmental	Kyoto / Copenhagen
Emission trading	CO2 Trading
Resource mobilization	Allocation / contracting

Managing partnerships	
Partnership	Arrangements / conventions / communication / transparency / confidence / reliability
Networking	Managing by walking around / creating referrals / community of interests / alumni
Project management	Project description / contracts / milestones / documentation / monitoring / process management

An overview of the learning process

The 1st learning workshop: As reflected in the figure above, the first learning workshop provides the foundation where the different concepts are introduced and discussed. People get to understand the basics, but linked to the real practice not abstract. The participants are prepared enough to make their first step into their field practice.

1st field practice: The participants go and practice in the framework of defined tasks and objectives, and begin to discover how things really are. Working with peers is very essential in giving them confidence to dare to try new things. Peer groups also provide the necessary support they need to face the challenges they meet in the field. Some level of backstopping is also given at this stage

2nd learning workshop: Here the participants share their field practice experience in terms of how it went (successes, challenges and insights). Sometimes the participants come up with symptoms; therefore the deeper analysis of the issues is essential during the workshop. In addition to this reflection, additional inputs in the form of lectures, stories, and case studies of all the 5 themes are given, to help deepen the issues, and also to prepare them for the next field practice.

2nd field practice: The participants go back to experience issues in real life. Here they begin to gain deeper understanding of the systemic bottlenecks

3rd learning workshop: The participants come back again to reflect and share about their field practice experience. Often here the challenges have shifted and the people have increased their ability to integrate the issues. That systemic integration becomes more visible. Additional input are given too

3rd field practice: They go for another round of field practice

4th learning workshop: This may be the final workshop, were they continue to reflect and share their experiences.

Annex three: Stakeholders consulted

Names	Stakeholder category	Contact detail	Comment – method of consultation
Dr W. Khairy	Inter-governmental	Nile Basin Initiative, Uganda, WKhairy@nilebasin.org	Questionnaire & interview
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Names	Stakeholder category	Contact detail	Comment – method of consultation
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