Vulnerability Assessment and Options Appraisal in Developing an Adaptation Program in Uganda (water resources management system)

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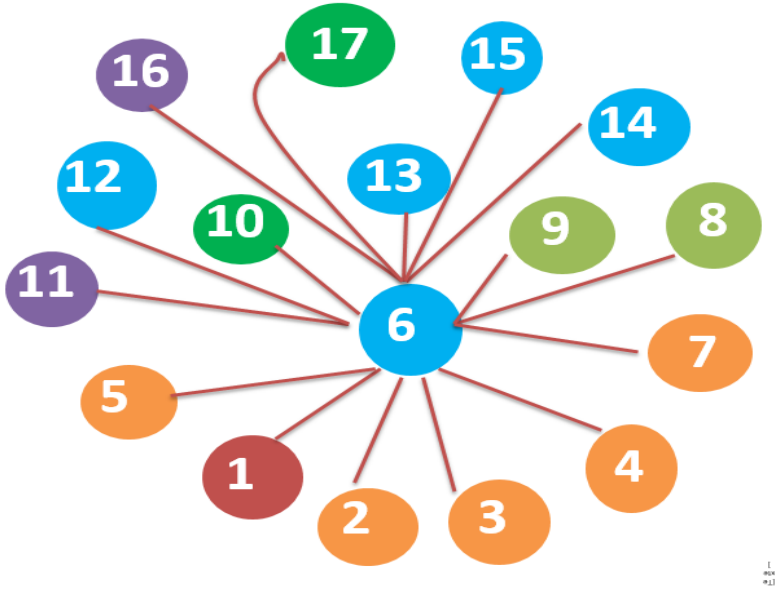
The National Adaptation Plan Global Support Programme (NAP-GSP)

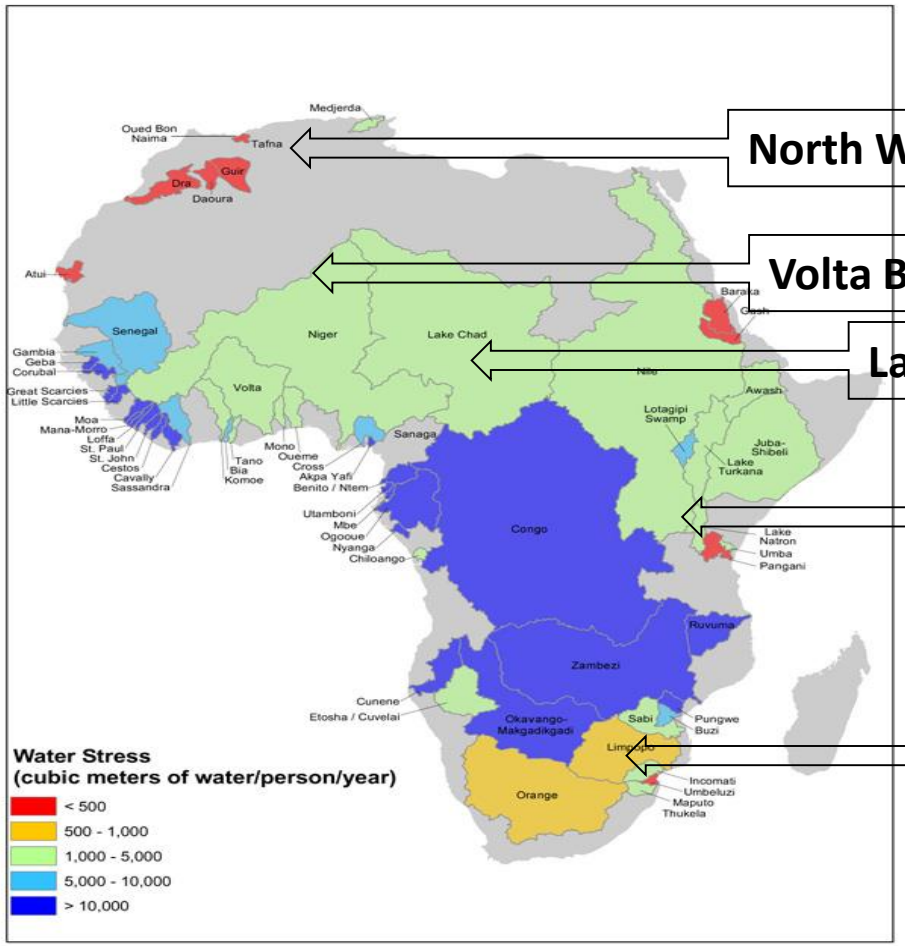
- GWP is part of the NAP GSP with UNDP-UNEP and other partners and has supported NAPs in several countries in Africa and Central America

- SDG 6 water and related targets



Sharing expeince from the Water, Climate and Development Program

Objective: to support integration of water security and climate resilience in development planning and decision making processes



North West Sahara Aquifer (SASS)

Volta Basin

Lake Chad Basin

Kagera Basin

Limpopo Basin

Phase 1:

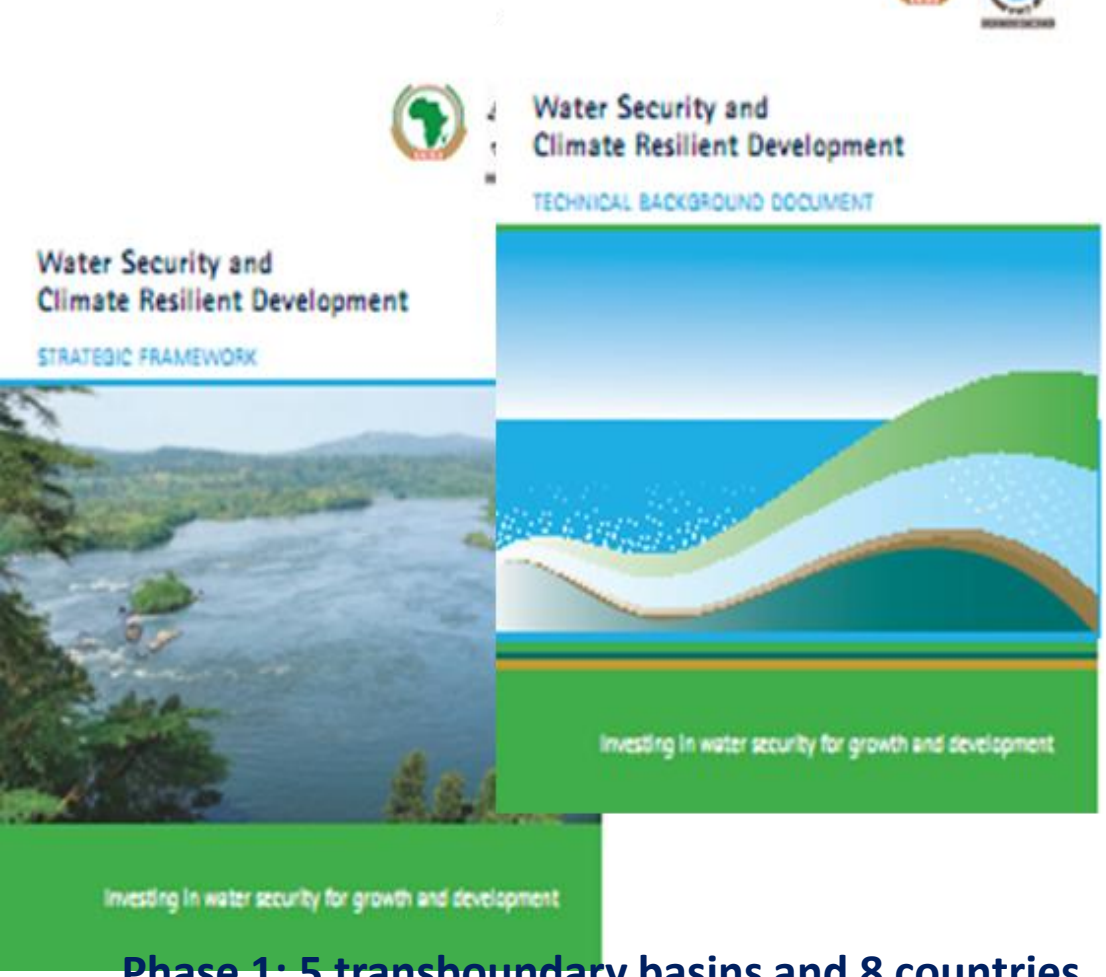
1. Ghana
2. Burkina Faso
3. Cameroon
4. Tunisia
5. Burundi
6. Rwanda
7. Mozambique
8. Zimbabwe

Phase II

1. Kenya
2. Uganda
3. Zambia
4. Tanzania
5. Mauritania
6. Mali
7. Benin
8. Senegal
9. São Tomé and Príncipe
10. Central Africa Republic

Sharing expeince from the Water, Climate and Development Program

Water Climate and Development Program for Africa (WACDEP)
AU/AMCOW program on integrating water security and climate resilience into development plans



Phase 1: 5 transboundary basins and 8 countries
Phase 2: (same basins and 10 more countries

Strategic Framework

- Policy briefs provide key messages and recommendations for policy makers
- Strategic Framework guides on process and tools available
- Technical Background Document provides detail on tools and methods outlined in the Strategic Framework

Program Components:

- Facilitate regional/transboundary cooperation
- National development plans
- Investment plans and project preparation
- Demonstrations
- Capacity development and Knowledge magt
- Multi-stakeholder Partnership building

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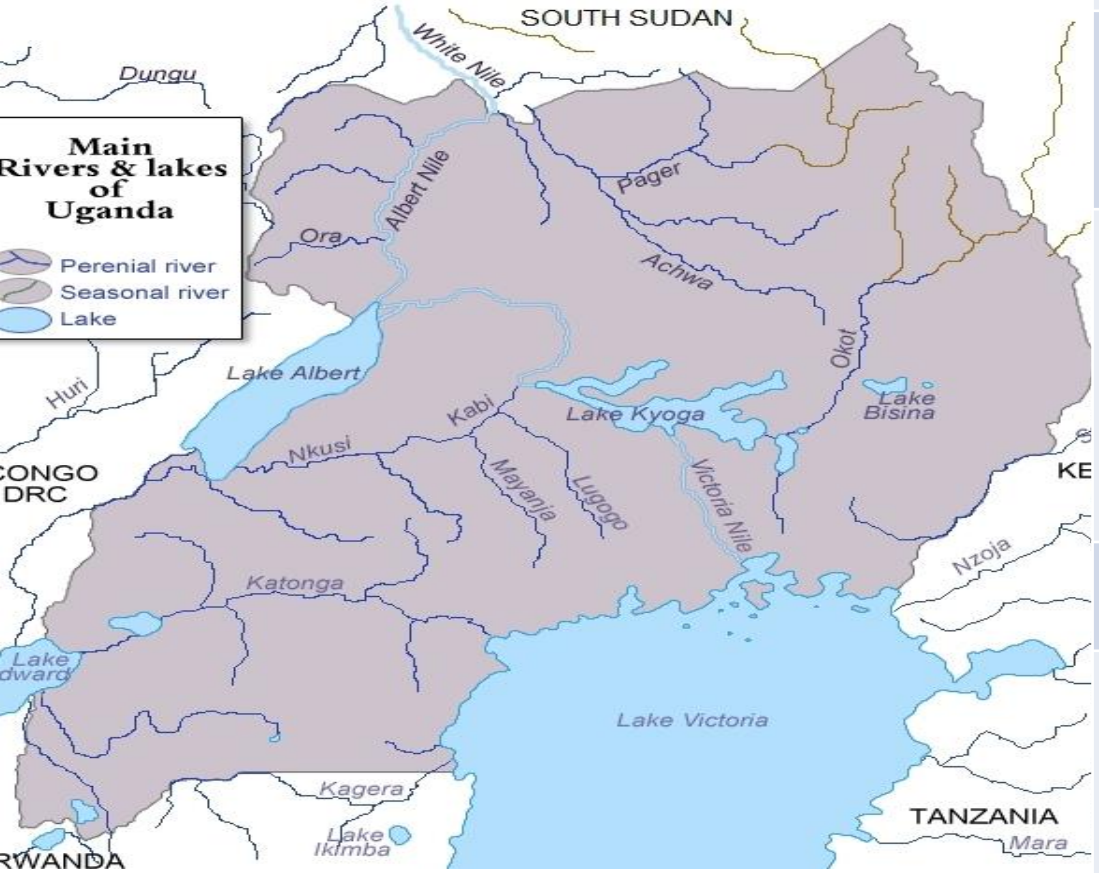
Key Messages

- Examine availability of data and information for vulnerability assessment and options appraisal (a lot of information was already available)-ICPAC, National Studies, Documents, IPCC Report…--Catchment Management Planning Process, and Other methods DSS (NBI) Tools, Water Balance, Demand/Supply etc. helped
- Adapt the approaches based on scale, context and diversity of stakeholders to make it simple, applicable and agreed by stakeholders
- Follow participatory and multi-stakeholder processes to:
  - identify challenges/issues, interventions and impacts (envt.al, social, economic)
  - make alignment with National strategies and plans; and to meet national technical standards, including ESIA
  - establish synergies with other projects, and build partnership with stakeholders
  - learn from others' experiences
  - create sense of ownership of the process
  - ensure sustainability of interventions

Uganda: Context Analysis (Uganda Vision 2040)

	Baseline		2040	
1. Per capita income	▪ 506		▪ 9500	
2. % Popn. < poverty line	▪ 24.5%		▪ 5%	
3. % level of urbanization	▪ 13%		▪ 60%	
4. % popn. Access to safe piped water	▪ 15%		▪ 80%	
5. Population growth rate	▪ 3.2		▪ 2.4	
6. Forest cover	▪ 15%		▪ 24%	
7. Weland cover	▪ 8%		▪ 13%	

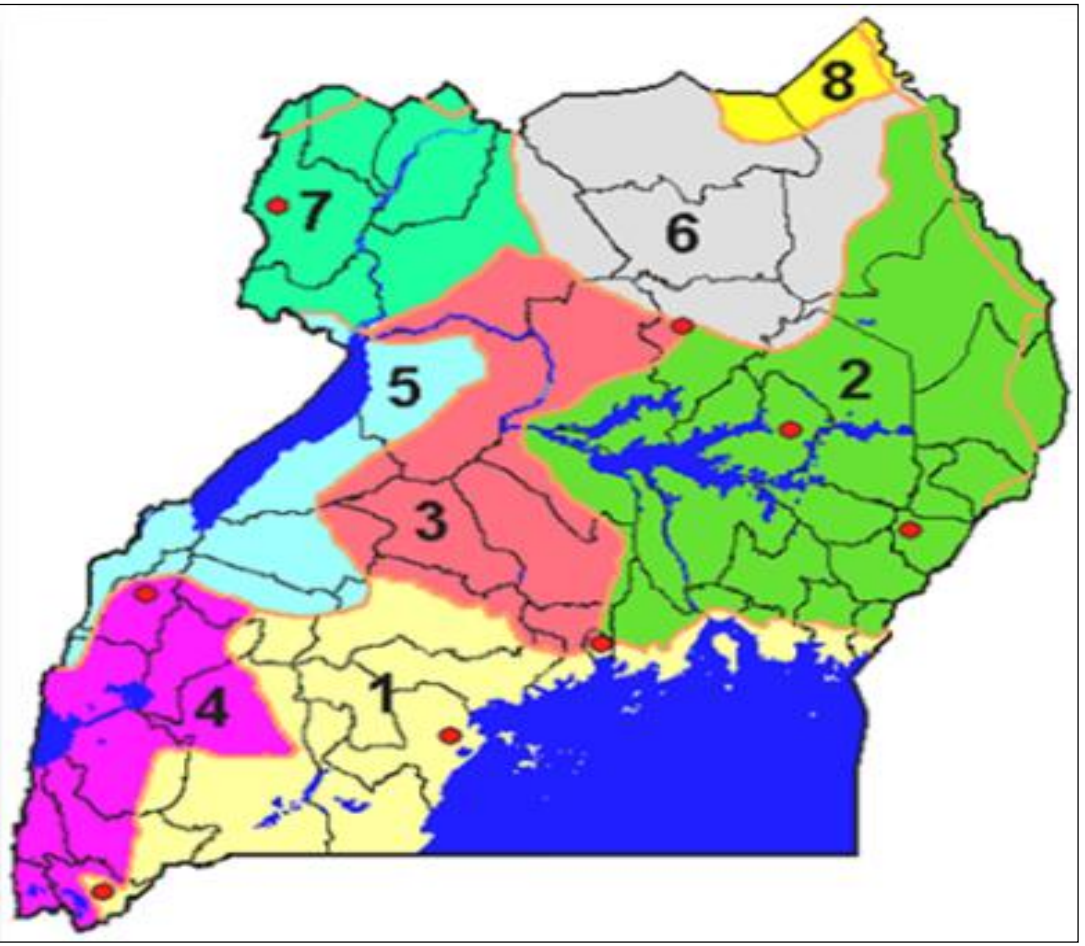
Uganda: Context Analysis



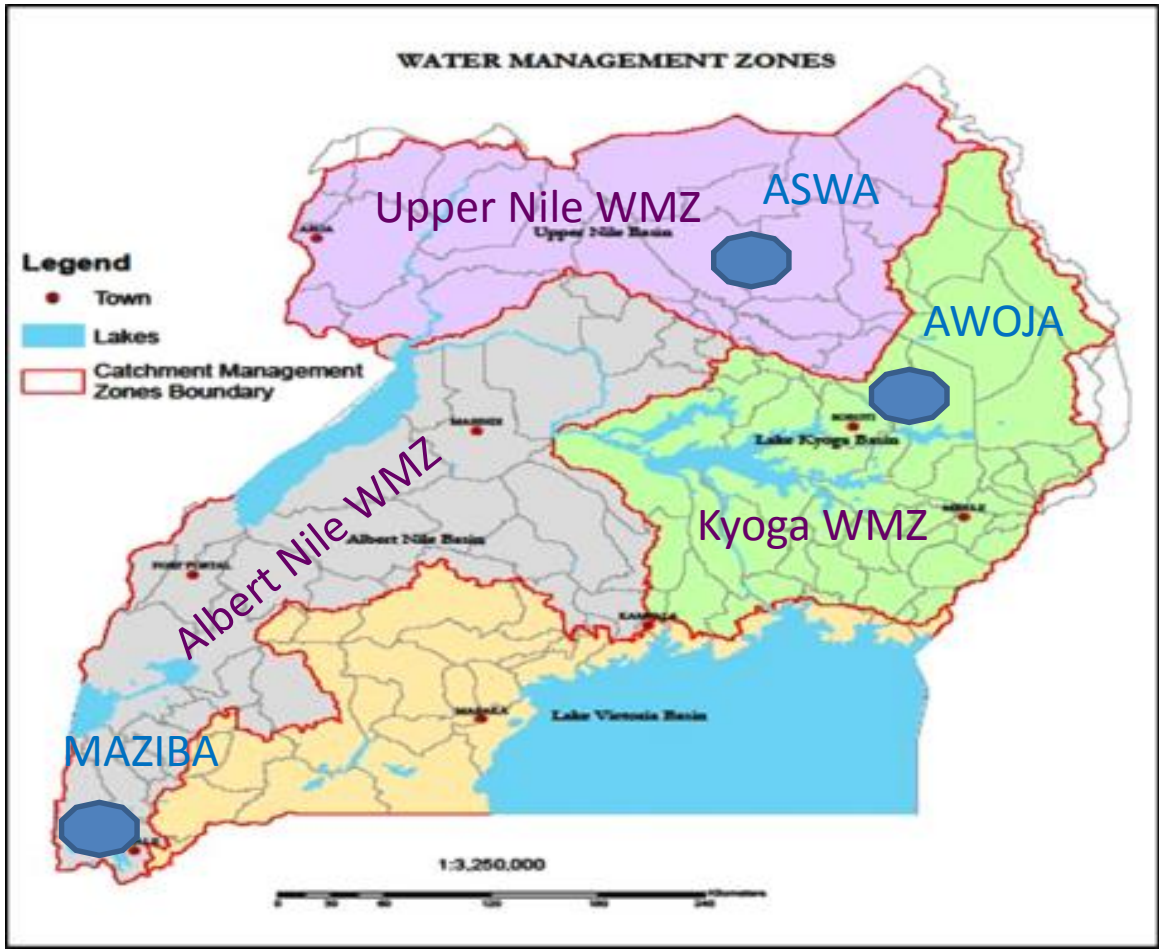
Water rich country with lake, river, wetland and rainfall (400 to 2200 mm per year.

	2010…2013	2050
1. Size	▪ 241,038 KM2	
2. Economy	▪ Per capita GNI 1200 USD, 29% <poverty line (1.25US/d) ▪ Agri. employs 60% of people, 20% GDP, subsistence	
3. Population	▪ 35M ▪ growth rate 3.7% ▪ Urban (20%)	▪ 103M ▪ growth rate 2.9% ▪ Urban (60%)
4. Climate	▪ Increasing projections for temperature ▪ Drought (1973, 79,81, 84-87,92,93,99,2004,10/11,15/16	▪ Change in rainfall distribution, intensity ▪ Dec-Jan-Feb some +? ▪ changes in the severity and frequency of extreme events (floods, droughts, heatwaves, storms), land slides, ~20-30%
5. Water	▪ Demand 408 (2010) MM3/yr	▪ Total demand 3963 MCM/yr
	▪ Total Annual renewable water=43 Billion M3 ▪ (29 externally renewable +14 internally renewable) ▪ dependence ratio on water resources originating from outside its borders is 69%. ▪ Utilization rate 2.8%, projected increase to 14.1% if all the irrigation potential of 240,000 ha is utilized.	
6. Climatic zones	▪ Highland climate; ▪ Savannah tropical climate+the lake basin climate; and ▪ Semi-arid climate	

Catchment Based Water Resources Management



8 hydrological basins



4 Water Management Zones (WMZs)

Catchments: (1) Awoja in Kyoga WMZ, (2) Aswa in Upper Nile WMZ and (3) Maziba in Albert Nile WMZ

Catchment selection criteria

- Relative degree of vulnerability to climate change, and severity of other challenges such as land degradation, water scarcity and population pressure
- Sensitivity of ecological systems such as degraded highlands, wetlands, grazing lands/savannah.
- Broader representation of climatic zones of Uganda..
- Representation of diverse livelihood and social systems

Note: Prioritization of catchments done by MWE as part of Catchment Management Planning process.

Catchment characteristics: AWOJA

Awoja highland : landslide around the mount Elgon-farming on steep slopes

Drought in Karamoja part of the catchment

Awoja midland: crop farming (sorghum) (flooding)

1. **Awoja Catchment** (area: 11,000 km^{2,})
   - high-rainfall mountain areas in the east,
   - lowland plains with sufficient rainfall to support rain-fed agriculture,
   - extensive wetlands and lakes, and
   - dry northern cattle corridor and pastoralists
   - CC Impacts

   droughts, landslides, land degradation/deforestation/overgrazing

Awoja lowland: part of the extensive lake/wetland system around the low-lying parts of the catchment, paddy rice (flooding)

Catchment characteristics: ASWA

Aswa highland : Drought in Karamoja part of the catchment

Aswa midland: maize and groundnuts cropping systems) (flooding)

2. Aswa catchment (area: 27,631 km^2)

- Conflict and social insecurity and mass displacement of people
- poverty and famine and high reliance on food aid.
- CC Impacts

Land degradation
erratic rainfall and more frequent droughts.

Aswa lowland river with turbid water due to sediment load from upper catchment (flooding, riverbank erosion)

Catchment characteristics: MAZIBA

Maziba highland : farming on the highlands/high slopes, less household farming plots

Maziba midland: replacement of natural vegetation with plantation mainly eucalyptus, less household farming plots

3. Maziba Catchment (Area 1370 km^2)

- small, fragmented landholdings on a mountainous terrain.
- numerous streams and wetlands
- CC Impacts

settlements in the hilly and fragile marginal lands
wetland degradation and land degradation

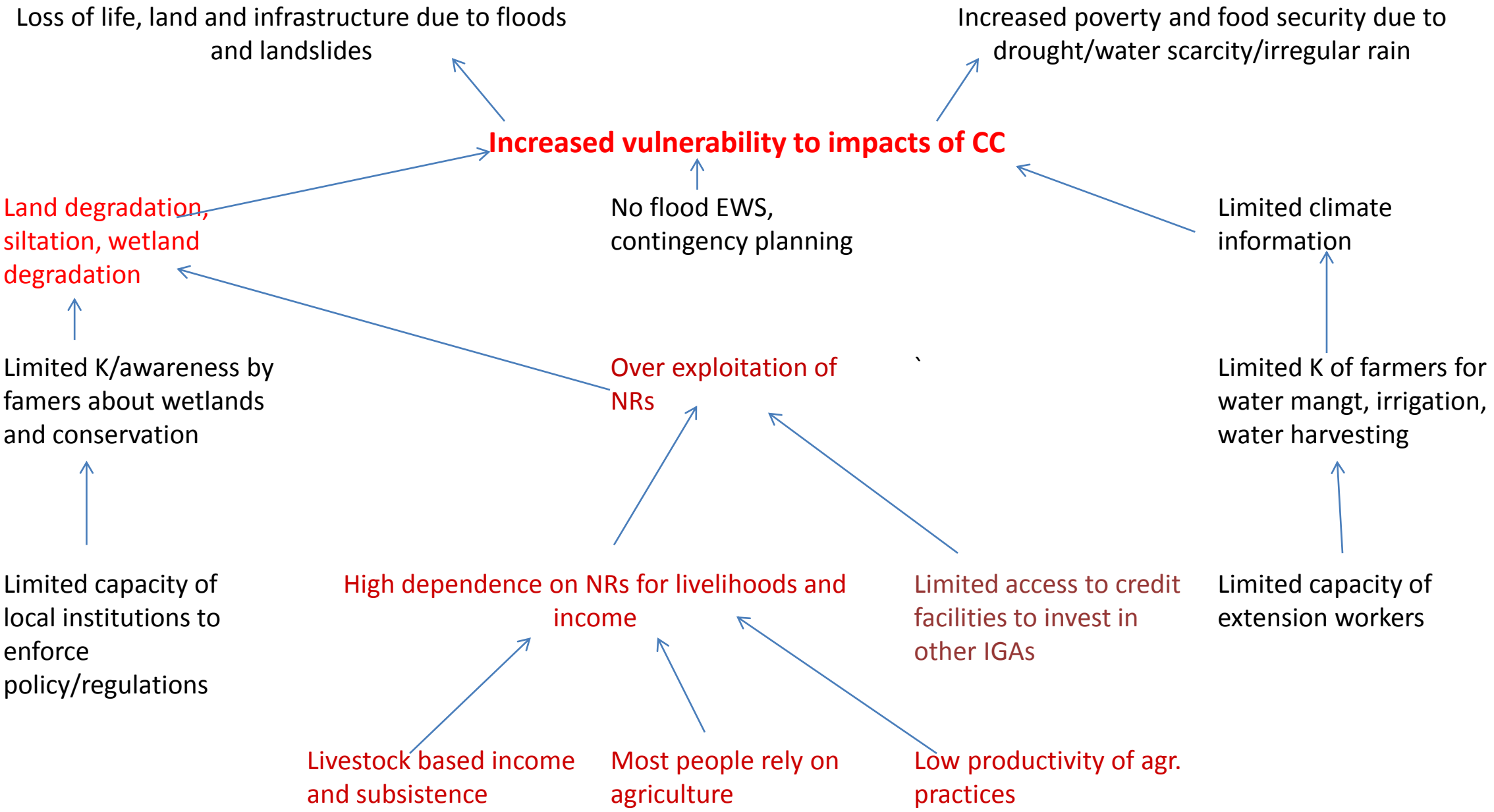
Maziba lowland river with turbid water due to sediment load from upper catchment (flooding, riverbank erosion)

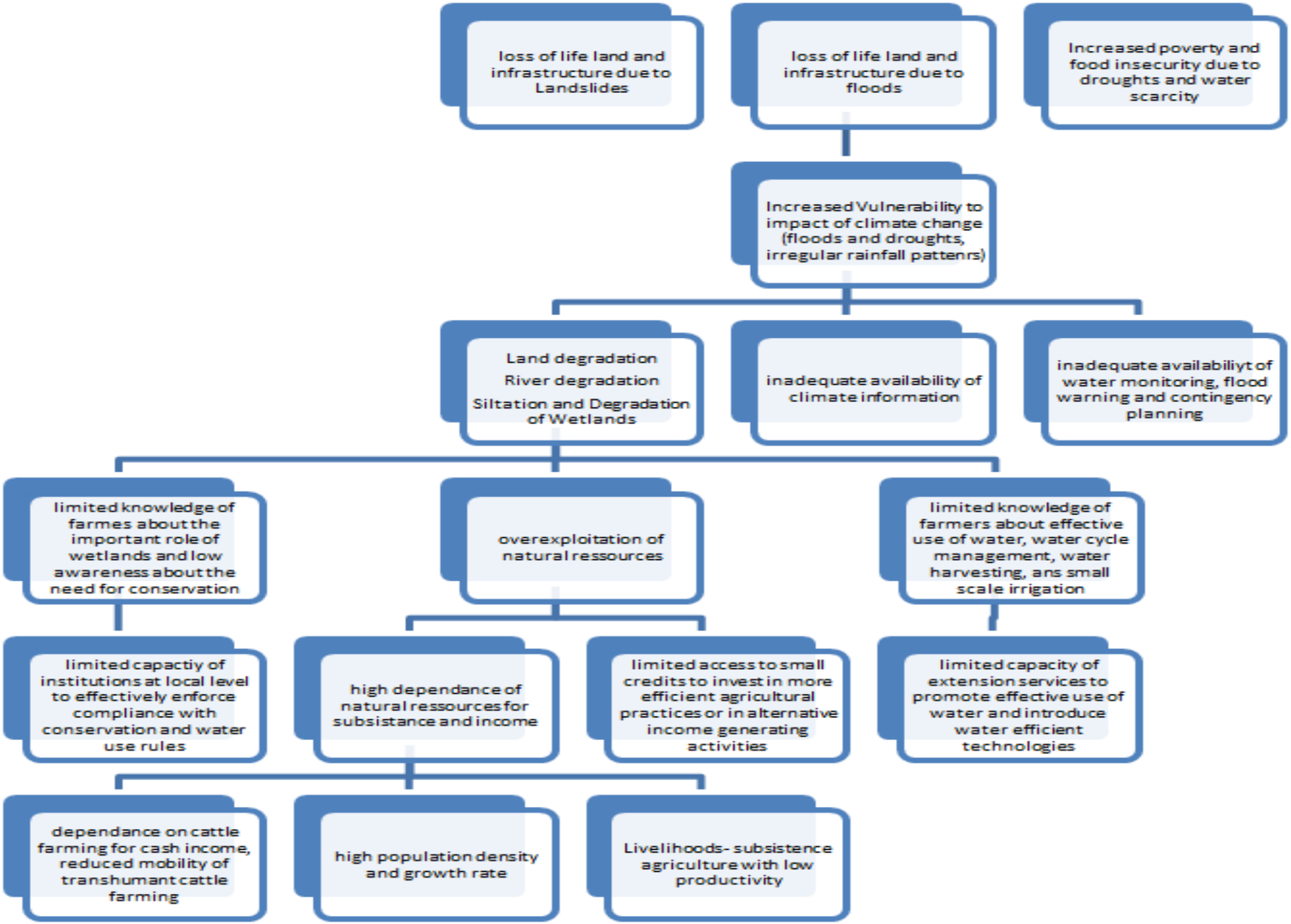
Vulnerability of three catchments: exposure to climate hazard, sensitivity of ecosystems and livelihoods)

Catcht.	*Exposure to hazard*	*Sensitivity of Livelihood/social systems*	*Sensitivity of ecological systems*
Awoja	▪ Drought/-especially Karamoja region ▪ Flood in lowlands ▪ landslides in mountain terrain	▪ mostly mixed (crop and livestock) farming systems. ▪ Livestock-based farming around Karamoja ▪ Farming on high slops due to population pressure ▪ Unregulated fishing practices ▪ Poor farming practices ▪ High population mostly dependent on land resources	▪ Land degradation in most places of the catchment. Soil erosion and deforestation ▪ Mount Elgon region- Important wildlife reserve, source of water. Land degradation, deforestation, landslides encroachment-transboundary (Ke & Ug) ▪ Wetlands, lake shorelines and riverbanks degradation ▪ Overgrazing in the cattle corridor
Aswa	▪ Drought/-especially Karamoja region ▪ Flood in lowlands ▪ Erratic rainfall	▪ area affected by armed conflict and social instability until recent past ▪ reliant on food aid ▪ Low level of rural community services and structures ▪ mostly mixed (crop and livestock) farming systems with poor farming practices ▪ Livestock-based farming around Karamoja	▪ Soil erosion and deforestation ▪ Overgrazing in the cattle corridor ▪ Tranboundary catchment (UG/S.Sudan)
Maziba	▪ Flood hazards ▪ landslides in mountain terrain	▪ Mixed (crop and livestock) farming systems with poor farming practices on mountain hills ▪ Unregulated fishing practices	▪ Farming in high slop areas ▪ Loss of natural vegetation (vegetation now dominated by eucalyptus plantation) ▪ Land degradation due high population pressure-land shortage ▪ Wetlands, lake shorelines and riverbanks degradation –transboundary-Ug/Rw

Causes of Increased Vulnerability to climate change	
Livelihoods- subsistence agriculture with low productivity	The population in the 3 catchments is almost entirely rural and more than 85% of livelihoods are based on agriculture. Most of the agriculture is subsistence, with low productivity levels relying on rain-fed agriculture. This leads to food insecurity and poverty. Major staple food crops include bananas, sweet potatoes, cassava, rice, Irish potatoes, millet, maize and sorghum. There are no significant formalized irrigation schemes.
High population density and growth rate	Each of the three catchments has a fast growing population, currently estimated at between 0.7million to 1.4 million people, but, if the growth rate, which varies between 4% and 6% in the catchments, is not contained, this will increase to between 2.4 and 4.8 million people by 2040.
Livelihoods – cattle farming for cash	Livestock including cattle, sheep, goats and pigs are important cash earning resources of the farm households within the three Catchments. Overgrazing in some parts of the catchments leads to the destruction of the vegetation cover exposing rangeland to degradation
Land degradation	Landslides and mudslides caused by cultivation of steep slopes leads to loss of life, land &infrastructure. Overgrazing lead to erosion and soil loss. Damage to wetlands due to encroachment activities. Deforestation caused by uncontrolled harvesting of timber and biomass.
River degradation	Land use (cultivation and livestock) up to river edges causes loss of riparian vegetation and destabilising of river banks, adding to soil erosion and sediment loads downstream.
Siltation and Degradation of Wetlands	Encroachment and exploitation of wetlands cause siltation and degradation. Wetlands lose their ecological functionality and capacity to provide ecosystem services, including ability to filter water to lakes. Floods result in the displacement of people and loss of crops.
Limited access to climate information, esp. flood EWS	Farmers have limited access to climate information and thus cannot prepare themselves and react timely
High poverty levels/food insecurity	Northern (Aswa) and North-eastern (Awoja) Uganda are the poorest regions with a poverty level at 75.8% of the population.) The cattle corridor is also significantly poorer than the wetter parts of the basin. Southwestern Uganda (Maziba)have degraded their wetlands and have overexploited their lands due to very high population density resulting in great reduction in food production and hence increase in poverty levels.

Vulnerability Assessment-Summary




loss of life land and infrastructure due to Landslides
loss of life land and infrastructure due to floods
Increased poverty and food insecurity due to droughts and water scarcity
Increased Vulnerability to impact of climate change (floods and droughts, irregular rainfall patterns)
Land degradation
River degradation
Siltation and Degradation of Wetlands
inadequate availability of climate information
inadequate availabiliyt of water monitoring, flood warning and contingency planning
limited knowledge of farmes about the important role of wetlands and low awareness about the need for conservation
overexploitation of natural ressources
limited knowledge of farmers about effective use of water, water cycle management, water harvesting, ans small scale irrigation
limited capactiy of institutions at local level to effectively enforce compliance with conservation and water use rules
high dependance of natural ressources for subsistance and income
limited access to small credits to invest in more efficient agricultural practices or in alternative income generating activities
limited capacity of extension services to promote effective use of water and introduce water efficient technologies
dependance on cattle farming for cash income, reduced mobility of transhumant cattle farming
high population density and growth rate
Livelihoods- subsistence agriculture with low productivity

Adaptation Options identified

- Catchment management, soil erosion mapping, soil and water conservation, Sustainable land use management, Afforestation
- Water supply and Sanitation
- Introduce payment for the ecosystem services
- Strengthen the land tenure rights of communities
- economic and environmental impact assessments before deciding on land use changes
- Value the natural resources in the catchment and institute proper natural resources accounting procedures
- Income diversification, employment and education opportunities
- Introducing improved cooking stoves, Biogas,
- Irrigation development, Livestock development and Aquaculture
- Implementation of bye laws to support soil erosion control
- Promoting proper Land Management practices
- establish and operationalize micro catchment institutional arrangements that bring all water users together
- Providing Community livelihood Fund
- Train extension service workers on sustainable agricultural, land catchment management, etc
- Public awareness on environmental issues
- Community participation and community structures, Community mobilization
- Develop guidelines for sustainable management and use of environment and natural resources.
- develop conservation enterprises and income diversification
- environmental education in schools
- Family planning
- Improve healthcare and sanitary standards

Options appraisal: participatory multi-criteria analysis

1. Responding to the challenges in hotspot areas/drivers of vulnerabilities:
   - Would the proposed options address the challenges that are prevailing in hotspot areas of the catchments? Do they contribute in building resilience of communities and ecosystems?
2. Priorities of Government:
   - Are the proposed interventions options within the priorities of Government?
3. Availability of lead implementing partners:
   - would the proposed interventions attract interest of the key national institutions for implementation?
   - Would there be ownership of such interventions by institutions?
4. Promoting transboundary cooperation:
   - Do the proposed interventions promote transboundary cooperation?
5. Complementing existing initiatives:
   - Would the proposed interventions complement existing initiatives/projects/activities? Specify which initiatives

Example

Interventions	Responding to the challenges in hotspot areas/drivers of vulnerabilities (40 points)	Priorities of Government: (30 points)	Lead implementing partners: (10 points)	Promoting transboundary cooperation (10 points)	Complementing existing initiatives: (10 points)	Total Points (100)	Priority Ranking
1 Promote climate smart agricultural practices such as improved agronomic practices (eg. composting, conservation), and agroforestry systems.	40	30	10 (Agri, NFA, Envt, NGos)	10	FAO,UNDP project in Karamoja IUCN project in Aswa NBI project in Maziba	100	1

Reasons/Causes and Drivers of unsustainable systems, Baseline situations and agreed adaptation interventions

Reasons/Causes of unsustainable management of natural resources	Drivers for unsustainable management of natural resources and of climate vulnerability	Baseline situation	Proposed Components and Activities
1. Degradation of the natural resource base for sustaining agricultural systems	• Poor agricultural practices • High dependence on rainfall which is unreliable in most cases • Low household income • Livelihoods dependent upon subsistence agriculture with low productivity • High poverty levels	• more than 85% of livelihoods are based on agriculture. Most of the agriculture is subsistence, with low productivity levels relying on rain-fed agriculture. This leads to food insecurity and poverty.Major staple food crops include bananas, sweet potatoes, cassava, rice, Irish potatoes, millet, maize and sorghum. Coffee is also grown especially around the highland/mountain sides of Awoja catchment around Mount Elgon. • There are no significant formalized irrigation schemes.	Interventions for resilient and sustained agricultural production and other livelihood systems • Promote climate smart agricultural practices such as improved agronomic practices (eg. composting), irrigation facilities (+drip), and agroforestry systems. • Promote water harvesting and storage facilities such as valley/sand dams/tanks and ponds • Promote farming systems that adapt to flood or drought conditions • Diversify livelihoods by introducing off-farm activities • Introduce revolving fund schemes to promote improved farming practices, off-farm activities and improve household incomes
	• Overgrazing in some parts of the catchments leads to the destruction of the vegetation cover exposing rangeland to degradation • Livelihoods dependent upon cattle farming for	• Livestock including cattle, sheep, goats and pigs are important cash earning resources of the farm households within the three Catchments. • Open grazing widely practiced • Poor management of rangelands especially in Karamoja areas of Awoja and Aswa catchments	Interventions for resilient and sustained agricultural production systems and other livelihood systems • Promote zero grazing, cut and carry or stock feeding of animals • Introduce improved breeds and improve their husbandry • Promote communities to keep reduced number of livestock

Reasons/Causes and Drivers of unsustainable systems, Baseline situations and agreed adaptation interventions

Reasons/Causes of unsustainable management of natural resources	Drivers for unsustainable management of natural resources and of climate vulnerability	Baseline situation	Proposed Components and Activities
2. Increased pressure on natural resources due to human activity- degradation of natural ecological systems	• Encroachment and over exploitation of ecological systems (wetlands, forests, highlands, riverbanks, grazing lands etc) • High population density and growth rate. Each of the three catchments has a fast growing population, currently estimated at between 0.7million to 1.4 million people, but, if the growth rate, which varies between 4% and 6% in the catchments, is not contained, this will increase to between 2.4 and 4.8 million people by 2040.	• High level of environmental degradation due to increased hill side farming, wetlands encroachment, overgrazing , deforestation • High soil erosion, siltation, landslides and mudslides caused by cultivation of steep slopes, overgrazing, deforestation • Increased deforestation caused by uncontrolled harvesting of timber and biomass. • Increased floods resulting in the displacement of people and loss of crops.	Interventions for resilient ecological systems • Introduce good practices of managing environmental resources such as agroforestry, hill side terracing, contour bunds, reforestation, • Promote catchment protection and buffer zone management around key ecological systems • Promote zero grazing, cut and carry or stock feeding of animals • Introduce improved cooking stoves or other alternative energy sources

Reasons/Causes and Drivers of unsustainable systems, Baseline situations and agreed adaptation interventions

Reasons/Causes of unsustainable management of natural resources	Drivers for unsustainable management of natural resources and of climate vulnerability	Baseline situation	Proposed Components and Activities
4. Low adaptive capacity of communities and institutions	• Limited access to climate information including flood early warning	• Farmers have limited access to climate information and thus cannot prepare themselves and react timely • No early warning systems, such as flood warning	Establishing water resources and climate monitoring systems for use in flood early warning and water quality management • Establish early warning, flood management, and environmental quality monitoring systems • Sensitize & engaged communities in identifying threats, response measures, and taking local actions
	• Inadequate frameworks and tools to integrate climate change adaptation issues into catchment management	• Absence/inadequacy of catchment management plans to provide framework for water resources management and climate change adaptation .Catchment management Plans for Awoja and Maziba do not integrate issues of climate change. Aswa catchment does not have a Plan for the entire catchment • The existing government guidelines for catchment management planning do not consider aspects of climate change	Integration of climate change issues into Awoja, Maziba and Aswa Catchment Management Plans • Revise existing catchment management plans of Awoja and Maziba, and integrate climate change issues into the plans • Develop catchment management plan for Aswa that integrate climate change adaptation issues • Revise the guidelines of the Ministry of Water and Environment on catchment planning from the perspective of integrating climate change adaptation issues
	• No or weak community structures and limited consultation platforms	• No or weak community structures to manage water and other natural resources • Absence or limited stakeholder participatory and coordination platforms especially at the local levels	Strengthen catchment management structures/frameworks, and establish stakeholders' participatory forums • Support catchment management institutional structures to take full ownership and responsibility • Establish multi-stakeholders' platforms at various levels in the catchments to facilitate collaboration
	• Limited capacity and awareness to take local adaptation actions	• Limited capacity to take local adaptation action and manage water resources • Limited awareness on the importance of taking local actions to build resilience and water security	Strengthening capacities of stakeholders: • Build capacities of stakeholders, especially of communities and local implementing partners • Organize trainings on IWRM as a tool for climate change adaptation • Raise awareness of stakeholders, including communities, local authorities and other stakeholders • Build capacities of national stakeholders for up scaling and integration of climate resilience issues into sectoral and national plans.
	• Unavailability of good practices/approaches of	• Very limited documentation of good practices for water security or climate resilience in Uganda	Knowledge management: ▪ Document processes and develop case studies on good practices and

Institutions participated in the process

N	Institution/ Departments	Mandates/ Main objectives of institutions	Role/contribution in Project Preparation
1	Ministry of Finance Planning and Economic Development	▪ Coordinating overall National Development planning and budgeting ▪ Designated National Authority	▪ Endorsed the Project ▪ Communicated on behalf of the Government of Uganda
2	Ministry of Water and Environment (MWE)	▪ Policy and regulatory role for water and environmental issues	▪ Executing Entity, together with GWP, technically coordinated the program development process ▪ Made available key government documents
3	National Environmental Management Authority (NEMA)	▪ Regulatory authority for all environmental issues	▪ Provided guidance regarding the required social and environmental impact assessments per Ugandan law ▪ Cleared the TOR and processes of conducting environmental and social impact assessments
4	Uganda National Meteorological Authority (UNMA)	▪ Meteorological services	▪ Contributed by reviewing the draft project proposal
5	Directorate of Environment Affairs, MWE	▪ Policy and coordination of environmental activities	▪ Contributed by reviewing the draft project proposal
6	Directorate of Water Resources Management, MWE	▪ Policy implementation and coordination of water resources management activities ▪ implementation of standards regarding water quality and the issuance of permits	▪ Lead Directorate with responsibility of executing the project on behalf of the MWE. ▪ In collaboration with GWPEA, facilitated the process of project proposal development
7	Climate Change Department, MWE	▪ Policy and coordination of climate change issues ▪ UNFCC Focal Point	▪ Contributed by reviewing the draft project proposal ▪ Provided the technical endorsement of the project content
8	Policy and Planning Department, MWE	▪ Coordinating policy and planning of the Ministry	▪ Contributed by reviewing the draft project proposal, especially in making sure that the proposed project is in line with government priorities and strategies
9	International Union for Conservation of Nature (IUCN)	▪ Nature conservation ▪ Ecosystem based adaptation ▪ Wetlands management	▪ Experience sharing on revolving fund ▪ Linking with its project in Aswa catchment ▪ Contributed by reviewing the draft project proposal
10	ECOTRUST	▪ Environmental conservation	▪ Contributed by reviewing the draft project proposal
11	Environment Alert/ENRsNET (Environment and Natural Resources Network of CSOs)*	▪ Environmental conservation ▪ Networking and capacity building ▪ Advocacy and lobbying	▪ Contributed by reviewing the draft project proposal ▪ Providing information on NGOs that are active in the project sites
12	UNDP-Country Office-Uganda	▪ Development partner	▪ Contributed by reviewing the draft project proposal

Consultations at lower levels: Water Management Zones, Districts and catchment/communities levels:

1. The three Water Management Zones (WMZs):
   - Kyoga WMZ for Awoja catchment
   - Upper Nile WMZ for Aswa catchment
   - Victoria WMZ for Maziba catchment

2. Districts from the targeted catchments were also consulted in the process such as
   - Districts of Soroti, Sironko, Napak, Bulambuli, Kapchorwa and Kumi in Awoja
   - Districts of Abim, Gulu, Aleptong, Lira in Aswa catchment
   - Districts of Kabale, Kisoro and Ntungamo in Maziba catchment

3. The communities in the three catchments, including catchment committees

About Global Water Partnership (GWP)

- GWP is founded in 1996 to promote Integrated Water Resources Management (IWRM)

- GWP's network comprises
  - 13 Regional Water Partnerships
  - 84 Country Water Partnerships
  - over 3,000 partner organizations in 172 countries.

GWP Strategy towards 2020

GWP's Vision *– a water secure world*

GWP's Mission*- to advance governance and management of water resources for sustainable and equitable development*

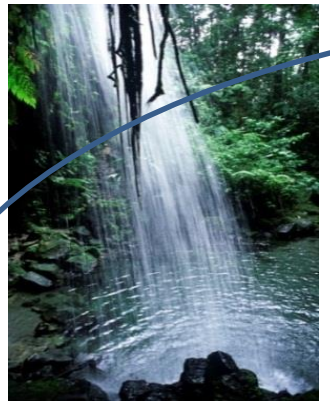
Strategic Goals

1 **Catalyse change in policies and practice**

2 **Generate and communicate knowledge**

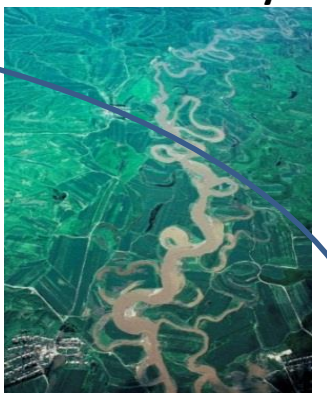
3 **Strengthen partnerships**

Ecosystems



Food

Transboundary



Thematic Approach:integrate WS with devt.actions

Energy

Climate Change

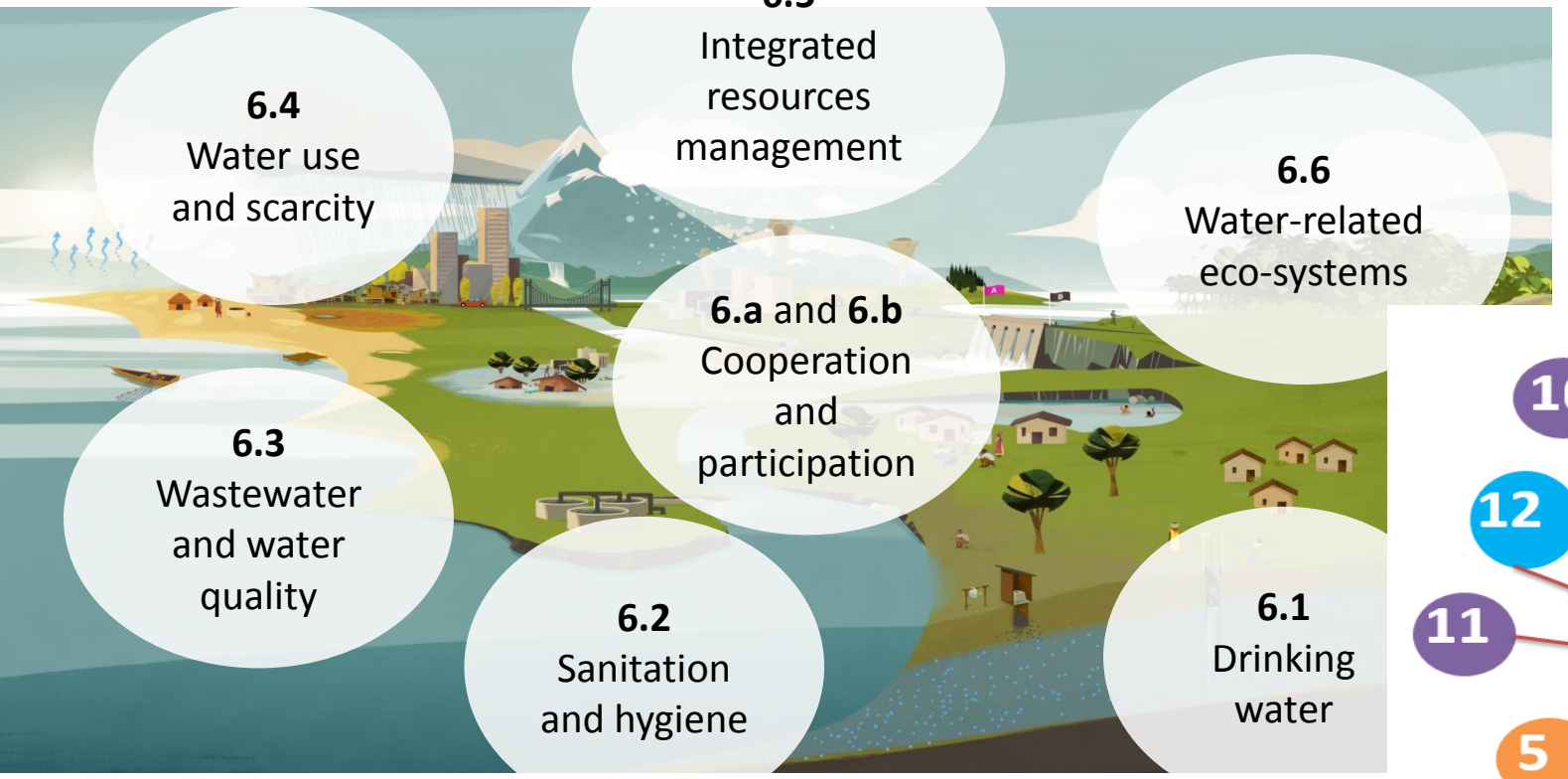
Urbanisation

Cross-cutting issues

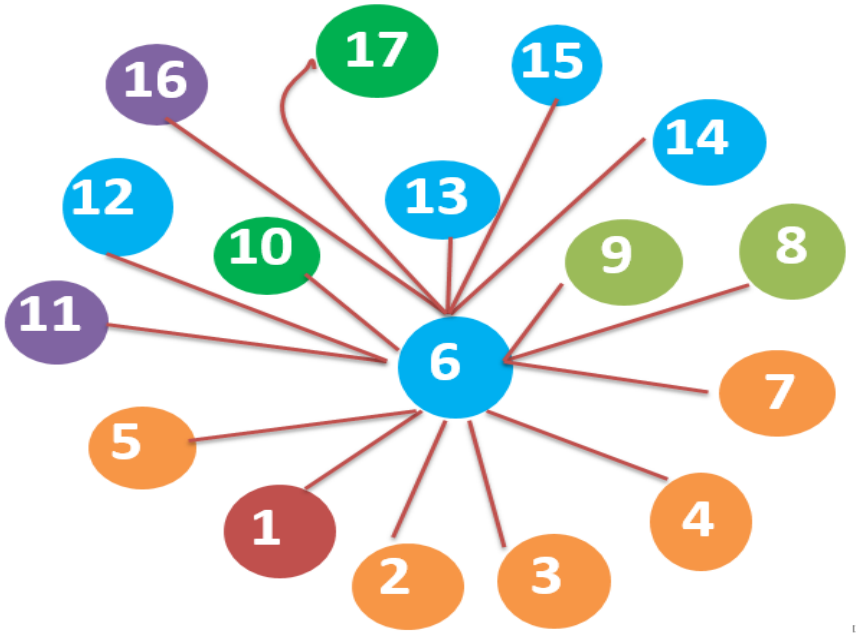
- Support for **gender** mainstreaming in water management
- Support for **youth** and young water professionals

A. Support Water-SDG 6

“Ensure availability and sustainable management of water and sanitation for all”



B. Water at the core of SD-linking SDG 6 and other SDGs



Thank you!

http://www.gwp.org