



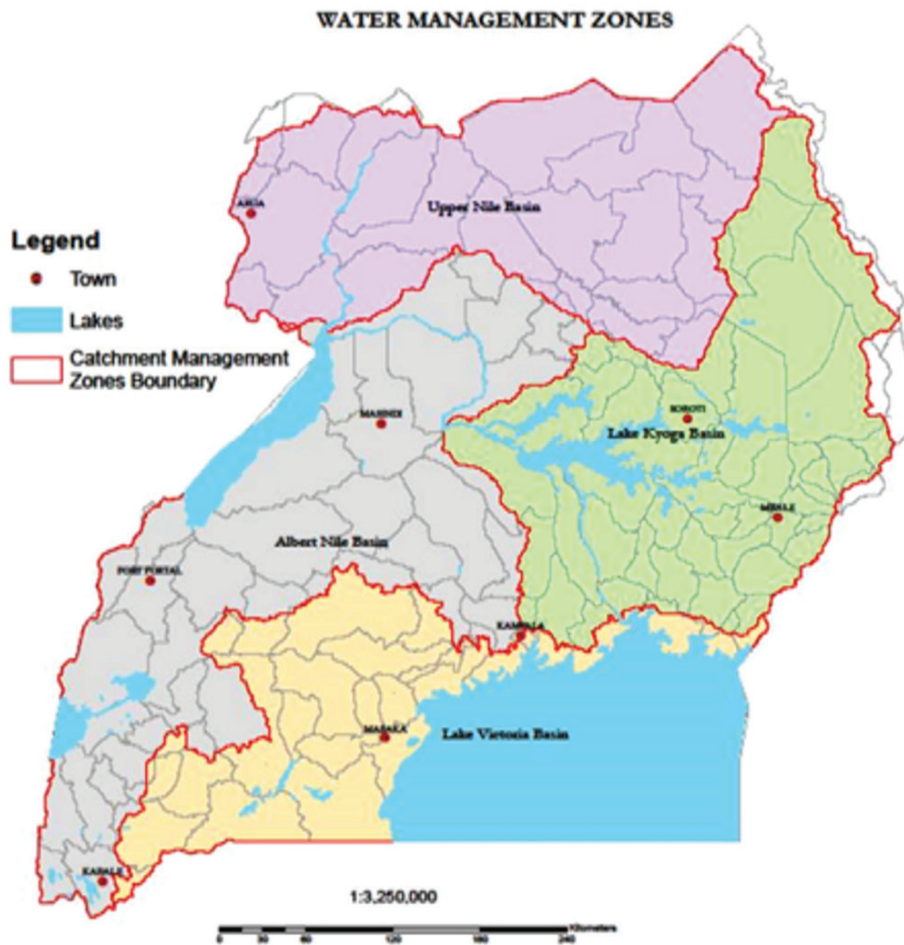
REPUBLIC OF UGANDA

**MINISTRY OF WATER AND ENVIRONMENT**  
DIRECTORATE OF WATER RESOURCES MANAGEMENT  
KYOGA WATER MANAGEMENT ZONE

# **AWOJA CATCHMENT MANAGEMENT PLAN**



**REVISED VERSION, 2020  
INCORPORATING ASPECTS OF CLIMATE CHANGE**



# AWOJA CATCHMENT MANAGEMENT PLAN

# FOREWORD



*Hon. Sam Cheptoris*

Water resources support key sectors of the economy namely hydropower generation, agriculture, fisheries, domestic water supply, industry, navigation, etc. However, efficiency and sustainability of intervention under these sectors has recently been a concern in Uganda mainly due to inadequate sectoral collaboration in planning and implementation, increasing frequency of floods and droughts, environmental degradation and pollution of water resources. This situation therefore calls for development of mechanisms for promoting integrated planning, development and management of water resources so as to create synergy among various sectors, promote efficiency in utilization of available resources, reduce water and environment degradation and ensure more efficient utilization of water resources to meet various social and economic demand.

In 2011, my Ministry embarked on preparation of Catchment Management Plans (CMPs) as tools for ensuring equitable access to, and use of water resources, and safeguard of key natural resources for sustainable socio-economic development of the country.

A CMP provides a long-term strategy for sustainable development and utilization of water and related water resources. Catchment based water resources planning and management is in line with the integrated Water Resources Management (IWRM) paradigm, which ensures that land, water and related resources are developed and managed in a coordinated manner without compromising sustainability of vital ecosystems. As a lead agency for implementing Catchment based Water Resources Management (CbWRM) in Uganda, my Ministry through the Directorate of Water Resources Management is operationalizing the CbWRM framework through the four Water Management Zones of Albert, Kyoga, Upper Nile and Victoria WMZ.

In order to develop this CMP, a number of studies were undertaken which included an assessment of the existing catchment knowledge base, the current and projected water resources situation, the catchment's social and environmental assessment, and stakeholder engagement. The CMP identifies critical issues, challenges, opportunities, and threats within the catchment which need to be addressed to ensure the economic development of the people.

Guided by the key issues, challenges, threats, opportunities, key water resources planning principles and national strategies, the stakeholders developed a vision for the catchment. To achieve the vision, stakeholders came up with a number of strategic objectives, options and actions that need to be perused in the short, medium and long-term up to the year 2040.

Awoja CMP was first developed in 2014 following the Uganda Catchment Planning Guidelines of 2014. In 2018, the Uganda Catchment Planning Guidelines were updated to include aspects of climate change. Using the updated guidelines, the Awoja CMP has been updated to include aspects of climate change.

My Ministry is therefore pleased to formally make this updated CMP available for use by various stakeholders. It will enormously help and guide all developers and users of water and related resources at the national and local levels. I therefore wish to call upon all the relevant government ministries and agencies at both national and local levels, the civil society, private sector, academia and research institutions, cultural institutions, religious institutions and the local communities to utilize this plan in order to optimally plan for the development and management of water and related resources for prosperity.

In line with the provisions of Section 5 of the Water Act Cap 152, I formally approve this Updated Catchment Management Plan for use by various stakeholders.

**For God and My Country.**



Hon. Sam Cheptoris

***Minister of Water and Environment  
The Republic of Uganda***

## ACKNOWLEDGEMENTS



*Alfred Okot Okidi*

I would like to thank the Directorate of Water Resources Management for spearheading the preparing of Catchment Management Plans in Uganda. This is a stakeholder driven process that is key in ensuring that water resources are effectively planned for and sustainably developed and managed so as to support the achievement of the country's vision 2040.

Special thanks go to all the stakeholders at the national, regional and local levels for their active participation and involvement in preparation of this plan. Special appreciation goes to Kyoga Water Management Zone for coordinating the plan preparation process and the Awoja Catchment Management Organization through the Awoja Catchment Management Committee for ensuring that the plan is stakeholders' driven and addresses the needs of the people in the catchment.

Finally, I wish to thank the World Bank for providing funds that enabled preparation of the Awoja CMP in 2014. I also wish to thank the Adaptation Fund, through Sahara and Sahel Observatory, for providing funds that facilitated updating of the CMP to incorporate climate change issues as well as printing and disseminating the plan to stakeholders.

Alfred Okot Okidi  
**PERMANENT SECRETARY**  
***Ministry of Water and Environment***

# EXECUTIVE SUMMARY

The Awoja catchment is one of the 11 catchments within the Kyoga Water Management Zone (KWMZ), situated in the eastern part of the zone abutting Mount Elgon. It covers an area of approximately 11,000 square kilometres, which is about 19% of the total area of the KWMZ. It borders Mount Elgon to the east and drains into the Lake Kyoga region in the west. The catchment cuts across 14 districts of Bulambuli, Kween, Kapchorwa, Sironko (wholly in the catchment), Amudat, Nakapiripirit, Bukedea, Katakwi, Napak, Soroti, Kumi, Ngora, Bukwo, and Serere (partially in the catchment). According to projections made based on the 2002 census, the population of people leaving in Awoja catchment in 2013 was estimated to be about 1.45 million.

The Catchment Management Plan (CMP) for Awoja Catchment is intended to provide a long-term strategy for the sustainable development and utilisation of the water resources in the Awoja Catchment basing on a clear understanding of the prevailing challenges, risks, threats, and opportunities. This catchment based water resources planning and management is in line with the Integrated Water Resources Management (IWRM) paradigm, which ensures that land, water, and related resources are developed in a coordinated manner to ensure sustainability. The implementation of Catchment Based Water Resources Management (CBWRM) in Uganda is by the Ministry of Water and Environment (MWE), through the Directorate of Water Resources Management (DWRM) in which the country has been divided into four Water Management Zones (WMZs: Upper Nile WMZ, Albert WMZ, Victoria WMZ, and Kyoga WMZ). The Awoja Catchment is located in Kyoga Water Management Zone (KWMZ).

In order to facilitate the planning process for CBWRM, MWE developed Catchment Management Planning Guidelines (MWE 2012) whose piloting, formed the basis for development of this CMP following the progressive steps stipulated therein including:

- Stakeholder identification, engagement and analysis,
- Water Resources Assessment (WRA),
- Strategic Social and Environmental Assessment (SSEA),
- Options and scenarios analysis,
- Catchment Management Plan (CMP) and Implementation Plan (IP).

At all stages through the process of development of the CMP, stakeholders were engaged to ensure thorough engagement and ownership of the plan, which would ultimately ease its implementation. Stakeholder identification was undertaken to determine all organisations and communities, which may be affected (positively or negatively) by the water resources management in the catchment and who may be able to contribute to the programme of work due to their expert knowledge and or experience in the project areas. The operational environment of the Kyoga WMZ team, in terms of stakeholders in the use, development and management of water resources in the catchment was evaluated, and key stakeholders identified and analysed. The stakeholders also participated in mapping as well as prioritization of issues within the catchment.

An assessment of the existing catchment knowledge base, the current and projected water resources situation, the catchment's social and environmental state, together with stakeholder engagement at various steps through the development of the CMP led to identification of critical issues, challenges, opportunities, and threats within the Awoja Catchment. Through this assessment, information regarding the catchment was generated.

Much of the Awoja Catchment lies at an altitude ranging from 940 to 1000 metres above sea level (masl), with the upland hilly areas rising to 1400m and the high mountains to over 3000m. Although just 2° north of the equator, the altitude results in the catchment having a relatively mild climate, with annual patterns dominated by rainfall rather than by radiation. Much of the catchment is well watered and can support rainfed agriculture, but there exists spatial variation in seasonality and seasonal droughts are a common feature. The main dry season for the Awoja catchment is from December to February. The mean annual rainfall is 1103mm, but this is not evenly spread. The western tip and southern part of the Awoja Catchment experiences an average annual rainfall of 1200 - 1500mm/year. The majority of the central and northern part of the catchment has an average annual rainfall of 1197mm with a 10 months period for which evaporation exceeds rainfall. In the higher parts of the Awoja Catchment around Mount Elgon, high rainfall of between 1,500–2,000mm/year can be expected. The north-eastern part of the Awoja Catchment in the Karamoja region, including Nakapiripirit, Napak, and Amudat experience erratic rainfall, averaging 745mm/year which is far from ideal for crop cultivation.

The Awoja Catchment has a network of rivers, lakes, and temporary wetlands all of which play an important role in the catchment. All the rivers typically flow from the east or north to the south-western part of the catchment, converging in Soroti district, where the catchment's outlet is situated. The three largest lakes are Lake Bisina, Lake Opeta and Lake Okolitorum. Lake Bisina and Lake Opeta and associated swamps together extend over an area of 1200 square kilometres, with an open water area of approximately 250 square kilometres with Lake Opeta having an open water area of 40 square kilometres. Wetland area within Awoja is 4,195 square kilometres, consisting of original wetlands (which form a larger part) and converted wetlands. These lakes also play a major role for the socio-economic activities like fishing, transport, water supply for domestic use and livestock of the surrounding communities.

The population of Awoja is almost entirely rural, with district populations between 82% and 99% depending on agriculture for their livelihoods. Livelihoods are, therefore, almost exclusively based on the natural resources of the catchment, with subsistence agriculture being the primary source of food and income. The majority of farming is small scale and rainfed, where productivity is low and vulnerability to climate variability (including floods and droughts) is high. While the districts within the cattle corridor (Napak, Nakapiripirit, Kumi, Katakwi, Ngora, Amudat, Bukedea, and the top part of Bulambuli) are highly dependent on livestock and hence also on stock-watering facilities, livestock also complements cultivation in the central and southern parts of the catchment. Capture fisheries and fish farming provide another important opportunity for livelihoods. Capture fishing is practiced to a greater extent than aquaculture/fish farming.

The south-eastern part of the region is densely populated with the slopes of Mount Elgon (parts of Kween, Kapchorwa, Bulambuli and Sironko) being overpopulated, the inhabitants benefiting from rich volcanic soils, but living on small plots of land, mainly as subsistence farmers. This pattern increases the risks of erosion, landslides and food shortages. In contrast to this, the cattle corridor is generally a sparsely populated area. This region includes Karamoja (Nakapiripirit, Napak and Amudat, which is inhabited by nomadic pastoralists and characterised by difficult environmental and economic conditions as well as a history of insecurity. By 2040, the population is expected to triple, reaching a total of 4,790,044 people. The current population is almost entirely rural (over 90%) with Soroti being the only district with a large urban town. There is no vision for the development of large urban growth nodes, although the population of towns may increase disproportionately as rural resources become more thinly stretched.

There exists potential for tourism in the mountains of the northeast, including the Mount Elgon National Park offering sightseeing and hiking opportunities. Lake Opeta and Lake Bisina already draw many bird watchers and were declared Ramsar (an international treaty that provides the framework for the national action and international cooperation for the conservation and wise use of wetlands and their resources) sites. Lake Bisina and Lake Opeta are Important Bird Areas (IBA) for shoebills, fox's weaver, papyrus gonoleks, white-winged warbler and others thus making them conservation areas of high significance. The lakes' system is also important as a refuge for fish species that have gone extinct in the main lakes like Lake Victoria and Lake Kyoga.

The key environmental distinctions within the Awoja Catchment include:

- (a) the high-rainfall mountain areas
- (b) lowland plains with sufficient rainfall to support rainfed agriculture
- (c) extensive wetlands and lakes, and
- (d) the dry northern cattle corridor occupied by pastoralists.

The total natural runoff for the Awoja Catchment is approximately 1,615MCM/yr (million cubic metres per year) and the net runoff, after deducting estimated evapotranspiration losses of 384MCM/yr in the wetlands, is estimated to be 1,232MCM/yr. The total potential groundwater available for the entire Awoja Catchment was estimated to be 236MCM/yr.

The Awoja Catchment has seen little development of its water resources with the main water use sectors being water for domestic use, livestock watering, rainfed agriculture, and aquaculture. Environmental flows were assumed to be 15% of the natural streamflows in the sub-catchment. This was chosen as an illustrative measure for the preservation of river health and biodiversity that only becomes critical with high development and this was computed to be 185MCM/yr. The 2013 water demand for domestic, livestock, rainfed agriculture, aquaculture, rural industry, and environmental water requirements expressed as a percentage of the total water demand in Awoja Catchment stood at 4.47%, 6.24%, 10.12%, 0.63%, 0.21%, and 78.34% respectively. Projections for 2040 indicate that, water demands for domestic use, aquaculture, and rural industry will increase to 19.22%, 1.43%, and 1.05% respectively while that of livestock, rainfed agriculture, and environmental flow requirements will drop to 4.97%, 11.02%, and 62.32% of the total water demand respectively. This is associated with the projected population increment and levels of social-economic development within the catchment.

Droughts, floods, landslides and mudslides are a particular concern to the people residing in the Awoja Catchment as they often lead to loss of human life, animals, and crops. Land degradation and deforestation play a large role in the onset of flood events and may also contribute to droughts as soils lose their capacity to store water for later release, either to streams or as evapotranspiration. Floods frequently occur in low-lying areas, in areas along river banks, close to wetlands and along lakes. Awoja's large wetland areas, some of the severely degraded riverbanks, the catchment topography and degraded soils all promote flooding. Unstable soils along the steep mountain slopes lead to landslides and mudslides. Droughts are a feature of the highly seasonal rainfall and the most drought-prone areas in the Awoja Catchment are within the cattle corridor, particularly in the Karamoja region in the north catchment. The capacity to cope with existing climate risks is poor.

The Awoja Catchment has protected areas, the largest being the Pian Upe Wildlife Reserve and the smaller Mount Elgon National Park being situated in Kapchorwa, Bulambuli, Kween, Bukwa, and Sironko districts and consisting of a range of vegetation zones including afro-montane forest. Smaller community wildlife management areas and some forest reserves have also been set aside. However, due to the increasing population pressure protected areas are being encroached upon as land to settle on becomes scarce, especially in the northern part of the catchment.

This wealth of information generated from the assessments resulted in the identification and mapping of key catchment issues including high population density and growth rate, high poverty levels, livelihoods- subsistence agriculture with low productivity, limited access to basic services, natural disasters, land degradation, river and wetlands degradation, deforestation, lack of awareness on environmental management among others. Guided by these key issues, together with the challenges, threats, opportunities, principles for development, and national strategies, the stakeholders then developed a vision for their catchment:

"Sustainably manage and utilise the water resources and related sources of the Awoja Catchment by 2040."

To achieve this vision, the four strategic objectives were set:

- 1 Catchment Protection and Conservation: To protect and restore the catchment for sustainable delivery of goods and services



- 2 Development for Socio-Economic Growth: To develop water resources for socio-economic growth through meeting community needs for water, energy, and food security
- 3 Mitigation and Adaptation: To mitigate and adapt to the impacts of droughts, floods, and landslides
- 4 Social and Institutional Development: To optimise catchment resources through capacity building, awareness, policy enforcement and institutional coordination.

These four strategic objectives were further broken down into options (options being possible measures/ interventions used to address issues and reverse those trends that undercut sustainable development), which are specific, suitable and tailored to the different areas in Awoja.

<b>No</b>	<b>1. Catchment Protection and Conservation</b>
1.1	Sustainable land and environmental management
1.2	Reforestation
1.3	Lakes and wetlands management
1.4	Buffer zone set-asides
<b>No</b>	<b>2. Development for Socio-Economic Growth</b>
2.1	Sanitation systems
2.2	Refurbishment of infrastructure
2.3	Piped water schemes (surface water)
2.4	Groundwater development
2.5	Rainwater harvesting (roof water tanks and roof catchments)
2.6	Sand dams
2.7	Dams (small stock watering dams, valley dams and tanks, large dams)
2.8	Enhancement of irrigation
2.9	Water use efficiency
2.10	Small hydropower
2.11	Alternative energy supply
2.12	Aquaculture
2.13	Socio-economic strengthening
<b>No</b>	<b>3. Mitigation and Adaptation (Floods, Droughts and Landslides)</b>
3.1	Flood management and preparedness for floods
3.2	Construction of infrastructure for flood control
3.3	Cattle keeping practices
<b>No</b>	<b>4. Social and Institutional Development</b>
4.1	Monitoring
4.2	Extension services (information and training)
4.3	Awareness raising
4.4	Institutional capacity building
4.5	Legislation and enforcement

Following careful evaluation and screening of the potential options in line with the strategic objectives, three scenarios were developed through sets/combinations of options, weighted and ranked to get the best scenario. Among the three scenarios; Scenario 1 (SC1)-Mitigation of floods through riverbank protection (focusing on structural measures), SC2- Reliable water supply to the users, and SC3- Protect the environment through improved soil and water conservation. SC3 was ranked best for which implementation actions were detailed, an implementation and investment plan drawn with a 5-6 year timeframe which can be adjusted forward (since the options are many and funding requirements are high) after checking the adequacy of options. Thus, the CMP is a living document, which should be reviewed and updated periodically, advisably every five years to suit other administrative planning cycles.

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# ACRONYMS AND ABBREVIATIONS

<b>ACF</b>	Action Contre le Faim (Action Against Hunger)
<b>ACTED</b>	Agency for Technical Cooperation and Development
<b>ARC2</b>	African Rainfall Climatology model version 2
<b>asl</b>	Above Sea Level
<b>ASM</b>	Artisanal and small-scale mining
<b>AWMZ</b>	Albert Water Management Zone
<b>BOD</b>	Biochemical oxygen demand
<b>CAO</b>	Chief Administrative Officer
<b>CBO</b>	Community Based Organization
<b>CBWRM</b>	Catchment Based Water Resources Management
<b>CCU</b>	Climate Change Unit
<b>CFM</b>	Collaborative Forest Management
<b>CIS</b>	Community Information System
<b>cm</b>	Centimetre
<b>CMC</b>	Catchment Management Committee
<b>CMO</b>	Catchment Management Organisation
<b>CMP</b>	Catchment Management Plan
<b>CMS</b>	Catchment Management Secretariat
<b>CSF</b>	Catchment Stakeholder Forum
<b>CSO</b>	Civil Society Organisation
<b>CTC</b>	Catchment Technical Committee
<b>DDP</b>	District Development Plan
<b>DEA</b>	Directorate of Environmental Affairs
<b>DESS</b>	Department of Environmental Support Services
<b>DHD</b>	District Health Department
<b>DIO</b>	District Information Officer
<b>DOM</b>	Department of Meteorology
<b>DPO</b>	District Production Officer
<b>DWD</b>	Directorate of Water Development
<b>DWO</b>	District Water Officer
<b>DWRM</b>	Directorate of Water Resources Management
<b>DWSSC</b>	District Water and Sanitation Coordination Committee
<b>ENRM</b>	Environmental Natural Resources Management
<b>FAO</b>	Food and Agriculture Organization of the United Nations
<b>FDGs</b>	Focus Group Discussion
<b>FEWS</b>	Flood Early Warning System

<b>FIETS</b>	Financial, Institutional, Environmental, Technical and Social
<b>FSSD</b>	Forestry Sector Support Department
<b>GIS</b>	Geo-Information System
<b>GIZ</b>	Deutsche Gesellschaft für Internationale Zusammenarbeit
<b>ha</b>	Hectare
<b>IP</b>	Implementation Plan
<b>IUCN</b>	International Union for Conservation of Nature
<b>IWRM</b>	Integrated Water Resources Management
<b>JICA</b>	Japan International Cooperation Agency
<b>KIDDP</b>	Karamoja Integrated Disarmament and Development Programme
<b>km<sup>2</sup></b>	Square Kilometre
<b>KUWS</b>	Karamoja Umbrella of Water and Sanitation
<b>KWMZ</b>	Kyoga Water Management Zone
<b>l</b>	Litre
<b>LC</b>	Local Council
<b>LCB</b>	Local Capacity Builders
<b>LED</b>	Local Economic Development
<b>LLG</b>	Lower Local Government
<b>LSM</b>	Large-scale mining
<b>M&amp;E</b>	Monitoring and Evaluation
<b>MAAIF</b>	Ministry of Agriculture Animal Industry and Fisheries
<b>masl</b>	Metres Above Sea Level
<b>MCM</b>	Million Cubic Metre
<b>MEMD</b>	Ministry of Energy and Mineral Development
<b>MLG</b>	Ministry of Local Government
<b>mm</b>	Millimetre
<b>Mm<sup>3</sup></b>	Million cubic meters
<b>MOFED</b>	Ministry of Finance, Planning and Economic Development
<b>MOH</b>	Ministry of Health
<b>MoU</b>	Memorandum of Understanding
<b>Mt</b>	Metric ton
<b>MTI</b>	Ministry of Tourism and Industry
<b>MTTI</b>	Ministry of Tourism, Trade and Industry
<b>MWE</b>	Ministry of Water and Environment
<b>MWT</b>	Ministry of Works and Transport
<b>n.a.</b>	not applicable

<b>NAADS</b>	National Agricultural Advisory Services
<b>NaFORRI</b>	National Forestry Resources Research Institute
<b>NELSAP</b>	Nile Equatorial Lakes Subsidiary Action Program
<b>NEMA</b>	National Environmental Management Authority
<b>NFA</b>	National Forest Authority
<b>NGO</b>	Non-Governmental Organization
<b>NRDs</b>	Natural Resources Departments
<b>NRM</b>	Natural Resources Management
<b>NWRA</b>	National Water Resources Assessment
<b>NWSC</b>	National Water and Sewerage Corporation
<b>O&amp;M</b>	Operation & Maintenance
<b>OPM</b>	Office of the Prime Minister
<b>PME</b>	Planning, Monitoring and Evaluation
<b>RWTSUs</b>	Regional Wetlands Technical Support Units
<b>SME</b>	Small and Medium Enterprises
<b>SNV</b>	Netherlands Development Organisation
<b>SSEA</b>	Strategic Social and Environmental Assessment
<b>SWAT</b>	Soil and Water Assessment Tool
<b>SWOT</b>	Strength, Weaknesses, Opportunities and Threats
<b>TLU</b>	Tropical Livestock Units
<b>TSU</b>	Technical Support Unit
<b>UBOS</b>	Uganda Bureau of Statistics
<b>UGX</b>	Ugandan Shilling
<b>UNMA</b>	Uganda National Meteorological Authority
<b>UNRA</b>	Uganda National Roads Authority
<b>UNWMZ</b>	Upper Nile Water Management Zone
<b>UOs</b>	Umbrella Organisation
<b>UWA</b>	Ugandan Wildlife Authority
<b>UWAS- NET</b>	Uganda Water and Sanitation NGO Network
<b>UWS-E</b>	Umbrella of Water and Sanitation East
<b>VSLA</b>	Village Saving and Loan Association
<b>VWMZ</b>	Victoria Water Management Zone
<b>WASH</b>	Water, Sanitation and Hygiene
<b>WfP</b>	Water for Production
<b>WMD</b>	Wetlands Management Department

<b>WMZ</b>	Water Management Zone
<b>WRA</b>	Water Resources Assessment
<b>WSDF-E</b>	Water Sector Development Facility East
<b>WSS</b>	Water Supply Scheme
<b>WSSBs</b>	Water Supply and Sanitation Boards
<b>WUC</b>	Water Users Committee
<b>yr</b>	Year

# 1. INTRODUCTION

## 1.1 Background to Catchment Planning

The national water policy in Uganda is based on the Integrated Water Resource Management (IWRM) with implementation at the catchment level and provides an overall policy framework and defines the Government's policy objective as:

*"To manage and develop the water resources of Uganda in an integrated and sustainable manner, so as to secure and provide water of adequate quantity and quality for all social and economic needs of the present and future generations and with the full participation of all stakeholders."*

As part of the realisation of this objective, the National Water Policy was based on the implementation of objectives for water management within the IWRM framework. The IWRM in a river-basin context is defined as *"a process that enables the coordinated management of water, land and related resources within the limits of a basin so as to optimise and equitably share the resulting socio-economic well-being without compromising the long term health of vital ecosystems."*

A key feature of the implementation of IWRM in Uganda by the Ministry of Water and Environment (MWE) through the Directorate of Water Resources Management (DWRM) is to provide for the de-concentrated management of water resources to the local catchment level with the participation of all stakeholders.

Following the recommendations of the National Water Policy, the Water Sector Reform Study (2005), the JSR (2006) and other national and regional policies as well as steps already taken for implementation purposes, the country was delineated into four (4) Water Management Zones (WMZs) along hydrological boundaries. Thus, the northern parts of the country are covered by the Upper Nile Water Management Zone (UNWMZ), the western parts by the Albert Water Management Zone (AWMZ), the south by the Victoria Water Management Zone (VWMZ) and the east by the Kyoga Water Management Zone (KWMZ) as Figure 1-1 shows.

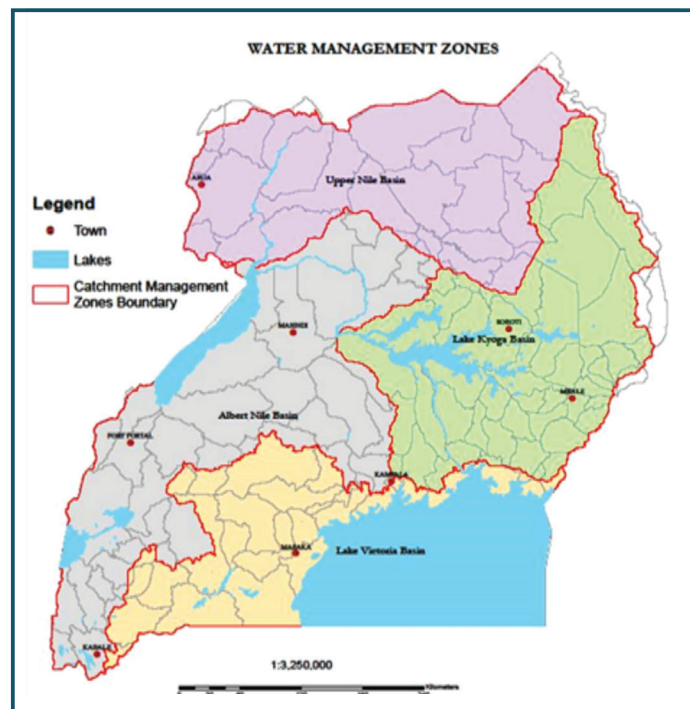
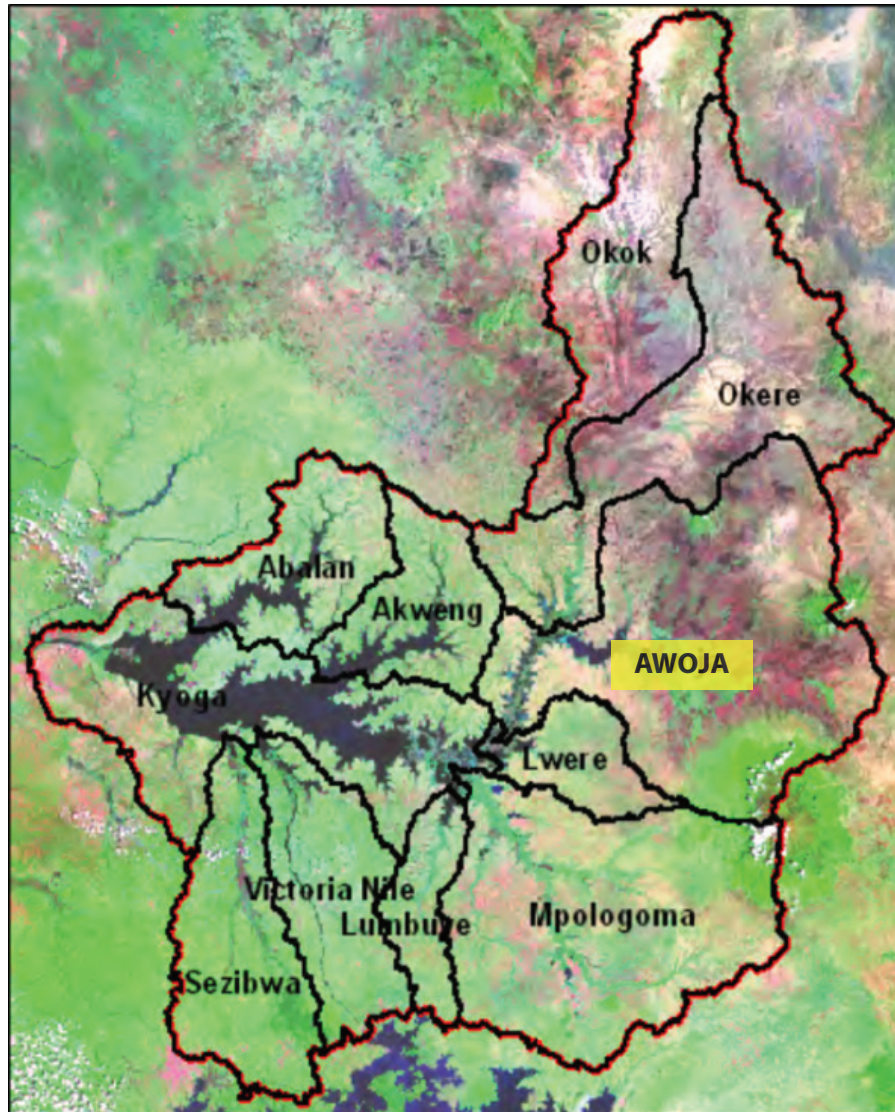


Figure 1-1: Water Management Zones in Uganda

Within each WMZ, there exists a number of smaller hydrological units called catchments for which tools and capacity for management of water resources have to be developed. Catchment Management Plans (CMPs) are to be developed for each catchment in the WMZs to enable planning of water resources development and management at a catchment level.

In line with this, the Awoja Catchment in Kyoga WMZ was chosen as a pilot following screening of potential catchments against a number of criteria which included water supply and sanitation, irrigation, livestock, farming,

fisheries and fish farming, wetlands management, tourism and recreation, natural disaster mitigation, and energy. Kyoga WMZ further benefited from the fact that there was an existing extensive and accessible knowledge base, including a functional Mike Basin simulation model and Geographic Information System (GIS) database. The Awoja Catchment is one of 11 catchments within the Kyoga WMZ *Figure 1-2*, and is situated in its eastern part abutting Mount Elgon. It extends over close to 11 000 square kilometres (km<sup>2</sup>), is mountainous to the east and drains into a lake region in the west.



*Figure 1-2: Catchments in Kyoga WMZ*

This document presents the Awoja CMP, which was prepared in close consultation with the stakeholders to ensure the sustainable use and protection of the water resources, and the conservation of the environment within Awoja Catchment. The CMP was developed through piloting the Catchment-based Water Resources Planning Guidelines, which were developed to guide the process.

## **1.2 Objectives and Purpose of the CMP**

The purpose of this CMP is to provide a long-term strategy for the sustainable development and utilisation of the water resources in the Awoja Catchment by the stakeholders in an integrated manner.

The CMP provides the basis for understanding a complex system and prioritising key focus areas for effective management taking into consideration potential development opportunities, problems and challenges, risks and threats. Following a participatory approach in developing the CMP, the objective is to provide information and shared motivation that will initiate interventions and/or investments, which can be implemented to realise

sustainable management and development of water resources within the Awoja Catchment. The CMP also purposes to:

- consider all conditions and characteristics (physical, social, economic, environmental, political, transboundary etc.) in the catchment in an integrated manner,
- raise awareness on the understanding and importance of as well as the responsibility for water resources management and environmental conservation among all stakeholders and how this will be of benefit to the sustainable economic growth and livelihoods in the catchment as a learning process,
- clarify the interdependence of all activities in the catchment and even the effects on neighbouring catchments,
- engage the stakeholders on all levels in the integrated planning process and help them decide on the best options and scenarios for the development of their catchment as well as in the development and implementation processes,
- motivate the stakeholders and put them into the position to play an active role in preserving their water resources and the environment, and
- initiate investment from within and outside Awoja.

### 1.3 Report Structure

This document has six chapters that provide a logical and consistent flow of information throughout the document as highlighted here below:

**Chapter 1:** Introduction. This chapter presents the background to catchment management planning in Uganda, objectives of the CMP, and general layout of the report.

**Chapter 2:** Approach to Catchment Management Planning. This chapter describes the general approach to catchment management planning in Uganda, which is in line with the catchment management planning guidelines.

**Chapter 3:** Legislative and Institutional Framework. The existing policy, legal, and institutional arrangements, their linkages with catchment management planning and implementation, as well as the existing gaps are presented in this chapter.

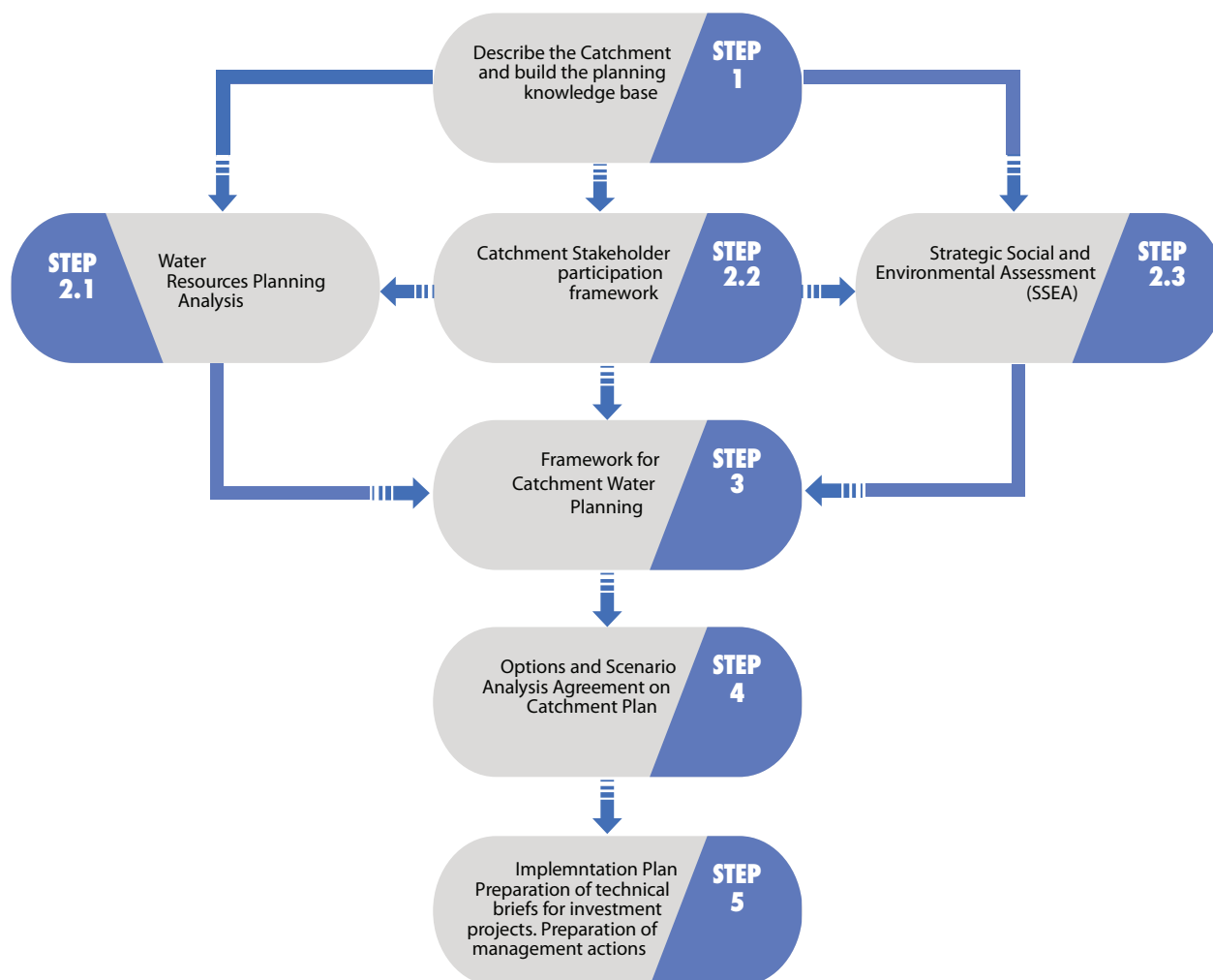
**Chapter 4:** Status of the Catchment. This chapter discusses the main characteristics and features of the catchment, which ultimately leads to identification of the major social, environmental, and water resources assessment issues together with the stakeholder engagement and issues' mapping.

**Chapter 5:** Vision, Objectives, and Analysis of Options. Catchment visioning and strategic analysis is presented and discussed in this chapter. The prioritisation of issues identified within the catchment, analysis of the options to manage the identified issues, as well as configuration of scenario and their evaluation.

**Chapter 6:** Management and Investment Actions. This chapter presents an agreed set of interventions resulting from the options for the best ranked scenario, the implementation plan, and costing of the agreed interventions.

## 2. APPROACH TO CATCHMENT MANAGEMENT PLANNING

The development of this CMP followed the guidelines for Uganda’s Catchment-based Water Resources Planning (MWE, 2012). The process stipulated in these guidelines provides for various steps including assessments on water resources, stakeholders and social and environmental context as indicated in *Figure 2-1*. From these thematic assessments, major issues/challenges within the catchment, the available opportunities, potential threats and risks are identified, options for managing the identified issues proposed, forming the basis for strategic analysis in order to meet the catchment vision and objective. A set of agreed interventions are then mapped and an implementation plan laid, constituting of the associated timing and costs, to form the main body of a Catchment Management Plan and the Implementation Plan.



*Figure 2-1: The catchment management planning process*

The roadmap for the development of the Awoja CMP, therefore, sequentially included the following key activities:

- Evaluation of the existing catchment knowledge base



- Assessment of the current catchment and water resources situation
- Assessment of the catchment's social and environmental characteristics and needs
- Stakeholders engagement at various steps of the development of the CMP;
- Providing a system model, and analysing water availability and future water demands
- Building consensus regarding development and management challenges and opportunities, and developing principles for catchment management and development
- Defining a vision and strategic objectives
- Identifying key strategic actions to realise the vision and objectives
- Developing and analysing options and scenarios; and
- Providing a time-bound implementation plan (short, medium and long term) for the options towards improved water development and management in the catchment.

All these activities and processes as stipulated in the catchment planning guidelines 2012 were adhered to and thematic reports were generated, all of which fed into this CMP. The thematic reports developed in the process of undertaking these activities included:

The development of this CMP was solely based on the guidelines for Uganda's Catchment-based Water Resources Planning (MWE, 2014). The process stipulated in these guidelines provides for various steps including development of a knowledge base, water resources planning analysis, stakeholders' participation, and social and environmental context as indicated in *Figure 2-1*. From these thematic assessments, major issues/challenges within the catchment, the available opportunities, potential threats and risks are identified, options for managing the identified issues also identified, and this forms the basis for strategic analysis in order to meet the catchment vision and objective. A set of agreed interventions are then mapped and an implementation plan laid, constituting of the associated timing and costs, to form the main body of a Catchment Management Plan and the Implementation Plan.

The roadmap for the development of the Awoja CMP, therefore, sequentially included the following key processes, however, stakeholder consultation was done at almost all stages in the development process:

- **The Water Resources Assessment report**, which comprises of a basic assessment of the natural catchment characteristics, natural water resources, rainfall and runoff characteristics, hydro-meteorological monitoring, water quality, water demands and water infrastructure.
- The **Social and Environmental Issues** report, which comprises of the legal and policy context, institutional arrangements, environmental baseline and socio-economic characteristics of the Awoja Catchment that affect the social and environmental well-being of the catchment and highlights possible interventions to address the identified issues.
- The **Water Balance** report, which gives information on the water availability for surface water and groundwater. Use of the Mike Basin model (a water allocation tool) was made to determine current and future water demands and the availability of water resources for proposed development options.
- The **Stakeholder Engagement** report details the stakeholder participation framework and interactions in mobilising the input of water users and affected parties in the management of water resources. Field visits, informal and formal meetings as well as the proceedings of joint stakeholder forum workshops were highlighted and their input of water resources issues captured.
- The **Options for the Management and Development of Water Resources** Report details the identified catchment issues and provides an analysis of the options for solving them. It further presents and evaluates the formulated scenarios as well as costing them and as such, serves as the forerunner to the CMP.

All these thematic reports fed into the CMP, which consists of two main elements: first, a number of agreed investments in infrastructure and other interventions; and second, various water management interventions and actions aimed at resolving conflict, conserving and protecting the catchment and its natural resources, and ensuring equitable access to and use of water resources. The CMP further supports one of the highest priorities of the National Development Plan (NDP, 2010), which is to invest in water for production, including irrigated agriculture, water supply, livestock water supply, fisheries and aquaculture, and water for rural industry.

# 3. LEGISLATIVE AND INSTITUTIONAL FRAMEWORK

## 3.1 Policy and legal context

The Africa Water Vision 2025 states its goal as *“an Africa where there is an equitable and sustainable use and management of water resources for poverty alleviation, socio-economic development, regional cooperation, and the environment”* and the water policy reform initiative is aimed at realising this vision for water management in Uganda within the IWRM framework. Worth noting is the fact that sustainable management of water resources is not limited to physical management but also incorporates legislation, policies, economic tools, institutions, and stakeholders involved in management, regulation, and utilisation of water resources. Whilst water is essential to livelihoods, and always provides for subsistence and survival, it does not solely drive economic development. Many other factors also have to be in place if the provision of water is to have its full beneficial impact on society. A strong cooperative approach between role-players and especially governmental institutions is, therefore, essential to work together within their respective legislative and policy mandates to promote the approach to IWRM and to ensure the best economic, social and environmental development.

A synopsis of the legal context in Uganda under which IWRM is implemented and managed is provided by:

- The Constitution of the Republic of Uganda
- National Policies
- National Legislation
- Trans-boundary considerations, and
- International Conventions

## 3.2 The Constitution of the Republic of Uganda (1995)

The Constitution of the Republic of Uganda sets a number of national guiding principles relating to, and supporting the principles of sustainable development including having balanced and equitable development, which requires that the State adopts an integrated and coordinated planning approach. It further stipulates that the State ensures balanced development between different areas of Uganda and between the rural and urban areas with special measures employed to favour of the development of the least developed areas.

Through the constitution, the State is entrusted to protect important natural resources including land, water, wetlands, minerals, oil, and fauna and flora on behalf of the people of Uganda. The state must further endeavour to fulfil the fundamental rights of all Ugandans to social justice and economic development, with all developmental efforts directed at ensuring the maximum social and cultural well-being of the people. In terms of the Constitution, all Ugandans have a right to education, health services, clean and safe water, work, decent shelter, adequate clothing, food security, and pension and retirement benefits.

The State must promote sustainable development and public awareness of the need to manage land, air, water resources, as well as use of natural resources, in a balanced and sustainable manner for the present and future generations. All possible measures must be taken to prevent or minimise damage to land, air, and water resources resulting from pollution or other causes. The Constitution entrusts the State to ensure the conservation of natural resources and promote the rational use of natural resources to safeguard and protect the biodiversity of Uganda.

Through all this, the Constitution sets the scene for Integrated Water Resource Management in Uganda.

### **3.3 National Policies**

#### **3.3.1 National Water Policy (1999)**

The 1999 National Water Policy provides an overall policy framework that defines the Government's policy objective as managing and developing water resources of Uganda in an integrated and sustainable manner, to secure and provide water of adequate quantity and quality for all social and economic needs sustainably, with the full participation of all stakeholders (DWRM, MWE, 2012).

According to the National Water Policy and the Water Act Cap 152, the responsibilities to provide water services and to maintain facilities were devolved to local councils in districts and urban centres. The role of the Central Government's Agencies is that of guiding and supporting as required. The Act thus emphasises the shared responsibilities in development and management of water resources among stakeholders, including the Private Sector and non-Government organisations (NGOs) to regulate human activities that can pose risks to water resources. It also provides for pollution control measures with associated penalties and fines.

The existing policy and legal framework promotes wise use of water resources from the lowest possible level, while considering roles to be played by different stakeholders at different levels. This offers an opportunity to ensure that communities can actively participate in the development and maintenance of water sources within a given catchment.

#### **3.3.2 National Policy for the Conservation and Management of Wetland Resources (1995)**

The national policy for the conservation and management of wetland resources (1995) is aimed at restricting the continued loss of wetlands and their associated resources and aims to ensure that benefits derived from wetlands are sustainably and equitably distributed to all people of Uganda. The wetlands policy calls for:

- No drainage of wetlands unless more important environmental management requirements supersede
- Sustainable use to ensure that benefits of wetlands are maintained for the foreseeable future
- Environmentally sound management of wetlands to ensure that other aspects of the environment are not adversely affected
- Equitable distribution of wetland benefits; and
- The application of environmental impact assessment procedures on all activities to be carried out in a wetland to ensure that wetland development is well planned and managed.

Wetland related issues have been incorporated into the National Environmental Statute 1995. The Wetlands Policy is strengthened by a supplementary law specifically addressing wetland concerns. Wetland resources are regarded as forming an integral part of the environment and it is recognised that present attitudes and perceptions of Ugandans regarding wetlands be changed. Wetland conservation requires a coordinated and cooperative approach involving all the concerned people and organisations in the country, including the local communities.

Within the context of the guiding principles, the National Wetlands Policy set five goals:

- To establish the principles by which wetland resources can be optimally used over time
- To end practices, which reduce wetland productivity
- To maintain the biological diversity of natural or semi-natural wetlands
- To maintain wetland functions and values; and
- To integrate wetland concerns into the planning and decision making of other sectors.

### **3.3.3 Uganda National Land Policy**

The Uganda National Land policy provides a framework for articulating the role of land in national development, land ownership, distribution, utilisation, alienability, management, and control of land. The Land Policy has a specific objective that seeks to ensure sustainable utilisation, protection and management of environmental, natural and cultural resources on land for national socio-economic development. It seeks to ensure that all land use practices and plans conform to principles of sound environmental management, including biodiversity, preservation, soil and water conservation, and sustainable land management. Section 6.7, item 140 of the policy promotes optimal and sustainable use and management of environment and natural resources for the present and future generations.

### **3.3.4 National Forestry Policy**

The National Forestry policy provides for the establishment, rehabilitation and conservation of watershed protection forests. It aims at promoting the rehabilitation and conservation of forests that protect the soil and water in Uganda's key watersheds and river systems.

### **3.3.5 The Renewable Energy Policy for Uganda**

The overall goal of the Renewable Energy policy is to increase the use of modern renewable energy, from the current 4% to 61% of the total energy consumption by the year 2017. Renewable sources of energy include solar energy, hydropower, biomass, wind, and geothermal as well as peat and wastes. For hydropower, the policy targets 1,200MW of installed capacity by 2017 for large hydropower plants and 85MW of installed capacity by 2017 for small and micro hydropower plants.

## **3.4 National legislation**

### **3.4.1 Water Act Cap 152 (1997)**

Uganda's Water Act Cap 152 provides for the use, protection and management of water resources and supply; and facilitates the devolution of water supply and sewerage undertakings. Its objectives are:

- i) To promote the rational management and use of the water resources of Uganda by:
  - Use of appropriate standards and techniques for the investigation, use, control, protection, management and administration of water resources
  - Coordinating all public and private activities which may influence the quality, quantity, distribution, use or management of water resources
  - Coordinating, allocating and delegating responsibilities for the investigation, use, control, protection, management or administration of water resources.
- ii) To promote the provision of a clean, safe and sufficient supply of water for domestic purposes
- iii) To ensure appropriate development and use of water resources other than for domestic use, e.g. watering of stock, irrigation and agriculture, industrial, commercial and mining uses, generation of energy, navigation, fishing, preservation of flora and fauna and recreation in ways which minimise damage to the environment; and
- iv) To control pollution and promote the safe storage, treatment, discharge and disposal of waste, which may pollute water or otherwise harm the environment and human health.

According to the National Water Policy (1999) and the Water Act Cap 152, the responsibilities to provide water services and to maintain facilities are devolved to local councils in districts and urban centres, with full mandates to construct, acquire or alter any water supply work. The role of the Central Government's Agencies is that of guiding and supporting as required. The Act thus emphasises the shared responsibilities in development and management of water resources among stakeholders (including the Private Sector and NGOs) to regulate human activities that can pose risks to water resources. It also provides for pollution control measures with associated penalties and fines.

Other Water Sector related policies form synergies with the Water Policy include:

- The National Gender Policy of 1999, which recognises women and children as the key stakeholders of water
- The Local Government Act of 1997, which underscores the role of Local Government in provision and management of water and sanitation, empowering the local authorities to plan and to implement development interventions according to local needs
- The 1998 Land Act, which stipulates the responsibility of the Central and Local Government in protecting environmentally sensitive areas such as natural lakes, rivers, groundwater, natural ponds, natural streams, wetlands, forest reserves, national parks and any other land reserved for ecological and tourist purposes; and
- The 1998 Water Abstraction and Wastewater Discharge Regulations for controlling water abstraction and wastewater discharge, to promote sustainable and environmentally friendly development and use of water resources. Some issues feature at the level of the policy and regulatory framework while others are crucial at catchment level. For instance, plans to develop irrigation schemes necessitate the development of a proper mechanism to protect water use rights and to settle disputes, especially between upstream and downstream water users. Issues of equity exist, whereby some users, often powerful up-stream users, put their interests first. In establishing the mechanism to handle user rights and conflict resolution, issues of active participation of all concerned stakeholders, including women, livestock keepers, and youths, should be taken into consideration.

The existing policy and legal framework promotes wise use of water resources from the lowest possible level, while considering roles to be played by different stakeholders at different levels. This offers an opportunity to ensure communities actively participate in development and maintenance of water sources.

#### **3.4.2 National Environment Act (1995)**

The National Environmental Act provides for *“sustainable management of the environment; to establish an authority as a coordinating, monitoring, and supervisory body for that purpose; and for other matters incidental to or connected with the foregoing.”*

The Act makes provision for a tiered approach to environmental planning, commencing with a National Environmental Management Plan to be prepared and reviewed every five years. Each district is required to compile a district environmental action plan every three years that compliments the National Environmental Management Plan. Both of these plans are made available to the public. At a project scale, the Act stipulates that developments of a certain nature (as determined under Section 19(7) of the Act) are required to undertake detailed Environmental Impact Assessment process in a prescribed manner.

The Act also makes provision for the monitoring of air and water quality and makes provision for the establishment and implementation of minimum standards pertaining to emissions and effluent.

Section 34 of the Act deals specifically with limitations in the use of rivers and lake systems and aims to minimise the negative impacts and control activities that have the potential to be detrimental to these systems. The Act goes on to make specific provisions for the protection of river banks and lake shores in Section 35 and protection and management of wetland systems in Section 36 and 37 respectively.

Hilly and mountainous areas have also been identified as areas requiring special attention and protection by the Act. The Act makes provision for the restoration of vegetative cover in these areas. This Act coupled with the provisions made in the Prohibition of the Burning of Grass Act (1974) and the Forest Act (1947) and the Cattle Grazing Act (1945) provides a good basis for restoration, protection and management of vegetative cover in hilly and mountainous areas.

### **3.5 Transboundary considerations**

The trans-boundary nature of Uganda's water resources are such that there are a number of international conventions relating to management of water resources with which Uganda must comply. Currently, the key conventions/organisations to which Uganda is party are; the Protocol for Sustainable Development of Lake Victoria Basin and Nile Basin Initiative.

#### **3.5.1 Legal Framework for the Sustainable Management of the Nile Waters:**

Treaties regarding the management of the waters of the Nile basin date back to 1929 when Great Britain and Egypt signed an agreement under which no irrigation, power works or other measures were to be constructed or undertaken on the Nile, and its branches, or on lakes from which it flows in the Sudan, or in countries under British administration except with the previous agreement of the Egyptian government. The Agreement was followed by the 1959 Agreement on the Full Utilisation of the Nile Waters, which was signed between Egypt and Sudan. The 1959 Agreement allocates the waters of the Nile between the two signatory states.

#### **3.5.2 Agreed Curve for the Lake Victoria Release:**

Before the construction of the Nalubale (Owen Falls) Dam, which began in 1951, the outflows from Lake Victoria were controlled naturally by the Ripon Falls some 3km upstream of the dam site. After study of the discharge measurements, which had been made since 1923 at Namasagali, about 80km downstream of the lake outfall, an Agreed Curve was established, which described the natural relation between lake levels measured at the Jinja gauge and simultaneous measured outflows from the lake. Since 1954 (when the Nalubale Dam was completed), water flow from the lake has been constrained to mimic the natural outflows from the lake using a rating "Agreed Curve" that correlates the flow of the Nile at the source with Lake Victoria water level.

#### **3.5.3 Nile Basin Cooperative Framework Agreement**

The Nile Basin countries embarked on the process of negotiating and developing a new agreement for the sustainable management and development of the shared Nile water resources in the 1990s. This process is still on-going and it is envisaged that once these negotiations are successfully concluded, the resulting agreement will supersede all the existing Nile water agreements. (NELSAP, 2012)

#### **3.5.4 The Lake Victoria Basin Commission**

The Lake Victoria Basin Commission which was established under article 33 of the "Protocol for Sustainable Development of Lake Victoria Basin" has a broad function of promoting, facilitating and coordinating activities of different actors towards sustainable development and poverty eradication of the Lake Victoria Basin. These activities include catchment management interventions among others.

### **3.6 International Conventions**

#### **3.6.1 Ramsar Convention (1971)**

The Convention on Wetlands (Ramsar, Iran, 1971) is an intergovernmental treaty that commits member countries to maintain the ecological character of Wetlands of International Importance and to plan for the "wise use", or sustainable use, of all of the wetlands in their territories. The Convention's mission is "the conservation and wise use of all wetlands through local and national actions and international cooperation, as a contribution towards achieving sustainable development throughout the world." The wise use of wetlands is defined as "the maintenance of their ecological character, achieved through the implementation of ecosystem approaches, within the context of sustainable development." Uganda signed the Convention on the 4th July 1988. It currently has 12 Ramsar registered wetland systems, representing a combined area of 454,303ha.

#### **3.6.2 UN Framework Convention on Climate Change (UNFCCC) and related Kyoto Protocol**

Uganda ratified the UNFCCC in 1993 and is one of the Least Developed Countries (LDCs). The First National Communication to the UNFCCC was developed in 2002. A Climate Change Policy was launched in 2012, with a related prioritisation of outputs under a short (1-5 years), medium (6 to 10 years) and long-term (10-15 years) timeframes. The priorities in the National Climate Change Policy have been integrated in the Second National

### **3.6.3 UN Convention on Biological Diversity**

The Convention's main objective is to ensure the conservation of biological diversity and sustainable use of its components. The study process should undertake thorough investigation of the sites and come up with lists of biodiversity in the areas and available information indicate that none of the groups are threatened, rare or vulnerable, hence no impact of the project on such groups.

### **3.6.4 International conventions for shared water resources**

There are a number of international conventions relating to management of shared water resources with which Uganda must comply. Currently, the key conventions/organisations to which Uganda is party are; the Protocol for Sustainable Development of Lake Victoria Basin and Nile Basin Initiative referred to in section 3.5.3 above.

## **3.7 The institutional context**

### **3.7.1 National Level**

The Ministry of Water and Environment (MWE) plans and coordinates all water and environmental sector activities and is the ultimate authority responsible for water resources and environmental management in Uganda. The MWE has the overall responsibility for setting national policies and standards related to water and the environment, managing and regulating all water resources and determining priorities for water development and management. The MWE is divided into three directorates: Directorate of Water Resource Management (DWRM), the Directorate of Water Development (DWD), and the Directorate of Environmental Affairs (DEA).

The DWD has the responsibility for providing overall technical oversight for the planning, implementation, and supervision of the delivery of urban and rural water and sanitation services across the country including water for production. It is responsible for regulating the provision of water supply and sanitation and the provision of capacity development and other support services to Local Governments, Private Operators and other service providers. The Directorate comprises of three Departments: Rural Water Supply and Sanitation, Urban Water Supply and Sanitation, and Water for Production.

The DEA is responsible for environmental policy, regulation, coordination, inspection, supervision and monitoring of the environment and natural resources as well as the restoration of degraded ecosystems and mitigating and adapting to climate change. The DEA comprises of four departments of Environmental Support Services (DESS), Forestry Sector Support Department (FSSD), Wetlands Management (WMD), and the Department of Meteorology (DOM), recently turned into an Authority.

The MWE further works closely with the National Environment Management Authority (NEMA), which is mandated with the coordination, monitoring, regulation, and supervision of environmental management; the National Water and Sewerage Corporation (NWSC) — with the mandate to operate and provide water and sewerage services in the larger urban centers; and the National Forest Authority (NFA), whose mandate is to manage Central Forest Reserves and to supply high quality forestry-related products and services.

Other national entities significantly impacted by technical water management issues are the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF); the Ministry of Tourism and Industry (MTI); and the Ministry of Energy and Mineral Development (MEMD). The Ministry of Education and Sports (MES) is responsible for the implementation of Water and Sanitation in schools, and the Ministry of Health (MOH) is responsible for sanitation via the environmental health department.

The Ministry of Local Government (MLG) oversees the implementation of Local Government Development Plans, which include water supply and programmes for the improvement of hygiene and sanitation in institutions and public places. There are a number of development partners, private sector, and NGOs that also act in the water sector providing services, advice, and facilitation. A number of NGOs active in the water sector are coordinated at the national level through the Uganda Water and Sanitation NGO Network (UWASNET), an umbrella organisation largely funded by development partners and the MWE. An outline of organisations directly or indirectly involved in water management is indicated in *Figure 3-3*.

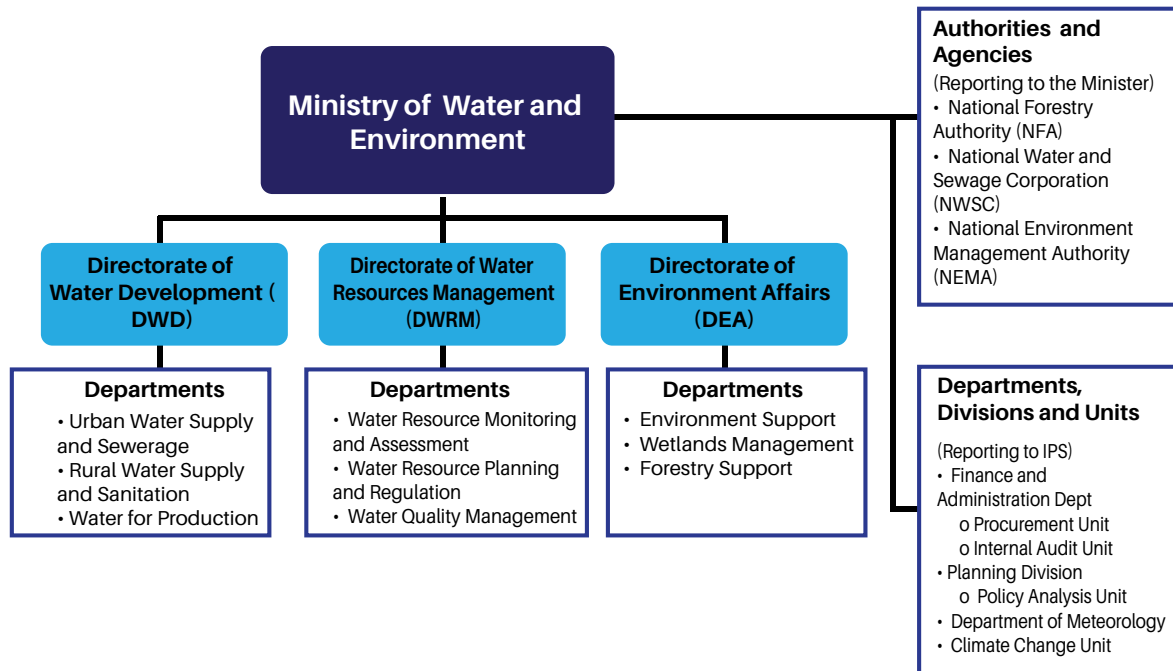


Figure 3-1: Institutional Setup at a National Level (MWE, 2009)

Coordination is a key process for Integrated Water Resources Management (IWRM), which involves multiple stakeholders from different sectors, on different scales, and with different structures and interests. At the national level, the following committees are relevant to integrated water resources management:

- The Policy Committee on Environment: chaired by the Prime Minister, at the highest level of political decision-making
- The Water Policy Committee, which is composed of directors, and enables high-level and strategic dialogue specifically in the water sector
- The IWRM Working group, which is an informal working group enabling technicians to coordinate
- The Water and Environment Sector Working Group (WESWG)
- The Inter-Ministerial Technical Committee regarding Water for Production, comprising members from the MWE, Ministry of Agriculture, Animal Industry and Fisheries (MAAIF), Office of the Prime Minister, National Planning Authority, and Ministry of Finance. It meets on a quarterly basis to coordinate investments and works regarding water for production
- The Wetlands Advisory Group (WAG), which is a technical group dedicated to wetlands. The WAG improves coordination on wetlands issues, particularly on the issue of dry land rice
- The MWE-DWRM has created Water Net, a network for building capacities of stakeholders connected to the water sector.

The National Environment Management Authority (NEMA) is the apex body for environmental law enforcement in Uganda. However, several functions have been delegated to other institutions as lead agencies in their respective fields. NEMA is in charge of:

- Review and administrative clearance of environmental evaluations, in conjunction with other lead agencies
- Delivery of permits (for instance, permits for activities within the legal buffer zones of water bodies). The responsibility of delivering permits is vested into the different lead institutions



- Monitoring compliance. The responsibility of control is distributed over 375 gazetted inspectors (2014) distributed in many Ugandan institutions (including the MWE). Only 30 of them belong to NEMA.

An Environmental Police has been formed at NEMA, comprising 25 officers. Only five regional Environmental Police officers (liaison officers) have been designated, among which one is based in Mbale (for the eastern region: his area covers 52 districts corresponding to a quarter of the country) and one in Jinja (for the south-eastern region). The liaison officers belong to the regular police but are specifically trained in environmental issues. They are under the command of the territorial police (Regional Police Commander/District Police Commander). Their functions include sensitisation, demarcation, control, issuing warnings, following up of cases, eviction, and prosecution.

Within each district, there are offices that are in charge of the environment, forestry, wetlands, agriculture, fisheries, planning among others. However, the structure varies from district to district.

### 3.7.2 Regional Level

As a result of the deconcentration of the management of water resources, DWRM created four Water Management Zones (WMZ) following hydrological boundaries. They operate on regional level with the objective to bring the central services closer to the stakeholders. Their primary role is to facilitate sustainable development of the water resources for the economic and social benefit of the people in the catchment and to implement the water management measures needed to protect and conserve the catchment and its water resources, ensure sustainability, and reduce or resolve conflicts over resource use.

The DWD established the Water and Sanitation Development Facility (WSDF) as a mechanism for supporting water supply and sanitation facilities for rural growth centres and small towns, intended to promote a demand-responsive approach where Water Authorities/Town Councils or Town Boards apply for funding. The successful applicant is assisted by the WSDF to develop piped water supply systems.

Technical Support Units (TSU) established by DWD at the regional level have the mandate to support capacity building of district-based structures. This involves training, technical advice and support supervision of districts to enable them to effectively implement their roles in the rural sub-sector. The mandate also covers water for production.

Umbrella Organizations (UO) are also regional organisations constituted as associations of the local Water Supply and Sanitation Boards (WSSBs) with the principle objective of providing operation and maintenance (O&M) back-up support (training, technical, legal and organisational support, supervision of rehabilitation, and extension works as well as water quality monitoring).

The DWD has further deployed staff from its Department of Water for Production to the regions while DEA has also established offices for its Wetlands Department on regional level.

These deconcentrated units in the regions are based together for improved cooperation and integration and represent the MWE on regional level.

### 3.7.3 Catchment Level

During the catchment management planning process, an institutional framework has to be created, which brings the stakeholders together to present and exchange their views and thus give the process legitimacy. Hence, the WMZ establishes Catchment Management Organisations (CMOs), which builds on and utilises to the maximum practicable extent, existing structures and relationships. The CMOs consists of several bodies *Figure 3-2*:

- The **Catchment Stakeholder Forum (CSF)** brings together all actors on catchment management. The CSF defines key issues related to water resources in the catchment that require consideration in order to effectively protect, manage, and develop water resources. It provides input to the CMP for coordinated, integrated and sustainable development and management of water and related resources in the catchment, including their implementation status
- The **Catchment Management Committee (CMC)** is composed of representatives of all relevant stakeholder groups (government, politicians, and community based organisations, NGOs, water

users, media, academic institutions, and private sector) and collaborates with the WMZ during the formulation of a Catchment Management Plan and plays a steering role during its implementation. The CMC responsibilities include: coordination of stakeholder-driven definition of key issues related to water resources, promotion of coordinated planning, and implementation as well as stakeholder-driven decision making related to integrated and sustainable development and management of water and related resources, development of plans for coordinated, integrated and sustainable development and management of water and related resources. It endorses the CMP and presents it to the Catchment Stakeholder Forum for information purposes. The CMC acts as an Executive Board for the Catchment Management Organisation.

- The **Catchment Management Secretariat (CMS)** provides support to the Catchment Management Committee in coordinating the planning and implementation of activities in the catchment as well as following up of recommended actions by the stakeholders. The CMS acts as an administrative secretariat for the Catchment Management Committee as well as the Catchment Technical Committee.
- The **Catchment Technical Committee (CTC)** forms the technical arm of the CMO and supports the CMC in their tasks. The CTC brings technical expertise and knowledge during the formulation of the Catchment Management Plan, operationalises and sometimes implements programmes and projects from the plan, and generally ensures that the different districts collaborate to implement the plan. It comprises of technical people from government, NGOs, private sector, development agencies, and other relevant organisations in the catchment.

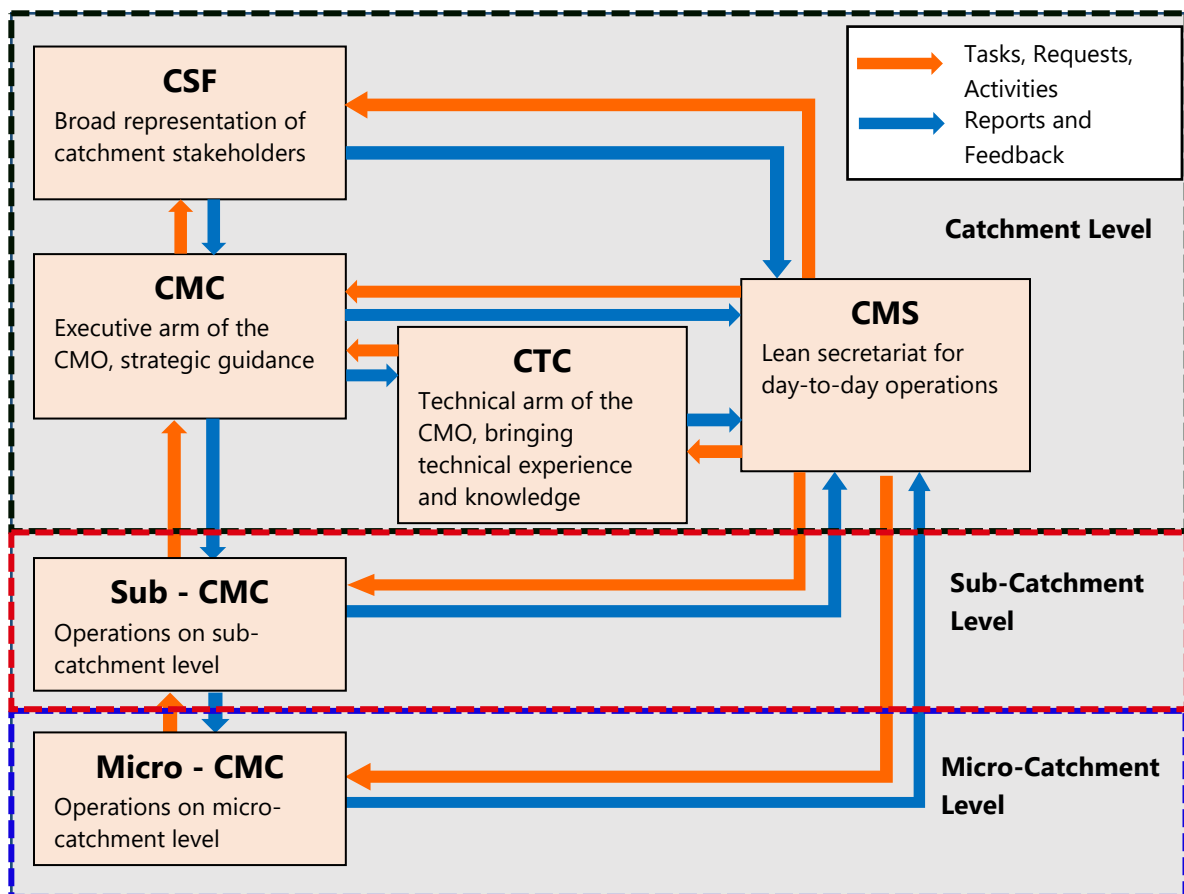


Figure 3-2: Catchment Management Organisation Structure (DWRM, 2016)

Other relevant institutions on the catchment level are:

- At the **District level**, the District Natural Resources Department (including the District Environment Office, District Forestry Office, and District Wetlands Office), District Works or Engineering Department under which the District Water Office falls, District Production Department with the District Agricultural Office, District Veterinary Office and District Fisheries Office, District Planning Department, Department of Community Based Services, District Information Department, and District Health Department are key in the implementation of the CMP. However, the structure varies from district to district according to the natural conditions in the district
- Policies at national level are translated into Sector Development Plans, which are implemented at district level under the Decentralization Policy. Most districts have 5-year district development plans in which all sector plans are integrated. Natural Resources Management activities are mandated to be implemented by every district
- Sub-counties
- CBOs and CSOs,
- Water User Associations etc.

Additionally, there are a number of private sector and NGOs, which also act in the water sector, providing services, advice and facilitation. They work on catchment and regional level or sometimes combine the two.

Many of these NGOs are coordinated at the national level through the Uganda Water and Sanitation NGO Network (UWASNET), an umbrella organisation largely funded by development partners and the MWE.

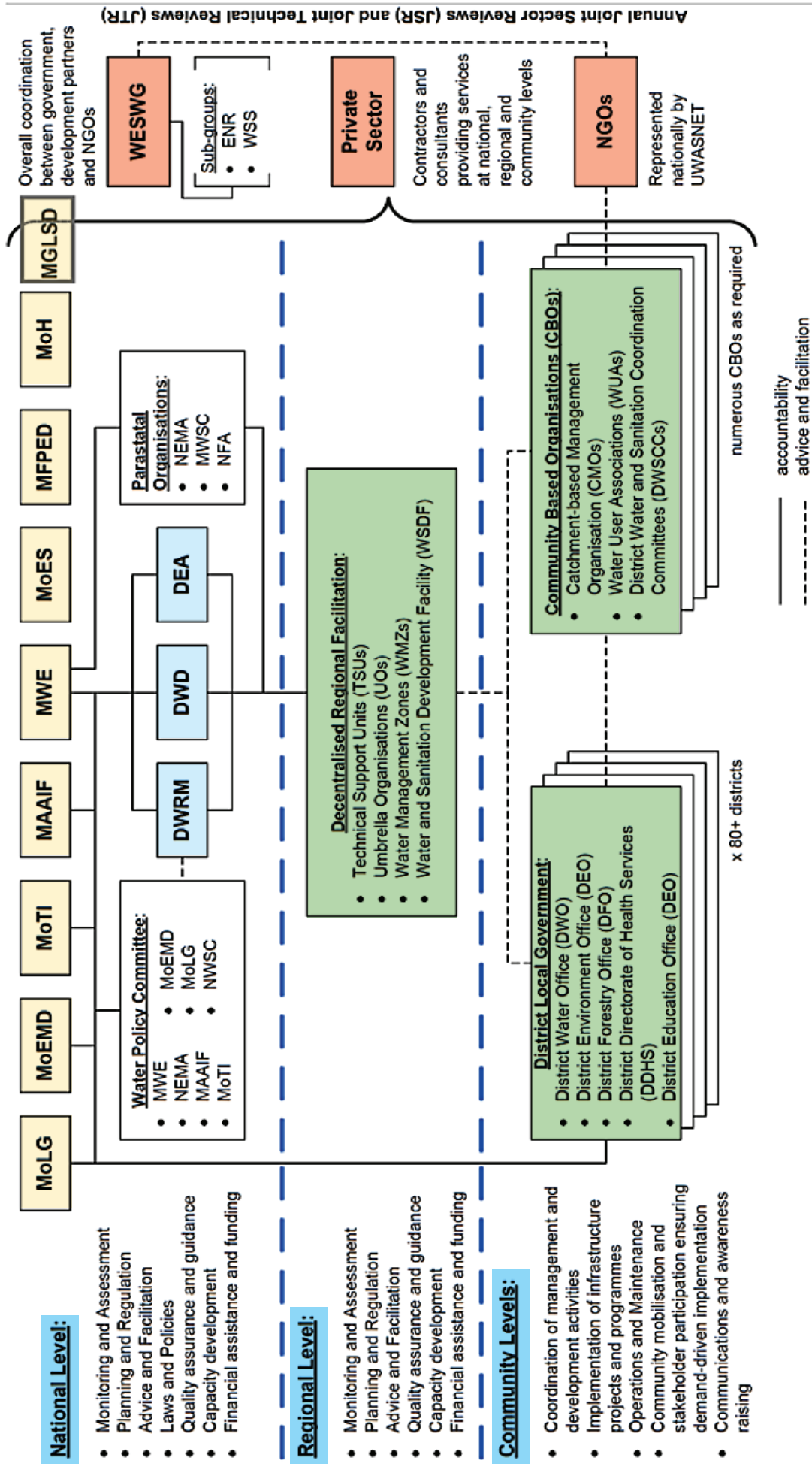


Figure 3-3: An Overview of Uganda's Water and Environment Sector (MWE, 2009)

### 3.7.4 Institutional Issues

Water resources management in Uganda continues to face some institutional challenges, mainly related with technical capacity, coordination, and enforcement of rules. *Table 3-1* highlights some of these challenges.

**Table 3-1: Institutional issues and implications**

Issues	Background and Implications
Technical Capacity in local authorities	Limited capacity in institutions on local level with limited knowledge base.
This has an impact on development and service delivery.	
Coordination and cooperation between institutions	Development initiatives by respective institutions are planned independently. Lack of coordination leads to inefficient use of water resources and lack of resource protection.
New institutional framework in water management	CMOs are being established. More direct interaction on local level with institutions will create more awareness and integration. Required capacities are being transferred to the zones.
Water user participation	Formal stakeholder forums are not established yet. Some water sector committees such as water and sanitation advocacy committees need to be expanded. Water sector user groups lack capacity and information on good management practices.
Law enforcement	Limited capacity and political will to enforce legislation leads to degradation of natural resources.
Development of Catchment Management Plans	It is vital that CMPs are implemented to achieve sustainability. All parties need to reach agreement on actual accountability, actual monitoring and actual enforcement as it is here where success or failure of initiatives will be determined.

## 4. STATUS OF THE CATCHMENT

### 4.1 Catchment Physiography

#### 4.1.1 Description

The Awoja Catchment is one of the 11 catchments within the Kyoga WMZ, the others being Okok, Okere, Akweng, Abalan, Kyoga, Sezibwa, Victoria Nile, Lumbuye, Lwere, and Mpologoma. It is situated in the eastern part of the WMZ abutting Mount Elgon, is mountainous to the east and drains into a lake region in the west. The catchment has an area of approximately 11,000 square kilometres (km<sup>2</sup>), which is about 19% of the total area of the KWMZ. The Awoja Catchment covers an area consisting of 14 districts; *Figure 4-1*, which are wholly or partly located within the catchment. However, the administrative borders do not correspond with the hydrological ones.

*Table 4-1: Districts fully or partly included in the Awoja Catchment*

Districts in the Awoja Catchment			
Wholly in the catchment	Partially in the catchment		
Bulambuli	Amudat	Nakapiripirit	Bukedea
Kween	Katakwi	Napak	Soroti
Kapchorwa	Kumi	Ngora	
Sironko	Bukwo	Serere	



### 4.1.2 Sub-catchments

Following the hydrological drainage, fourteen sub-catchments were delineated in the Awoja Catchment and named after the major river in each sub-catchment, *Table 4-2*.

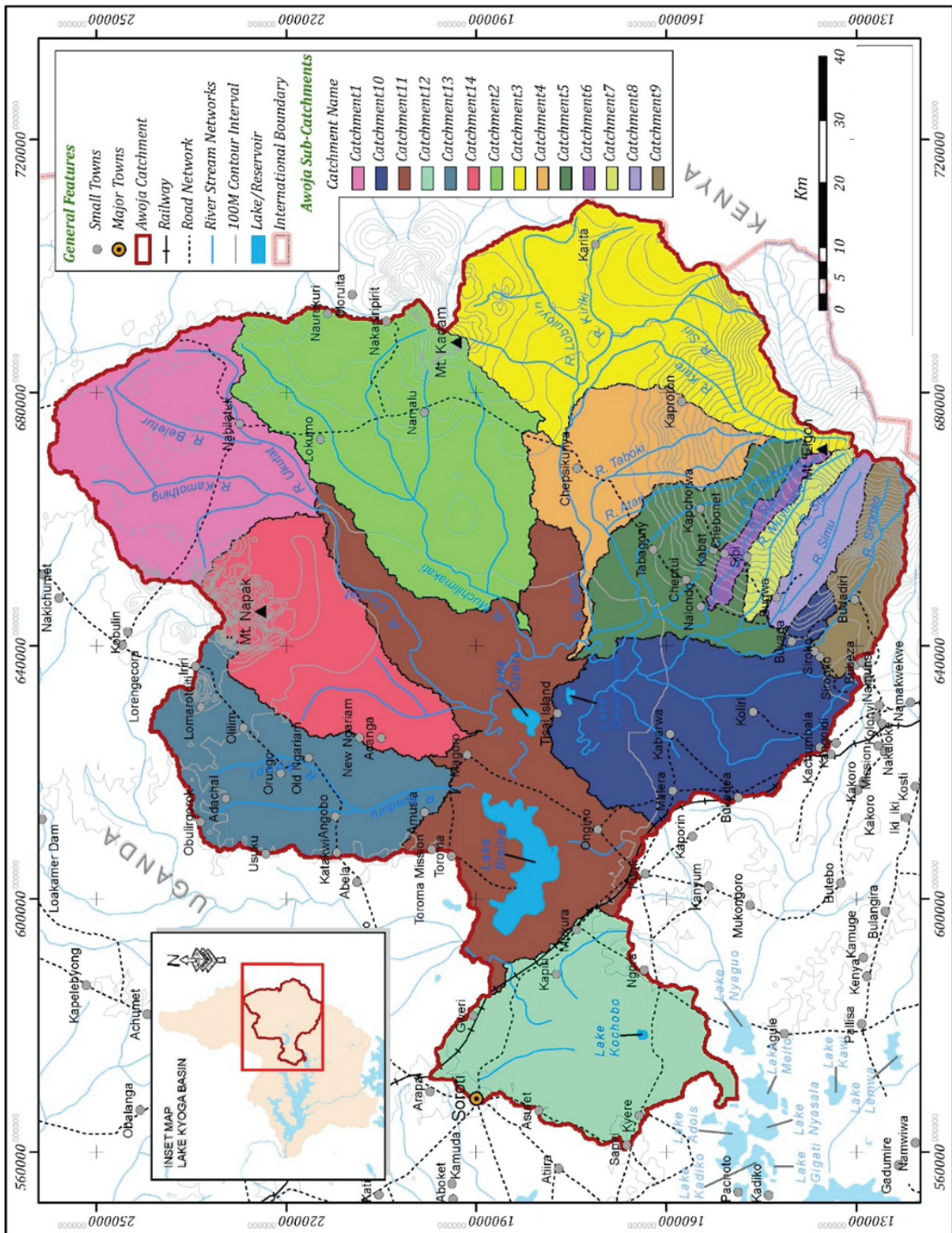


Figure 4-2: Sub-catchments within the Awoja Catchment

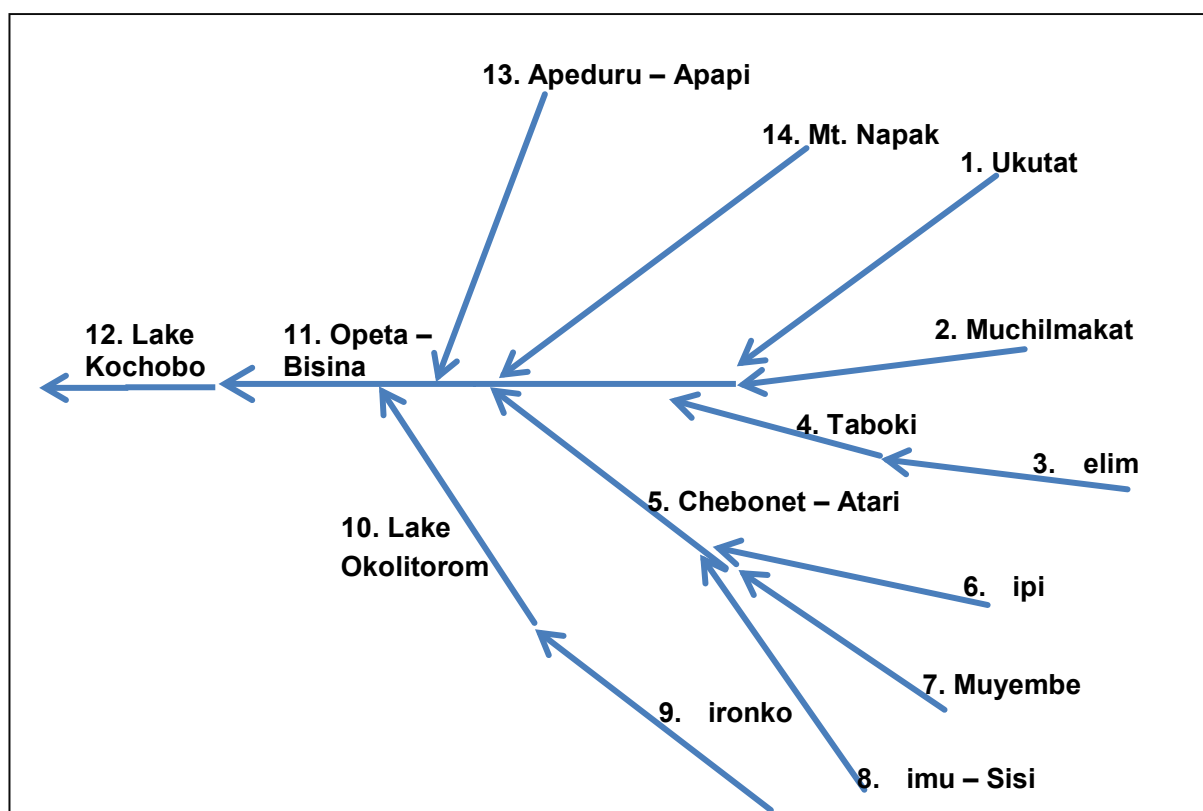


**Table 4-2: Names of Sub-Catchments in Awoja Catchment**

Sub-catchment	Name	Sub-catchment	Name
Catchment 1	Ukutat	Catchment 8	Simu – Sisi
Catchment 2	Muchilmakat	Catchment 9	Sironko
Catchment 3	Kelim	Catchment 10	Lake Okolitorom
Catchment 4	Taboki	Catchment 11	Opeta – Bisina
Catchment 5	Chebonet – Atari	Catchment 12	Lake Kochobo
Catchment 6	Sipi	Catchment 13	Apeduru – Apapi
Catchment 7	Muyembe	Catchment 14	Mt. Napak

The linkages of the flow of water between the respective sub-catchments is indicated as follows and shown in Figure 4-3.

- Sub-catchments 1, 2, 13 and 14 flow directly into sub-catchment 11;
- Sub-catchment 3 flows into sub-catchment 4, which flows into sub-catchment 11;
- Sub-catchments 6, 7 and 8 flow into sub-catchment 5, which flows into sub-catchment 11;
- Sub-catchment 9 flows into sub-catchment 10, which flows into sub-catchment 11;
- Sub-catchment 11 flows into sub-catchment 12.



*Figure 4-3: Schematic layout of flow between the respective sub-catchments*

#### 4.1.3 Climate

Much of the Awoja Catchment lies at an altitude ranging from 940 to 1000masl, with the upland hilly areas rising to 1400m and the high mountains to over 3000m. Although just 2° north of the equator, the altitude results in the catchment having a relatively mild climate, with annual patterns dominated by rainfall rather than by radiation. Much of the catchment is well watered and can support rainfed agriculture, although seasonality varies across sub-catchments and seasonal droughts are a common feature.

The main dry season for the Awoja Catchment is from December to February. The mean annual rainfall is 1103mm, but this is not evenly spread. The western tip and southern part of the Awoja Catchment experiences an average annual rainfall of 1200 - 1500mm/year. The majority of the central and northern part of the catchment has an average annual rainfall of 1197mm with a 10-month period for which evaporation exceeds rainfall. In the higher parts of the Awoja Catchment around Mount Elgon, high rainfall of between 1500 - 2000mm/year can be expected.

The north-eastern part of the Awoja Catchment in the Karamoja region, including Nakapiripirit, Napak and Amudat experience erratic rainfall, averaging 745mm/year, which is far from ideal for crop cultivation.

Evapotranspiration in the Awoja Catchment is high and this has an impact on groundwater recharge, crop production and rangeland productivity. The high evapotranspiration potential in the majority of the catchment tends to exceed annual rainfall except for the Mount Elgon region. The higher mountainous areas tend to have lower mean annual temperatures and, therefore, are less prone to evapotranspiration. High evapotranspiration values are generally associated with large lakes and wetlands and are also influenced by elevation and temperature (NWRA, 2011).

The Awoja Catchment is, therefore, generally well-watered, with the exception of Nakapiripirit, Napak, and Amudat. The entire catchment is characterized by strong seasonality with both floods and droughts prevailing. The downstream plains are highly subject to flooding due to the flat nature of the terrain. This is probably exacerbated by the volumes of silt brought down from higher ground, and by upstream deforestation resulting in both higher surface runoff and greater erosion. Downstream flooding also has a greater impact as the population pressure increases and people encroach further and further into wetland areas that were probably once considered to be no-go zones.

#### 4.1.4 Topography

The southern edge of the Awoja Catchment is marked by Mount Elgon at the border of Uganda and Kenya. Mount Elgon includes the highest peak in the area, with an elevation of 4,321m. Mount Kadam (3,063m) lies to the north of Mount Elgon, between the districts of Nakapiripirit and Amudat. Mount Napak (2,537m) is further north, between the districts of Napak and Katakwi. The remainder of the basin lies between 1,150masl and 1,033masl. The lower, relatively flat area has large peneplains with occasional granitic outcrops. A significant area of these flat plains comprises wetlands, both permanent and seasonal, fed by the high orographic rainfall that occurs as a result of the ring of surrounding mountains and drains towards Lake Kyoga and the Nile. The high mountains that ring the eastern watershed fall away sharply into flat plains to the west as indicated in *Figure 4-4*.

#### **Key Issues: Topography**

- *Mount Elgon and its piedmont areas are among the more highly populated areas in the catchment as a result of the agricultural potential. Population density, steep slopes (landslides) and incised mountain valleys (flash flooding) enhance the risk for environmental degradation.*
- *Poor agricultural practices on steep slopes resulted in significant siltation and landslides with aggravated consequences.*
- *Farming of very steep slopes must be discouraged and communities assisted to develop erosion protection measures on lesser slopes.*
- *Steeper slopes that have been degraded by agriculture or other land uses should be rehabilitated and natural vegetation cover protected.*

#### 4.1.5 Geology

Most geological formations in the region originate from the Precambrian supereon. The western part of the basin is dominated by the Gneiss-Granulite complex with some Quaternary sediments (Serere, Soroti, Ngora, Kumi, Bukudea and parts of Sironko and Katakwi). The central part of the basin hosts mostly Quaternary sediments, the Watian Series and the Aruan Series, as well as some Alkali Volcanics. These formations extend to the central north part of the catchment. The Aruan Series and Quaternary Sediments also occur towards the northeastern tip of the catchment. Large sections of the eastern part of the catchment are dominated by Alkali Volcanic formations including the areas around Mount Elgon (one of the oldest volcanoes in East Africa) and Mount Kadam (Kween, Bukwo, Kapchorwa and parts of Bulambuli, Soroti, and Nakapiripirit). The mountains in the northern part of the catchment, in Napak district, also consist of Alkali Volcanics. The portion of Amudat district that lies within the catchment is partially Aruari Series and partly Quaternary Sediments. The geologic formations are illustrated in *Figure 4-5*, with the boundary of the Awoja Catchment traced in red.





#### 4.1.6 Soils

Most, but not all, of the soil types found in the Napak, Nakapiripirit, and Amudat districts have moderate-high productivity while others are sandy and have moderate or even low productivity. Common key issues related to land degradation here are soil erosion and decreasing soil fertility.

The Ngora, Kumi, and Bukedea Districts have soils that are mainly sandy loam and are associated with limited amounts of plant nutrients due to leaching, erosion, volatilisation<sup>1</sup> and poor farming practices. The soils have a coarse texture and are high in iron content, which sometimes fixes nutrients such as Phosphorus (P). Harsh environmental conditions have increased laterisation<sup>2</sup> affecting the quality of the soils (Bukedea District, 2011). In the east of Bukedea and northeast of Kumi district, the soils are dark-heavy volcanic which are rich in mineral nutrients. In lowland/wetland areas, the soils are dark in colour and fairly fertile due to deposition of organic matter by the run-off from upland areas.

Soroti, Serere, and Katakwi soils are mainly ferralitic (sandy sediments and sandy loams). They are well drained and friable. Low lands contain widespread deposits of alluvium (Katakwi District, 2010; Serere District, 2010; Soroti District, 2004). The land resource is fertile and productive in some parts of these districts with the variation in the soil fertility influenced by the underlying geology. The soil types found mainly in the east of these districts have moderate-high productivity whereas those in the west have very low-low productivity. Generally, most of the soil types predominant in these districts contain sandy sediments and sandy loams, which are easily erodible if exposed.

Kapchorwa, Kween, and Bukwa have soils that can be categorised into three zones, which include Mount Elgon high farmlands, farm-forest and short grass plains. The soils in Mount Elgon high farmlands zone of the Kapchorwa, Kween, and Bukwa districts are derived mainly from volcanic parent material and are typically red clay loam, well drained, highly leached, often acid, but high in nutrients. The soils are generally highly productive. In the forest zone of these districts the soils are primarily reddish-brown loam over deep clay loam sub-soil. In the farmland areas, much of the soils are derived from volcanic parent material. Clay and clay loam soils are common and often acidic, but are of good nutrient supply. In the short grass plains of these districts, soil is clayey, often with vertic properties. Calcareous soils are common on the very flat Sebei plain. The zone extends south to the lower steps, or terraces of Mount Elgon where the clay loam soils are more often acidic. Soil erodibility is high while rainfall is moderate (Kapchorwa District, 2004, 2010). Soils are mapped in *Figure 4-6* and *Figure 4-7*.

The unsustainable use of wood for fuel in most regions is a threat for soil conservation, silting and landslides and possibly for the local climate. Cheaper (subsidised) sources of energy or woodlots should be made available. This may be possible with the future increase in electricity production and network, as well as with oil production in the country (NEMA, 2009).

The soils of the Awoja Catchment are characterised by their high susceptibility to erosion, which is clearly visible in the high levels of silt carried in streams and sedimentation in wetlands and basins. Soil erosion and siltation are without doubt a major environmental risk in the catchment and should be the dominant consideration in both land use and catchment management practices and strategies. Areas with higher rainfall, such as those around Mount Elgon, are more intensively farmed. This unfortunately coincides with steeper slopes where erosion is more problematic.

According to *The Identification of a Multipurpose Water Resources Management and Development Project in the Lake Kyoga basin in Uganda: Diagnostic / Situational Analysis Report* (NELSAP, 2012), evidence from soil scientists and agronomists suggests that Uganda's soils were considered to have a high natural fertility, but there has been a continual depreciation in plant nutrients with little systematic replacement. This has resulted in a lowering of productivity in areas under continual cultivation. An average of 1 to 2 kg/ha of inorganic plant nutrients are used as a supplement, which is considerably lower than the 9kg/ha average for sub-Saharan Africa. The use of organic nutrient cycling agricultural systems should be promoted ahead of, and augmented with, inorganic fertilisers where needed.

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<sup>1</sup> McGraw-Hill Science & Technology Encyclopedia: The process of converting a chemical substance from a liquid or solid state to a gaseous or vapor state. Other terms used to describe the same process are vaporization, distillation, and sublimation.

<sup>2</sup> Oxford Dictionary of Geography: The formation of lateritic soils. Laterization takes place in warm climates where bacterial activity takes place throughout the year. Consequently, little or no humus is found in the soil. In the absence of humic acids, iron and aluminium compounds are insoluble and accumulate in layers in the soil. Silica is leached out.

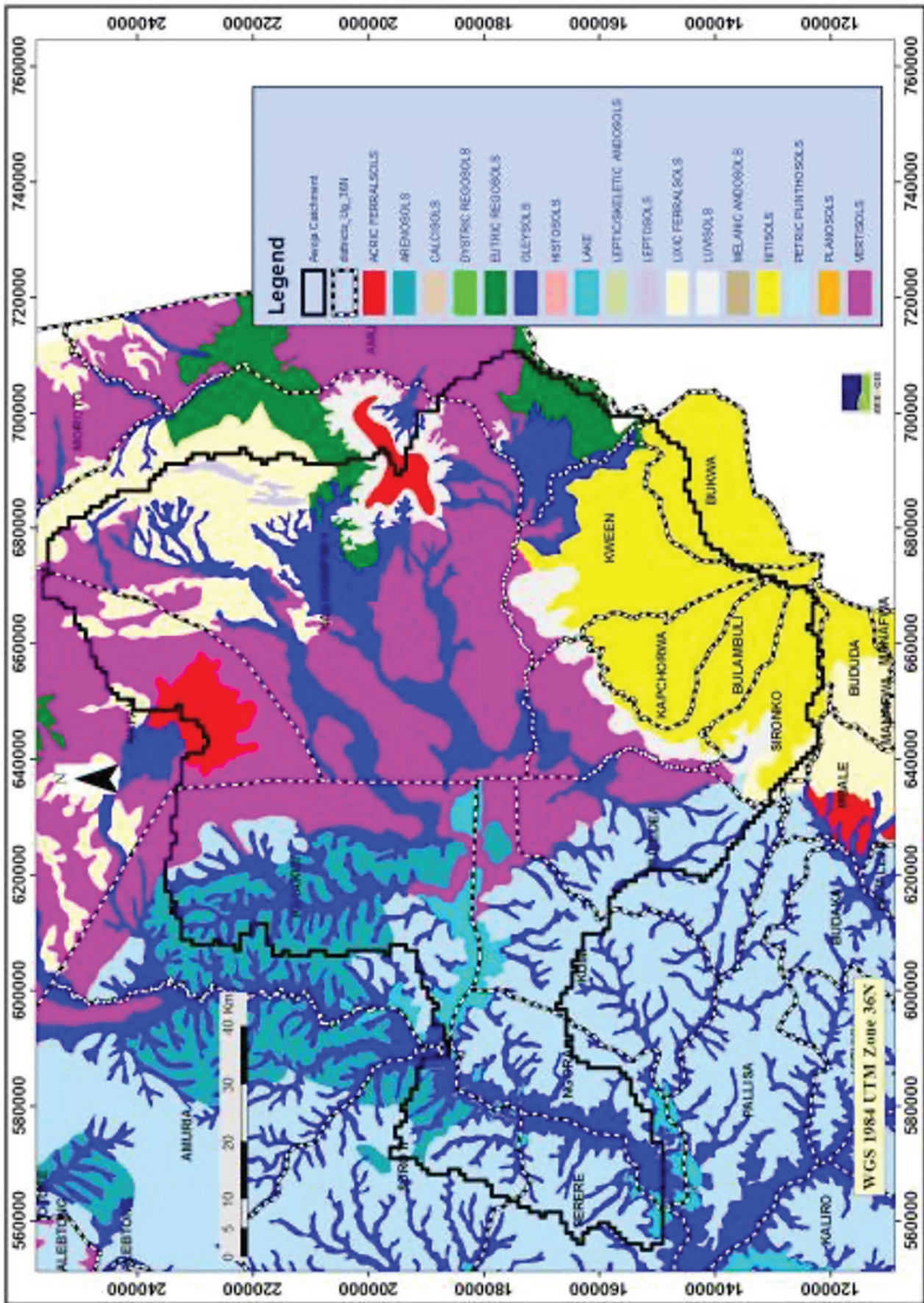


Figure 4-6 : Soil Types in the Awoja Catchment



## 4.2 Water Resources

Awoja Catchment is water rich, but the surface water and groundwater resources are unevenly distributed, with the western and southern parts of the basin having more abundant surface water resources while the northern and north-eastern parts of the basin are far drier. As the water demand in Uganda increases along with the growing population, it is becoming ever more essential to gain a quantitative knowledge of the surface and groundwater systems in order to effectively manage the resources in a sustainable manner that will benefit both the growing communities and the natural ecological systems. This section of the report provides knowledge that is crucial for sustainable planning and management of water resources within the Awoja Catchment.

### 4.2.1 Surface water

Surface water in the Awoja Catchment constitutes rivers, lakes, wetlands and temporary wetlands. Very limited infrastructure has been constructed for the utilisation of surface water for productive purposes including hydropower generation, domestic and industrial water supply, irrigation, and for accommodating floods and droughts.

#### 4.2.1.1 River systems, lakes, and wetlands

Awoja Catchment has a network of rivers, lakes, and temporary wetlands all of which play an important role in the catchment and need to be preserved and managed effectively to maximise their functionality in the catchment.

### Rivers

Important rivers in the Awoja Catchment include the Awoja, Sironko, Simu, Sisi, Muyembe, Sipi, Chebonet, Atari, Tabok, Kelim/Greek, Muchilmakat, Ukutat, Namalu, Apeduru, Apapi, Agu, and Abuketi rivers. These rivers typically flow from the east or north to the south-western part of the catchment, converging in Soroti district, where the catchment's outlet is situated. Very limited infrastructure has been constructed for the utilisation of surface water for productive purposes. However, rivers are used for domestic water, livestock watering, clothes washing, bathing, fishing, brick making and small scale irrigation along river banks. The rivers are often characterised by heavily degraded, eroded and often collapsing river banks. There are also high levels of sediment deposition. The state of the river banks and the river siltation increase flood risk. Altogether the increased degradation of land through unfavourable land use practices, overgrazing and deforestation enhances the problem of flooding.



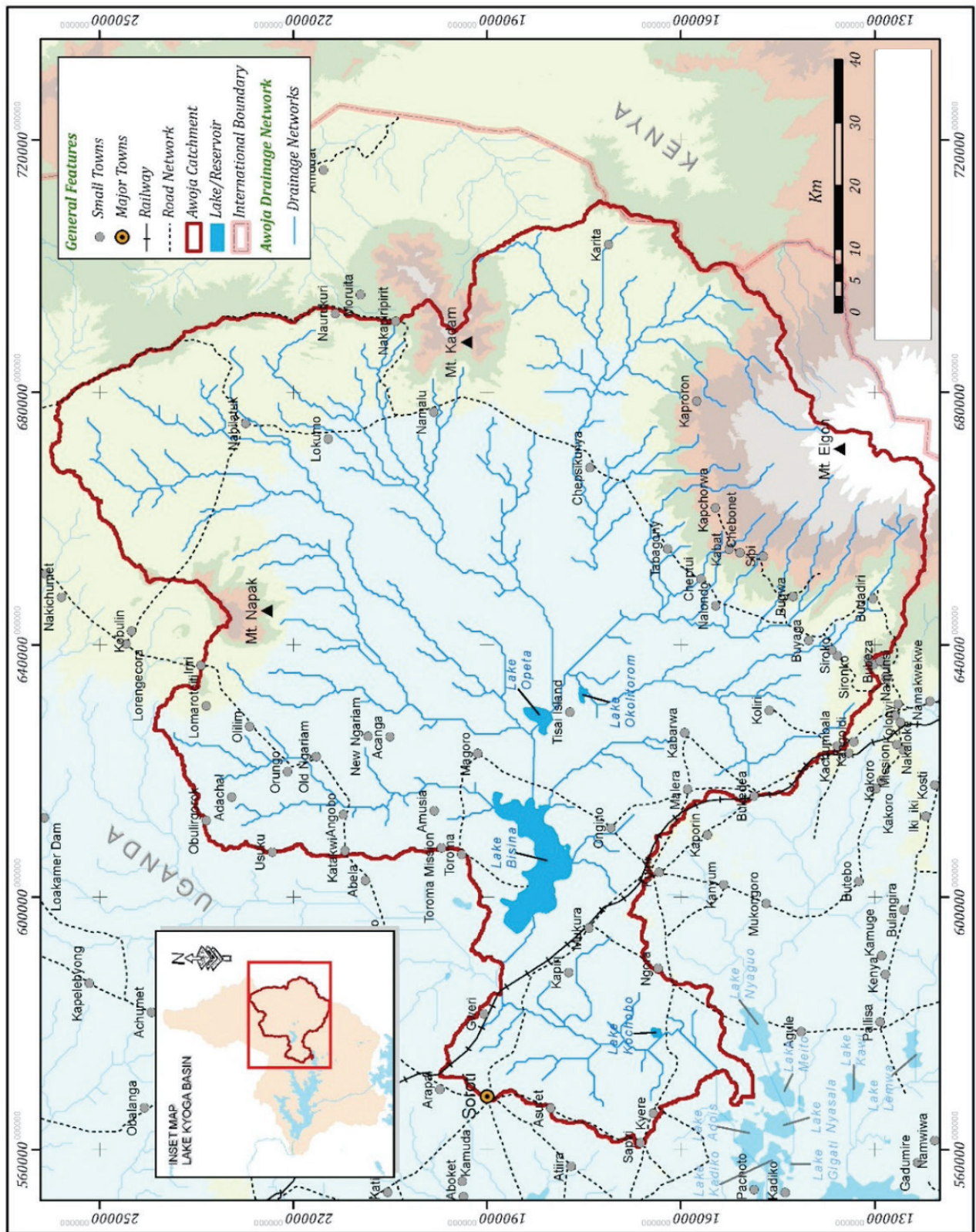


Figure 4-8: Drainage network in Awoja Catchment

## Lakes

The three largest lakes are Lake Bisina, Lake Opeta, and Lake Okolitorum. Lake Bisina and Lake Opeta and associated swamps together extend over an area of 120,000ha, with an open water area of approximately 25,000ha. These lakes are situated at an elevation of 1,040 – 1,060masl. Lake Opeta lies at 1°39'N and 34°09' – 34°14' E. It is 10km long and 5km wide and has an open water area of 4,000ha. Wide swamps occur on the fringes of the lake except along parts of the southern shore. The permanent swamps around Lake Opeta cover around 30,000ha. The Ukutat,

Muchilmakat, and Kelim rivers all enter Lake Opeta through a zone of permanent swamps east of the lake, above which each river has a seasonal floodplain. The Kamiryra and Sironko Rivers flowing from Mount Elgon also enter Lake Opeta, but do so through the swamps on the southern shore, and neither stream has an important floodplain.

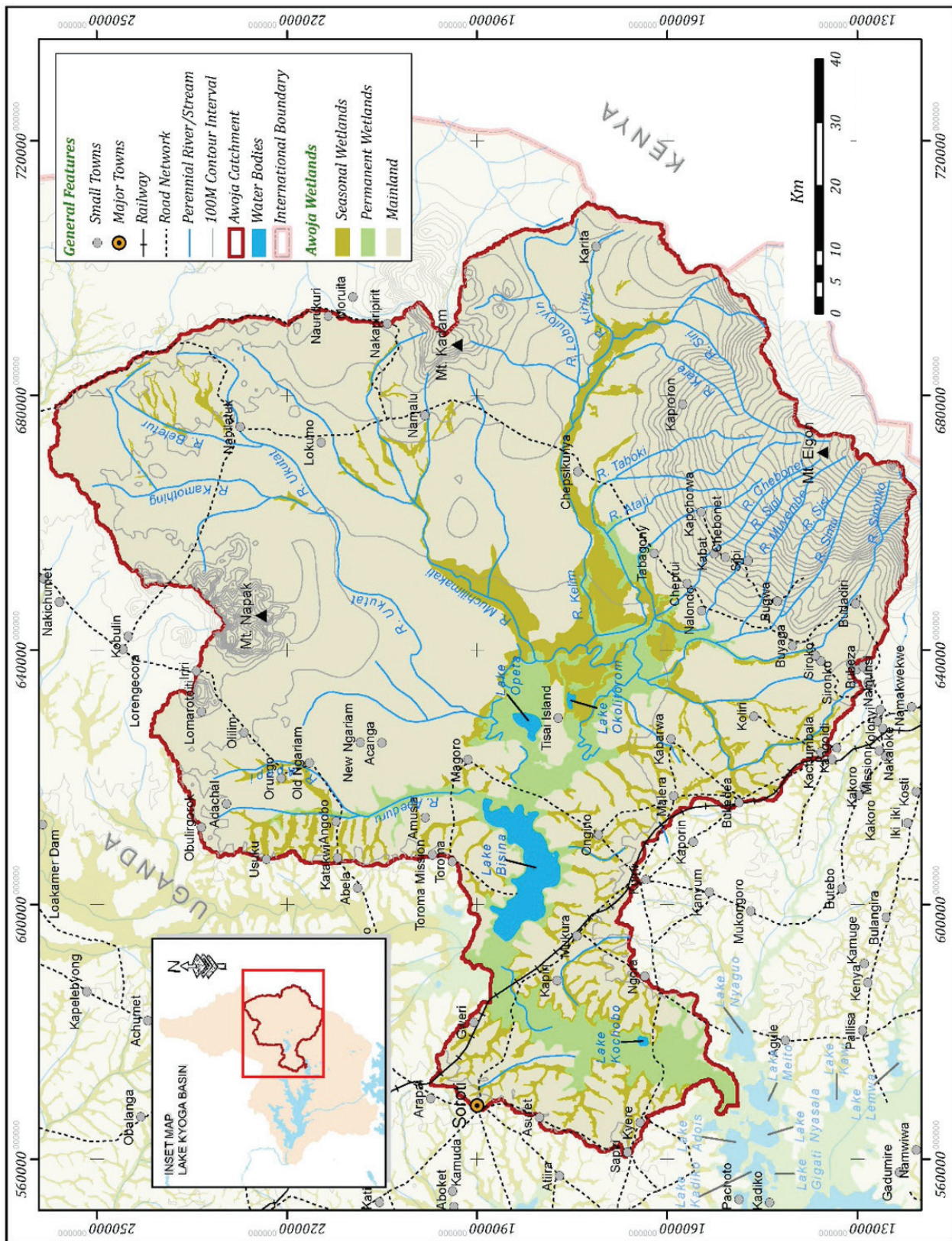


Figure 4-9: Rivers, lakes and wetlands in the Awoja Catchment

Water from Lake Opeta flows out of the western side of the lake through a dense swamp over 5km to Lake Bisina. This larger lake is situated at 1°35'-1°44'N and 33°49'-34°06'E. It is 30km long and up to 9km wide, with a maximum surface area of 21,000ha at high water. The largest river that flows into Lake Bisina is the seasonal Apedura River,

rising to the north on the slopes of Mount Akim. The Apedura River has a floodplain 30km long and up to 6.5km wide, which at high water covers 16,500ha. Similar to Lake Opet, Lake Bisina is oriented east to west and it drains from its western end through swamps, to the Okere system, which leads to the swamps at the head of the Mpologoma arm of Lake Kyoga.

## Wetlands

The Awoja Catchment has both permanent and seasonal wetlands mainly located in Kumi, Soroti, and Katakwi and they account for more than one third of their total district areas. *Table 4-3* shows the wetland area within Awoja accounting for 4,195 square kilometres, consisting of original wetlands (which form a larger part) and converted wetlands (NELSAP, 2012).

*Table 4-3: Wetland Areas within Awoja*

District	District	Wetland	Area	Original	% Converted	Wetland
	Area in km <sup>2</sup>	Area in km <sup>2</sup>	Converted km <sup>2</sup>	Wetland Area in km <sup>2</sup>		% of District
Kumi	2,848	989	61	1,050	6.2	34.7
Soroti/Katakwi	10,016	3,206	9	3,215	0.3	32.0
<b>Total</b>		<b>4,195</b>	<b>70</b>	<b>4,265</b>		

Districts like Bukwo, Sironko, Kween, and Kapchorwa have a few wetlands due to their hilly topographical nature with few low-lying areas. The rest of the districts, within the catchment have a big percentage of wetlands in their low-lying areas into which most of the seasonal streams and rivers from the elevated lands drain. In Kumi, Bukedea, and Ngora districts over 80% of the wetlands have been modified and almost all permanent wetlands are now seasonal (Bukedea District, 2011; Kumi District, 2010). Most of the wetland systems in the catchment are dominated by grassland. Common species in all these wetlands include *Echinochloa sp.*, *Cyperus aticulata*, *Setaria spp.*, *Hyparrhenia grass species*, *Typha (Ateso-Amusala)*, *Cyperus papyrus (Ateso-Aladoi)*, *Phragmites (Ateso-Ebilo)* and swamp forests. In the lowland wetlands, *Acacia spp.* and *Syzgium spp.* are found growing within or along the wetlands.

Large volumes of surface water is absorbed and stored in its wetlands. The wetlands thus function as fresh water reservoirs that slowly release water, either underground to replenish aquifers, or laterally towards the streams and rivers. The slow release of water increases water availability during the dry season for domestic use, edge cultivation, and livestock watering; keeps boreholes, shallow wells and springs functional. Wetlands also play a key role in filtering pollution. They provide considerable goods and services and are used for water storage, livestock grazing and natural tree harvesting (World Bank, 2011). Wetlands are further used for farming and fishing and provide construction material and fuel. Wetlands also provide flood attenuation, sediment capture and opportunities for eco-tourism. It is essential that these wetlands are preserved to maximise their functionality in providing these services.

### 4.2.1.2 Surface water potential

In order to determine the potential surface water available for development, an attempt was made to recreate the natural catchment situation without any abstraction. A thorough estimate of the potential surface water available for development in each sub-catchment was done with consideration of wetland evaporation. However, various issues related to the hydrological monitoring network were encountered which affect the reliability of the runoff determined per sub-catchment and for the Awoja Catchment as a whole. The monitoring of all hydrological elements needs improvement including the monitoring of: rainfall; streamflows; evaporation; groundwater yields and levels; siltation volumes in rivers, dams, lakes and wetlands; lake and wetland water levels; and water quality parameters.

The total natural runoff for the Awoja Catchment is approximately 1,615MCM/yr. The net runoff from the Awoja Catchment, after deducting estimated evapotranspiration losses of 384MCM/yr in the wetlands, is estimated to be 1,232MCM/yr. A summary of the natural runoff in each sub-catchment, without consideration of wetland losses, is given in *Table 4-4*. The Mean Annual Precipitation (MAP) and unit runoff for each sub-catchment were also indicated.

As some of the sub-catchments are interlinked it is necessary to consider the cumulative stream flows in the sub-catchments. In Table 4-5, these cumulative stream flows are indicated along with the wetland losses in sub-catchment 11.

**Table 4-4: Natural runoff by sub-catchment in the Awoja Catchment (excluding wetland losses)**

Sub-catchments		MAP (mm)	Area (km <sup>2</sup> )	Unit runoff		Natural runoff (mm)
ID	Name			m <sup>3</sup> /s	MCM/yr	
1	Ukutat	800	1053	0.5	16	16
2	Muchilmakat	1,250	1497	4.5	143	95
3	Kelim	1,300	1277	5.6	177	138
4	Taboki	1,350	587	3.8	120	204
5	Chebonet-Atari	1,400	617	3.8	120	194
6	Sipi	1,550	89	1.3	40	449
7	Muyembe	1,550	137	2.0	63	463
8	Simu-Sisi	1,550	178	2.5	78	438
9	Sironko	1,550	276	3.8	121	438
10	Lake Okolitorom	1,250	1035	5.0	157	152
11	Opeta-Bisina	1,250	1593	7.4	234	147
12	Lake Kochobo	1,350	974	5.0	159	163
13	Apeduru-Apapi	1,000	878	2.2	70	80
14	Mt. Napak	1,200	822	3.7	117	143
<b>Total</b>		<b>1,230</b>	<b>11,013</b>		<b>1,615</b>	<b>142</b>
<b>Average</b>				<b>3.65</b>		

**Table 4-5: Cumulative stream flows and wetland losses**

Sub-catchments		MAP	Area	Incremental Natural streamflow	Less Wetland Losses	Cumulative streamflow
ID	Name	mm	km <sup>2</sup>	MCM/yr/a	MCM/yr	MCM/yr
1	Ukutat	800	1053	16		16
2	Muchilmakat	1250	1497	143		143
3	Kelim	1300	1277	177		177
4	Taboki	1350	587	120		297
6	Sipi	1550	89	40		40
7	Muyembe	1550	137	63		63
8	Simu-Sisi	1550	178	78		78
5	Chebonet-Atari	1400	617	120		301
9	Sironko	1550	276	121		121
10	Lake Okolitorom	1250	1035	157		278
13	Apeduru-Apapi	1000	878	70		70
14	Mt. Napak	1200	822	117		117
11	Opeta-Bisina	1250	1593	234	-384	1073
12	Lake Kochobo	1350	974	159		1232

#### 4.2.1.3 Strategic Implications and Opportunities for Surface Water and Wetlands

Surface water is generally more easily accessible than groundwater, however its safe utilisation is generally associated with higher purification costs than for groundwater since surface water is more easily polluted than groundwater (JICA, 2011). Surface water can more readily be used without treatment for production purposes where drinking water quality standards are not required. Ultimately however, the degrading quality of surface water may lead to future contamination of groundwater and, therefore, this issue should be addressed.

As mentioned, wetlands have an important role to play in the catchment and need to be preserved and managed effectively to maximise their functionality in the catchment. As the wetlands serve multiple purposes it may be necessary to identify and allocate certain portions of the wetlands for certain roles. Wetlands need to continue providing flood attenuation unless significant storage structures are developed in the catchment for this purpose. Wetland encroachment needs to be addressed to ensure that the growing population residing near the wetlands are not endangered during flood events due to inappropriate land use choices. A distinction should be made between which wetland areas to preserve and protect for biodiversity conservation and which wetland areas to allocate for the continuation of certain essential livelihood practices such as cattle grazing, crop cultivation, papyrus harvesting, and fishing. This wetland area use allocation will be greatly influenced by the current state of the wetland.

Typically, wetland areas in close proximity to rural settlements and without too large a threat from flooding would be appealing for the continuation of livelihood practices. If people are living in areas that will become protected areas, people may need to be relocated.

Similarly, the areas that have remained the least exploited and have maintained their natural fauna and flora best would be more appealing for further protection. Ideally, the influence of the various wetland activities on each other, as well as on the natural wetland needs to be evaluated thoroughly in order to establish best management practices.

In order to maintain a sustainable balance between livelihood use and conservation, exploitation limits will need to be set and be enforced to ensure that the wetlands aren't overgrazed, over-fished and generally over-exploited. The limits will need to be determined through thorough investigation.

The wetlands also need to be recognised for their important role in water purification and this role needs to be communicated to the local communities.

Further, the wetlands need to be recognised for the ecotourism potential they have. Ecotourism should be promoted in areas set aside for biodiversity protection.

More information regarding the wetlands and their current state and use will need to be sourced, or a study will need to be done to inform a plan for accurate and effective wetland management. The Wetland Sector Strategic Plan and the associated documents for community involvement and sensitization proposed by the Wetlands Management Department (WMD) of MWE may be useful for the creation of an integrated wetland multipurpose development and conservation plan.

#### 4.2.2 Potential Groundwater Yield

The potential groundwater yield<sup>3</sup> that can be achieved through sustainable development of the groundwater resources in the catchment was re-assessed at a sub-catchment level (Murray, R, 2013), based on existing GIS coverages and previous assessments completed for groundwater in the area.

The study undertaken by JICA (2011) provided the most detailed assessment of the Awoja Catchment's groundwater situation and included numerous borehole pump tests. The work done by JICA was chosen as a basis for determining a more realistic potential groundwater yield per sub-catchment in the Awoja Catchment. The GIS coverage of the geology of the area, provided by the MWE, was considered *Figure 4 -10*.

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<sup>3</sup> The term "potential groundwater yield" is used because it best describes how much groundwater is available for use per sub-catchment in Awoja, and how much is available in total for Awoja. This required estimating a yield that can realistically be abstracted. The term "potential groundwater yield" adequately captures the realistic rate at which groundwater can be supplied from boreholes from a large area.



The potential groundwater yield available for development per sub-catchment is indicated in *Table 4-6*. The area of each sub-catchment and the yield as a function of the area is also indicated. It was determined that due to the low permeability of the catchment four boreholes can, on average, be placed per square kilometres. The total potential groundwater available for the entire Awoja Catchment is 236MCM/yr.

*Table 4-6: Potential sustainable groundwater yield by sub-catchment in the Awoja Catchment*

No.	Sub-Catchment	Potential GW Yield (MCM/yr)	Area (km <sup>2</sup> )	Potential GW Yield (MCM/km <sup>2</sup> /yr)	Potential GW Yield (m <sup>3</sup> /km <sup>2</sup> /d)
1	Ukutat	6.5	1053	0.006	16.9
2	Muchilmakat	44.3	949.9	0.047	127.7
3	Kelim	19.5	697.3	0.028	76.5
4	Taboki	15.0	386.6	0.039	106.5
5	Chebonet-Atari	13.5	345.3	0.039	107.4
6	Sipi	1.7	39.4	0.044	121.4
7	Muyembe	5.0	59.8	0.084	228.9
8	Simu-Sisi	3.1	75.1	0.041	111.9
9	Sironko	6.8	188.0	0.036	98.5
10	Lake Okolitorom	30.9	748.0	0.041	113.2
11	Opeta-Bisina	24.7	636.2	0.039	106.4
12	Lake Kochobo	24.3	572.6	0.042	116.3
13	Apeduru-Apapi	27.7	749.5	0.037	101.1
14	Mt. Napak	13.0	331.7	0.039	107.2
	<b>Total</b>	<b>236.0</b>	<b>6626.9</b>		
	<b>Average</b>			<b>0.040</b>	<b>110.3</b>

#### 4.2.2.1 Strategic Implications and Opportunities for Groundwater

Groundwater is often a preferred source of domestic water supply for urban and rural areas, as well as for livestock, due to the safer water quality compared to surface water. The use of boreholes for large scale irrigation is, however, not viable due to the relatively low yield of most boreholes. Small scale irrigation from groundwater sources is possible where surface water resources are not available, such as in the drier areas in the northern part of the catchment.

Weathered and fractured-bedrock aquifer systems are vulnerable to contamination from local land use practices. Increased pollution and uncontrolled abstraction associated with a growing population can also put strain on local resource supplies. It is not a regulatory requirement for town water suppliers to monitor boreholes intensively, making over-exploitation hard to control. These factors must be managed to ensure sustainable abstraction.

Groundwater utilisation requires careful planning, especially near rapidly developing urban areas. A thorough investigation of the hydro-geological environment is recommended, where the following aspects should be covered. The location of potential aquifers must be identified; the existing utilisation of specific aquifers must be determined and compared to the potential yield of the aquifers; water quality needs to be considered to assess how safe the water that can be delivered is. No new boreholes should be sunk in areas where aquifers may be over utilised.

An assessment should also be done of the various borehole pumping technologies and associated costs to determine how best to approach expansion of borehole coverage. More detailed information, captured in the national groundwater mapping survey since 2001, will be extremely useful for further groundwater planning in the catchment.

### 4.2.3 Summary of water resources potential

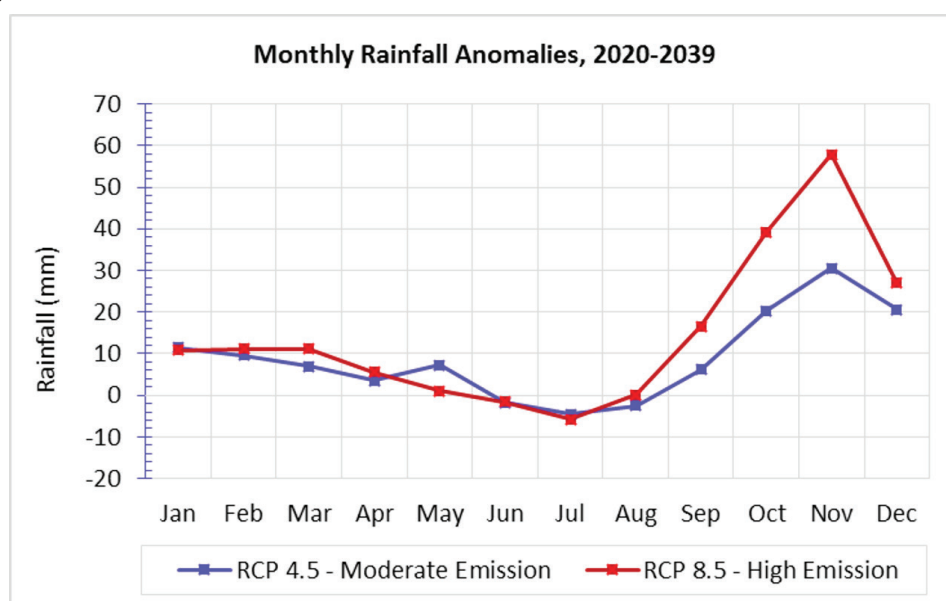
The total water resources potential is illustrated graphically in *Table 4-7*. The net cumulative runoff in each sub-catchment after consideration of wetland losses as well as the potential groundwater yield per sub-catchment are indicated.

*Table 4-7: Total water resources potential per sub-catchment*

Sub-catchments		Net Cummulative Runoff (MCM/yr)	Potential GW Yield (MCM/yr)
ID	Name		
1	Ukutat	16	6.5
2	Muchilmakat	143	44.3
3	Kelim	177	19.5
4	Taboki	120	15
5	Chebonet-Atari	120	13.5
6	Sipi	40	1.7
7	Muyembe	63	5
8	Simu-Sisi	78	3.1
9	Sironko	121	6.8
10	Lake Okolitorom	157	30.9
11	Opeta-Bisina	234	24.7
12	Lake Kochobo	159	24.3
13	Apeduru-Apapi	70	27.7
14	Mt. Napak	117	13
<b>Total</b>		<b>1615</b>	<b>236</b>

### 4.2.4 Impact of Climate Change

Water resources availability both in time and space continues to be impacted by climate change in Uganda, with many scientists predicting that generally, rainfall will be heavier in many parts of the world, but the periods between rains will most likely grow hotter and therefore drier. To model climate change impacts on water resources within the Awoja, two Representative Concentration Pathways (RCPs) were considered in the analysis, one moderate emissions scenario (RCP 4.5), where temperatures stabilize in the second half of the 21st century, and one high emissions scenario (RCP 8.5), where temperatures continue to increase throughout the 21st century. Rainfall anomalies for both the moderate emission (RCP 4.5) and high emission (RCP 8.5) show a slight decrease in rainfall amounts in the months June - August and a very big increment in the months September - December, figure 4-11.



*Figure 4-11: Monthly Rainfall Anomalies for the moderate and high emission scenarios*



Analysis shows a reduction in flow (from the baseline) for both the moderate and high emission scenarios of about 153 MCM/Yr and a 70 MCM/Yr respectively. The smaller reduction in the high emission scenario as compared to the moderate emission scenario is attributed to the increased magnitude of rainfall, *Figure 4-11*, in the months of September - December.

**Table 4-8: Awoja Water availability under climate change moderate emission scenario**

Sub-catchments		MAP (mm)	Area (km <sup>2</sup> )	Incremental simulated runoff (NAM)		Unit runoff (mm)	Cumulative simulated runoff
ID	Name			m <sup>3</sup> /s	MCM/yr		MCM/yr
A		B	C	D		E=1000 x D/C	D*
1	Ukutat	800	1053	0.45	14	13.4	14
2	Muchilmakat	1250	1497	4.37	138	92.1	138
3	Kelim	1300	1277	5.29	167	130.6	167
4	Taboki	1350	587	3.52	111	189.1	278
5	Chebonet-Atari	1400	617	3.62	114	184.9	295
6	Sipi	1550	89	1.28	40	453.6	40
7	Muyembe	1550	137	2.02	64	464.6	64
8	Simu-Sisi	1550	178	2.45	77	434.8	77
9	Sironko	1550	276	3.81	120	435.0	120
10	L. Okolitorom	1250	1035	4.69	148	143.1	268
11	Opeta-Bisina	1250	1593	5.79	182	114.5	1321
12	L. Kochobo	1350	974	4.46	141	144.3	1462
13	Apeduru-Apapi	1000	878	1.73	54	62.0	54
14	Mt. Napak	1200	822	2.89	91	110.8	91
<b>Total</b>				<b>46.35</b>	<b>1462</b>		

**Table 4-9: Awoja Water availability under climate change high emission scenario**

Sub-catchments		MAP (mm)	Area (km <sup>2</sup> )	Incremental simulated runoff (NAM)		Unit runoff (mm)	Cumulative simulated runoff
ID	Name			m <sup>3</sup> /s	MCM/yr		MCM/yr
A		B	C	D		E=1000 x D/C	D*
1	Ukutat	800	1053	0.49	15	14.7	15
2	Muchilmakat	1250	1497	4.72	149	99.5	149
3	Kelim	1300	1277	5.63	178	139.0	178
4	Taboki	1350	587	3.65	115	195.9	293
5	Chebonet-Atari	1400	617	3.84	121	196.1	315
6	Sipi	1550	89	1.37	43	485.7	43
7	Muyembe	1550	137	2.15	68	495.3	68
8	Simu-Sisi	1550	178	2.61	82	463.2	82
9	Sironko	1550	276	4.06	128	463.4	128
10	L. Okolitorom	1250	1035	4.91	155	149.7	283
11	Opeta-Bisina	1250	1593	5.93	187	117.3	1390
12	L. Kochobo	1350	974	4.94	156	159.9	1545
13	Apeduru-Apapi	1000	878	1.87	59	67.3	59
14	Mt. Napak	1200	822	2.83	89	108.4	89
<b>Total</b>				<b>49.00</b>	<b>1545</b>		

A comparison between the baseline water availability and that for climate change under the two emission scenarios is shown in *Figure 5-2*, showing very high flows for the high emission scenario in the months of October-December. This may imply increase in flooding events during these months under this scenario.

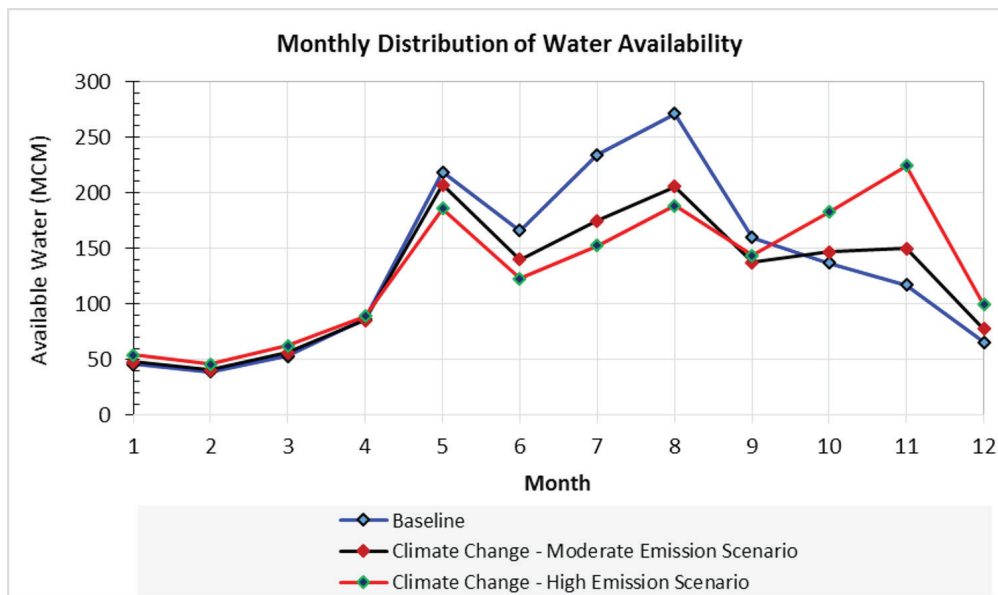


Figure 4-12: Comparison between current and climate change water availability

#### 4.2.5 Water quality

In their natural state, the quality of surface and groundwater in Uganda is generally good, however, the quality of some surface waters declined over the last 20 years primarily due to:

- Soil erosion (land degradation, deforestation, overgrazing, poor agricultural practice);
- Faecal pollution (poor sanitation);
- Fertiliser in agricultural run-off;
- Livestock pollution;
- Urban / domestic runoff and
- Poor waste management.

These are also the main sources of groundwater contamination, especially of shallow groundwater and springs, which are relied on by many poor urban and rural households.

The most important water quality issue in the Awoja sub-basin is bacterial contamination due to poor sanitation, which is indicated by coliform groups. High turbidity levels and high suspended solids have also been noted in the Awoja sub-basin. In some areas bathing is even considered dangerous due to the poor water quality.

Soil erosion brings sedimentation and siltation; silt damages water pumps, clogs filtration systems that may be in place, and reduces the lifespan of water storage dams at a rate that can make construction uneconomic. Wetlands are recognised as powerful natural filters for water of poor quality. Excessive silt captured in wetlands will, however, lead to a gradual change in their capacity to manage floodwaters, leading to the prospect of more destructive floods. All these factors reduce the water quality in Awoja.

#### 4.2.6 Infrastructure

Water resource infrastructure development is quite low in the Awoja Catchment with the existing limited to local supply systems only including:

- Many small schemes that provide water supply (including some water treatment works) within towns and larger villages (gravity fed and groundwater)
- Numerous wells and boreholes
- Many protected springs
- Some valley dams and valley tanks are still in existence but these are few, far from each other and functionality of many has been lost due to siltation or flood damage

- The Arechek Dam in Napak at 2.5 million m<sup>3</sup>, completed in 2012, falls outside the Awoja Catchment. Arechek Dam is larger than any built infrastructure within Awoja. Arechek is, by international definition, still a “small dam”.

In Awoja there is none of the following water resource infrastructure:

- No dams of any significant size
- No noteworthy irrigation schemes - small scale irrigation only
- No hydropower plants.

Additionally:

- Sanitation along with other basic services within the catchment is poor
- Road infrastructure is very poor with only two major arteries (Mbale-Nakapiripirit and Mbale-Soroti, the first is in very poor condition. The Mbale-Soroti link is currently being rebuilt. The construction of the bridge across the Awoja River close to Soroti has been completed. Access to many most locations is difficult especially during the rainy season, which affects transport
- Old rail links are defunct
- Soroti has an airfield boasting of having the third longest runway in Uganda (long enough for a Boeing 737)
- Electricity has been provided along the major arteries and to district centres. It is however estimated that 97% of the population do not have access to power.

The current set of District Development Plans (2010-2015) makes no provision for any major water resource infrastructure.

#### **4.2.7 Risk of floods and droughts**

##### *4.2.7.1 Overview*

Droughts, floods, landslides and mudslides are a particular concern to the people residing in the Awoja Catchment. These events often lead to loss of human life, animals, and crops. In Uganda, the Department of Disaster Management and Refugees is responsible for creating awareness, ensuring protection, and planning mitigation measures for floods and landslides. A flood management strategy was developed. Droughts, floods, and landslides are a consequence of natural climatic variations in the Awoja Catchment, although this is now being exacerbated by climate change. Land degradation and deforestation play a large role in the onset of flood events and may also contribute to droughts as soils lose their capacity to store water for later release, either to streams or as evapotranspiration. Effective flood management can also make a contribution to reduce risks of water-borne diseases that can increase significantly during flood periods.

##### *4.2.7.2 Floods, landslides and mudslides*

Floods frequently occur in low-lying areas, in areas along river banks, close to wetlands and along lakes (NELSAP, 2012). Awoja’s large wetland areas, some of the severely degraded riverbanks, the catchment topography and degraded soils all promote flooding.

Unstable soils along the steep mountain slopes lead to landslides and mudslides. During strong rains erosion gullies are often formed, promoting landslide and mudslide events. The Mount Elgon region is especially prone to landslides and mudslides. The steep mountain slopes in this region have become degraded due to high population pressure and uncontrolled land use practices on the mountain slopes. Deep-rooted trees contribute to stabilising the soil and preventing landslides, but deforestation is affecting this natural process.

In the last two decades, there were at least 14 major flood events, affecting an average of about 68,000 people (World Bank, 2011). However, the areas within Awoja that were the most affected by the floods and were recorded include: Sironko, Bulambuli, Kapchorwa, Kween, Kumi, Bukedea, Serere, and Soroti.

##### *4.2.7.3 Droughts*

Droughts are a feature of the highly seasonal rainfall. Uganda is already subject to significant climate variability, particularly in the large drought and flood-prone regions around Mount Elgon and in wetlands. The impacts of

hydrologic extremes will be exacerbated with continued watershed degradation, wetland loss, population growth, and paradoxically economic growth as higher-value assets are impacted. The capacity to cope with existing climate risks is poor. Climate change is expected to further alter hydrology and water demands, threatening the resource base necessary to provide desired water services and pointing to the need for additional adaptation (World Bank, 2011).

The most drought-prone areas in the Awoja Catchment are within the cattle corridor, particularly in the Karamoja region in the north of the Awoja Catchment (NELSAP, 2012). Drought related disasters in Uganda are related to La Nina. Over the past 10 years alone, droughts have increased in frequency by 50% in Uganda leading to a noted reduction in the quantity of water available in certain drier areas (NELSAP, 2012). In the recent past, droughts have led to chronic food shortages and widespread livestock deaths in certain areas of the country. Severe droughts were recorded in 1993 - 1994, 1998, 1999, 2002, and 2005, each affecting approximately 655,000 people on average (World Bank, 2011). Food security issues continue to affect the north and northeast parts of the Awoja Catchment because these areas have low average annual rainfall that is highly variable from year to year. Drought impacts were exacerbated by the poor condition of water infrastructure (small ponds, tanks, and reservoirs) and the lack of technology to access groundwater drought reserves especially in these areas. The districts within the Awoja Catchment that are most frequently affected by droughts include: Nakapiripirit, Amudat, and Napak. In the far northern parts of Nakapiripirit (the Ukutat sub-catchment) water shortages were found to last up to 18 months at a time.

An increased intensity and frequency of floods and droughts may, like other natural disasters, often lead to several negative consequences, such as:

- Increased pollution of drinking water resources during floods;
- Increased outbreaks of water borne diseases from floods;
- Increased risk of malaria due to increasing temperatures;
- Increased water shortages in dry rural areas where populations depend on shallow streams, swamps and springs which dry up during droughts;
- Increased vulnerability of crops due to both floods and droughts and
- Increased vulnerability of food security, as the population increases and crops are susceptible to floods and droughts.

Mitigation measures for flood and drought management include: planting more trees and grass in degraded areas, promoting appropriate land use practices, the resettlement of people living inappropriately on mountain slopes and flood plains, rehabilitation of degraded rivers banks, wetland restoration and the development of large water retaining infrastructure, such as dams to allow for better flood and drought control.

## **4.3 Water Demand**

### **4.3.1 Overview**

The Awoja Catchment has seen little development of its water resources. The main water use sectors in the Awoja Catchment include water for domestic use, livestock watering, rainfed agriculture, and aquaculture. There are only a few small scale irrigation schemes, but their impact on water resources in 2013 was assumed to be negligible as no information on scheme capacities is available. The use of water for hydropower generation was anticipated for a number of years, but as yet, no small-scale hydropower schemes were established. Previous assessments were focused on domestic water use and little was done to define the levels of development for the other water use sectors. This section of the report presents the estimated (current and projected) water demand within the Awoja Catchment for the various water users and for each sub-catchment.

### **4.3.2 Existing water demands**

#### **4.3.2.1 Domestic water use**

The population of the Awoja Catchment is growing at a very high rate. Despite the fact that the domestic water demand can probably be catered for through groundwater development up until 2040, there will be significant challenges to food security if the population continues to grow at the historic growth rate and food production trends are not improved. The physical infrastructure related to water supply for domestic use in the catchment is

not well developed and the institutions in the area still need to build capacity to effectively provide the required services.

Drinking water sources include: protected springs, groundwater from shallow wells or deep boreholes, harvested rainwater, and surface water (rivers and lakes). Water is abstracted and supplied in various ways, including: (1) through water supply systems with hand pumps; (2) through submersible motorised pumps that convey water through piped systems to elevated storage tanks from where the water is gravitated to yard taps or kiosks; (3) through gravity flow schemes incorporating concrete de-pressurising tanks and piped networks that deliver surface water and spring water to users via a public fountain; and (4) through large scale piped water supply systems that incorporate water purification plants.

Currently, groundwater is primarily used for domestic purposes because it is of a relatively high quality and requires minimal treatment. Systems are smaller scale and less complex and can be easily operated and managed (World Bank, 2011).

The abstraction of either groundwater or surface water is subject to permission from the DWRM. According to NELSAP (2012) the rural water infrastructure inventory in the Awoja Catchment in 2011 comprised the following:

- 15 dams;
- 1,047 deep boreholes;
- 15 kiosks;
- 1,016 protected springs;
- 623 public standing posts;
- 144 rainwater harvesting tanks;
- 456 shallow wells;
- 2 valley tanks;
- 130 yard taps for public use and
- 1 large scale piped water supply system with a water purification plant in Soroti.

A review of current District Development Plans reflects a number of water resource measures currently being planned or in process:

- Every District has an active borehole rehabilitation and development scheme
- Some valley dams and tanks are being de-silted
- Piped water schemes are being installed
- Tree planting/reforestation programmes were initiated
- There are some catchment rehabilitation projects in place. These can be categorised as 'sustainable land management' or 'source protection' projects and include activities such as riverbank erosion control, tree planting and contouring. These activities have here been grouped under the heading of Sustainable land management – with Sustainable land management
- Rainwater harvesting projects are being initiated
- Every District reports its engagement in sensitisation and awareness raising
- Water quality monitoring is addressed (although at very low level)
- The Department of Agriculture is seeking to improve agricultural production through improvements to crops, stock and farming methods (NAADS Programme).

The coverage target for rural domestic water supply is 77% by 2015, increasing to 100% by 2035. The coverage target for urban water supply is 100% by 2015. Thereafter, investments should continue to cover population increases and replacement of existing infrastructure that outlives its lifespan (NELSAP, 2012). The target for the functionality of supply facilities is 95% by 2015 (JICA, 2011). Districts that have safe coverage below the 2011 national average of 65% and functionality below the national average of 80% are shaded in grey in *Table 4-8: Safe water coverage in the Awoja Catchment as in 2011.*

**Table 4-10: Safe water coverage in the Awoja Catchment as in 2011**

District	Safe water coverage in 2011 (%)	Functionality (%)
Amudat	23	83
Bukedea	67	89
Bukwo	68	94
Bulambuli	79	82
Kapchorwa	78	97
Katakwi	85	93
Kumi	59	89
Kween	41	78
Nakapiripirit	51	85
Napak	49	77
Ngora	66	93
Serere	Not available	Not available
Sironko	70	85
Soroti	75	84

\* Grey shading indicates safe coverage below national averages

Improvements to sanitation and hygiene conditions leads to a reduction in water and hygiene related diseases and contribute to a better health standard in the population – which is essential in reducing poverty and advancing the quality of life. The coverage target for rural sanitation is 77% by 2015, increasing to 100% by 2035. The coverage target for urban sanitation is 100% by 2015 (JICA, 2011).

Latrine coverage and hand washing practices, both of which contribute significantly to hygiene, are not widespread. The ranges for latrine coverage and for the practice of hand washing are indicated by district, as determined in 2011 by JICA, in *Table 4-11*.

**Table 4-11: Sanitation coverage in the Awoja Catchment in 2011**

District	Latrine coverage range in 2011 (%)	Hand washing practice range (%)
Amudat	2 - 20	No data
Bukedea	61 - 77	11 - 20
Bukwo	78 - 97	11 - 20
Bulambuli	61 - 77	No data
Kapchorwa	61 - 77	1 - 10
Katakwi	41 - 60	11 - 20
Kumi	41 - 60	21 - 30
Kween	41 - 60	1 - 10
Nakapiripirit	2 - 20	No data
Napak	2 - 20	No data
Ngora	61 - 77	No data
Sironko	61 - 77	11 - 20
Soroti	61 - 77	11 - 20
Serere	61 - 77	1 - 10

Poor sanitation impacts negatively on the water quality of both groundwater and surface water, affecting the health of the water users. In urban areas, centralised sewerage systems improve sanitation and hygiene. The NWSC controls sewerage system coverage in urban areas and must focus on increasing coverage drastically. Currently, the only urban sewerage system is in the town of Soroti, on the edge of the Awoja Catchment. This system has

a treatment capacity of 3,000m<sup>3</sup>/day, but the collection network coverage is currently only 4%, utilising only 8% of this capacity. People that are not connected to the network still make use of pit latrines or have no sanitation facilities at all.

Sludge management in urban areas is also still very poorly handled and waste landfill knowledge needs to be increased. A challenge for sanitation and hygiene is that the communities do not view these health services as essential to survival, in the way that they view water supply, due to the indirect outcomes of poor sanitation and hygiene. Creating awareness on the importance of hygiene is an essential step in improving the current situation.

#### 4.3.2.2 Livestock watering

Livestock consists of cattle, sheep, goats, pigs, chickens, ducks, and turkeys. The water use for these animals as well as required land area to carry them was determined by converting the populations of the various animals to equivalent Tropical Livestock Units (TLU) using representative conversion factors. One TLU represents an equivalent animal live weight of 250kg. According to PEM consult, 2009, the water demand per TLU is 50L/TLU/day. Livestock numbers as indicated in the National Livestock Census (2008) are shown in *Table 4-10*: Livestock numbers estimated in 2008 for districts falling wholly or partially within the Awoja Catchment. Little is known about livestock watering infrastructure in the catchment. As livestock is critical to livelihoods it is important that a comprehensive audit to support planning for improvements is carried out.

*Table 4-12: Livestock numbers estimated in 2008 for districts falling wholly or partially within the Awoja Catchment*

District delineation 2006 (numbers for 2008)	Cattle (no.)	Goats (no.)	Sheep (no.)	Pigs (no.)	Poultry (chicken, ducks, turkey) (no.)	Total Livestock (no.)	Total Tropical Livestock Units 2008
Bukedea	86,141	54,810	10,013	23,264	225,247	399,475	80,453
Bukwo	23,360	23,312	2,137	1,657	96,880	147,346	21,316
Kapchorwa (incl. Kween)	95,564	75,073	9,852	8,070	288,868	477,427	84,305
Katakwi (excl. Amuria)	136,966	104,932	25,511	19,381	294,554	581,344	124,667
Kumi (incl. Ngora)	220,055	168,887	30,994	67,650	579,431	1,067,017	213,977
Moroto (incl. Napak)	352,867	380,172	307,028	5,534	282,906	1,328,507	353,715
Nakapiripirit (incl. Amudat)	674,746	547,365	389,676	322	331,056	1,943,165	614,662
Sironko (incl. Bulambuli)	92,562	79,141	9,806	32,733	419,390	633,632	93,325
Soroti (incl. Serere)	271,634	236,839	53,010	75,499	851,877	1,488,859	268,080

According to the National Livestock Productivity Improvement Project (2002), the rangeland carrying capacity for Uganda has never been determined with certainty, but is estimated to range from 0.7ha/TLU for high rainfall areas to 2.7ha/TLU for dry areas. The carrying capacity within the Awoja Catchment was, therefore, assumed to be 0.7ha/TLU for dry areas with a MAP of 745–1,000mm; 1.7ha/TLU for areas with a MAP of 1,000–1,500mm and 2.7ha/TLU for areas with a MAP above 1,500mm. A proper livestock carrying capacity assessment is advised to guide stocking densities and grazing management as a catchment intervention.

Based on the above carrying capacities it was found that the majority of the districts within Awoja were either overstocked in terms of livestock or at full capacity in 2008. The only two districts with room for growth in livestock numbers were Bukwa and Kapchorwa. As more recent livestock figures are not available, it is not clear whether livestock has increased or decreased since 2008. It has, however, been suggested by DWRM that there have, in fact, been substantial losses in livestock in the catchment, leading those living in the catchment to request government assistance for re-stocking. According to the UBOS statistical abstract 2012, the CIS household register indicates that between 2008 and 2011 Kumi district had the highest proportion of households owning cattle in Uganda (56.3 percent) and Ngora district had the highest proportion of households owning goats (56.4 percent) in Uganda.

The carrying capacity of the respective areas should be used to determine stocking. Emphasis is placed on the improvement of livestock rearing practices and on the mix of animals making up the total livestock component. The

consumption and reproduction rate of livestock need to be carefully monitored and balanced as the population grows. Livestock water demands are summarised in *Table 4-11: Summary of current and future water demands for the Awoja catchment.*

#### *4.3.2.3 Rainfed agriculture*

Agriculture in the Awoja Catchment is mainly dependent on rain and information regarding area under rainfed agriculture for 2002 was extracted from sources provided by the MWE, informed by the Food and Agriculture Organisation (FAO). These values were projected to 2013 based on population growth statistics. Certain parts of the Awoja catchment are already highly cultivated. The Mount Elgon region specifically has almost reached its capacity for rainfed cultivation. Because of rainfall variability and inconsistent rains, crops are often planted in areas on river banks and on extremely steep mountain slopes. This results in river bank and mountain slope destabilisation. Destabilised river banks are susceptible to erosion and wash-aways during floods. On mountain slopes the runoff is increased and weakened soils are carried downstream, causing siltation downstream. As the mountain slope stability decreases the likelihood of landslides and mudslides increases.

With population increase, additional agricultural produce will be required from the land. Ideally, the additional food supply should come from increasing the crop yields within the existing rainfed fields. Since this is not being realised, the other alternative is to increase the cultivated area. It was assumed that wetlands, game reserves, forest reserves and national parks would not be used for rainfed cultivation. In intensively cultivated districts, the maximum area available for cultivation was capped at 85% of the available land, to allow for urban expansion, transport networks, houses and for areas that might be otherwise unsuitable (steep slopes, rock outcrops, inappropriate soils etc.).

An estimate of the required land for rainfed cultivation in 2040 was done based on the assumption that cultivation practices must improve because of the land constraints and population growth. If commercial irrigation schemes are not implemented the land required for rainfed agriculture will increase in parallel with the population. This reflects a 2040 scenario upon which other development scenarios are evaluated against. Rainfed areas for 2002 were used as a departure point. A limit for rainfed agriculture was set as 85% of the inhabitable area. This allows 15% for human settlement, unsuitable land and infrastructure development.

By projecting the 2002 rainfed area to 2013 using the same growth rate as for the population, it was found that both Bulambuli and Sironko districts are currently (2013) over-cultivated. In these districts, additional food supply would have to be imported or come from increasing the crop yields from the rainfed fields. If no steps are taken to improve the yield from the current rainfed area, it is expected that all the districts of Awoja will have reached their maximum potential for rainfed agriculture by 2040. Small-scale supplemental irrigation of rainfed crops, including widespread use of conservation farming practices will greatly increase water use in agriculture in the future.

There are no major irrigation schemes in the Awoja Catchment. Existing small scale irrigation schemes are located on the foothills of Mount Elgon and they include; the Atari scheme, the Tabagonyi scheme, the Bunamono scheme, and the Nabongo scheme. Some informal irrigation along the rivers and on the wetlands' margins (during the dry seasons) was noticed during field visits. Examples include a students' group garden next to the River Namalu in Nakapiripirit district, irrigation of cotton fields and vegetable gardens along the Sipi River and millet, sorghum, lentils and vegetables next to Simu River in Bulambuli district. Some of the irrigation was literally on the edge of the river. Rudimentary techniques of irrigating and controlling water are applied. People with farms and gardens along the rivers use pipes and pressure pumps to irrigate their farms and gardens.

#### *4.3.2.4 Aquaculture*

Fishing is currently practiced to a greater extent than aquaculture, but there is room for growth of properly managed aquaculture. To determine the existing fish pond area and fish production rates of the districts within the Awoja Catchment, the 2006 fisheries information presented in the Strategic Sector Investment Model for the Uganda Water Sector, (PEMconsult, 2009) was used. The number of ponds, total pond area and production of various fish species was determined per 2010 district (district delineation in 2010), using a basic conversion from the 2006 district delineations, where it was assumed that the ponds are evenly distributed across the district. The water requirement for aquaculture in 2013, including water losses through seepage and evaporation is approximately



1.49million m<sup>3</sup>/yr. The location of the fish ponds in the 2002 district delineations and the functionality of the ponds could not be established and as such aquaculture water use estimates should be used with reservations.

#### 4.3.2.5 Rural Industries

The water demand for rural industries is currently negligible in relation to the other demand sectors. This can be expected to increase along with the development of agricultural industries and food processing close to production areas as well as due to growth in tourism. It is assumed that water demand for rural industries will require 1% of the demand required for livestock, crops, and fisheries in 2013, increasing to 3% of the demand required in 2040. The demands are expected to be of a small order and have a minimal impact on the water balance. As there is little data available for the existing rural industries in the Awoja Catchment and the rate at which they have grown in the past it is difficult to accurately project growth trends for this sector. The impact of these demands will be negligible in relation to the other demands in each sub-catchment. It is suggested that the growth of this sector be monitored and that water consumption is recorded in order to refine the 2040 estimates in future.

#### 4.3.2.6 Water demand summary

The key water use sectors considered in the Awoja Catchment include:

- 1) Domestic water use,
- 2) Agricultural water use,
- 3) Livestock water use,
- 4) Aquaculture/fisheries use,
- 5) Rural industries, and
- 6) Environmental flows.

The total demands for the various water use sectors in the Awoja Catchment are indicated at five year increments in *Table 4-11: Summary of current and future water demands for the Awoja catchment*. Environmental flows are assumed to be 15% of the natural streamflows in the sub-catchment. This is chosen as an illustrative measure for the preservation of river health and biodiversity that only become critical with high development. A figure of 5-10% for environmental flows will not materially affect the available water availability for development.

**Table 4-13: Summary of current and future water demands for the Awoja catchment**

Total water demands in Awoja (MCM/yr)							
Year	Domestic	Livestock	Rainfed	Aqua-culture	Rural Industry	Environ-mental Flows (15% of runoff)	Total
2013	10.55	14.74	23.89	1.49	0.49	185	236
2018	14.93	14.74	25.32	1.99	0.67	185	243
2023	20.89	14.74	26.83	2.48	0.94	185	251
2028	28.97	14.74	28.44	2.98	1.33	185	261
2033	39.91	14.74	30.14	3.48	1.91	185	275
2035	45.3	14.74	30.85	3.98	2.22	185	282
2040	57.05	14.74	32.7	4.24	3.13	185	297

It should be noted that the aquaculture demand indicated is non-consumptive. The distribution of the total demands by sub-catchment for 2013 is given in *Table 4-12: Water demands by sub-catchment for 2013* and in *Table 4-13: Water demands by sub-catchment for 2040* for 2040. Aquaculture and rural industry demands are not indicated as the demands per sub-catchment have not been specifically determined due to insufficient information regarding the location of fish ponds and rural industries.

Table 4-14: Water demands by sub-catchment for 2013

	Sub-catchment	Total Area (km <sup>2</sup> )	EWR at 15% of runoff MCM/yr	Domestic demand MCM/yr	Livestock MCM/yr	Rainfed average annual demand MCM/yr	Total Demand MCM/yr	Demand per km <sup>2</sup> MCM/yr/km <sup>2</sup>
1	Ukutat	1,053	2.40	0.5	2.4	0.3	5.6	0.01
2	Muchilmakat	1,497	21.45	0.4	2.3	1.0	25.2	0.02
3	Kelim	1,277	26.55	0.7	1.6	2.8	31.7	0.02
4	Taboki	587	18.00	0.8	0.8	3.9	23.4	0.04
5	Chebonet-Atari	617	18.00	1.1	0.9	3.1	23.0	0.04
6	Sipi	89	6.00	0.1	0.1	0.3	6.5	0.07
7	Muyembe	137	9.45	0.2	0.1	0.5	10.3	0.07
8	Simu-Sisi	178	11.70	0.3	0.2	0.7	13.0	0.07
9	Sironko	276	18.15	0.9	0.5	3.1	22.6	0.08
10	Lake Okolitorom	1,035	23.55	1.9	1.6	3.8	30.8	0.03
11	Opeta-Bisina	1,593	160.95	1.0	1.5	0.9	164.3	0.10
12	Lake Kochobo	974	184.80	1.5	1.7	1.9	189.9	0.19
13	Apeduru-Apapi	878	10.50	0.8	0.9	1.3	13.5	0.02
14	Mt. Napak	822	17.55	0.3	0.4	0.3	18.6	0.02
	Awoja	11,013	185.0	10.5	15.0	23.9	234.4	0.02

Table 4-15: Water demands by sub-catchment for 2040

	Sub-catchment	Total Area (km <sup>2</sup> )	EWR at 15% of runoff (MCM/yr)	Domestic demand (MCM/yr)	Livestock (MCM/yr)	Rainfed average annual demand (MCM/yr)	Total Demand (MCM/yr)	Demand per km <sup>2</sup> (MCM/yr/km <sup>2</sup> )
1	Ukutat	1,053	2.40	3.8	2.4	1.4	9.9	0.01
2	Muchilmakat	1,497	21.45	3.1	2.3	4.6	31.4	0.02
3	Kelim	1,277	26.55	4.2	1.6	6.8	39.2	0.03
4	Taboki	587	18.00	3.8	0.8	5.7	28.2	0.05
5	Chebonet-Atari	617	18.00	4.2	0.9	2.8	25.9	0.04
6	Sipi	89	6.00	0.5	0.1	0.5	7.0	0.08
7	Muyembe	137	9.45	0.8	0.1	0.4	10.8	0.08
8	Simu-Sisi	178	11.70	1.0	0.2	0.5	13.4	0.08
9	Sironko	276	18.15	2.8	0.5	1.8	23.2	0.08
10	Lake Okolitorom	1,035	23.55	8.7	1.6	3.6	37.5	0.04
11	Opeta-Bisina	1,593	160.95	6.2	1.5	1.3	169.9	0.11
12	Lake Kochobo	974	184.80	8.8	1.7	2.1	197.4	0.20
13	Apeduru-Apapi	878	10.50	6.3	0.9	2.4	20.1	0.02
14	Mt. Napak	822	17.55	2.8	0.4	0.4	21.2	0.03
	Awoja	11,013	185.0	57.0	15.0	34.3	291.3	0.03

In 2013 and in 2040 the highest water demand as a function of the sub-catchment area is being and will be experienced in the Opeta-Bisina sub-catchments and in the Lake Kochobo sub-catchment, followed by the sub-catchments around Mount Elgon (Sironko, Muyembe, Sipi and Simu-Sisi).

## 4.4 Water Balance

The water balance for Awoja was done for two periods:

1. The water balance for the current (2013) situation with negligible large infrastructure development as it currently stands
2. The water balance for a future (2040) baseline scenario where no noteworthy investment in additional water infrastructure or water related management programmes has taken place.

By determining the expected water balance for 2040 (the end of the planning horizon) it is possible to determine which areas will have a surplus of water and which areas will have a water deficit in future. A water surplus would suggest opportunities for increased productive water use. A water deficit would suggest that the water development plan will need to include measures to improve water use efficiency and possibly measures to manage increases in water demand or use over time. Deficits and surpluses are likely to vary spatially within the catchment.

These assessments were intended first, to weigh the potential water resources (both surface water and groundwater) against the estimated water demands in the Awoja Catchment in order to determine if the demands can be met currently and in 2040 without investment in infrastructure, productivity improvement programmes or land management programmes. Where a water surplus is evident from the assessment, an opportunity for increased productive water use is indicated. Secondly, in the event that demands are not being met or cannot be met in future, these assessments identify the sub-catchments that require measures to improve water use efficiency and to manage water deficits. Thirdly, when compared with each other these assessments serve as indicators of change in water demands and the water balance over time. Water deficits and surpluses are likely to vary spatially within the Awoja Catchment.

Mike Basin was used to model the water resources potential as well as the major demands for both water balance assessments. Environmental flows, equivalent to 15% of the stream flow in each sub-catchment were taken into consideration as a starting point. The impact of other environmental flow percentages was considered in other development scenarios.

An initial water balance assessment comparing the average net cumulative runoff per sub-catchment (the available surface water) with the estimated demands for 2013 and 2040 is shown in *Table 4-14: Water Balance Assessment with average annual potential and demands*. If average annual runoffs are considered it is found that the domestic demand, livestock demand and rainfed agriculture demand can be met using only the surface water in both 2013 and 2040. The potential groundwater yield is also indicated in *Table 4-14: Water Balance Assessment with average annual potential and demands* as the development of groundwater to cater for domestic demands is preferred due to the better standard of groundwater quality. Surface water generally requires treatment before consumption is regarded to be safe. From the table it can be deduced that if developed, the potential groundwater yield would be able to serve the domestic demand. As mentioned previously, the extent of groundwater development per sub-catchment is not currently known. A topographical survey marking existing groundwater infrastructure would be useful during future planning of development, so as to enable a calculation of how much groundwater is currently developed in each sub-catchment and how much more is required at a certain future date.

As droughts are of particular concern in the Awoja Catchment it is suggested that development plans should rather be based on water balance estimates in the driest year than in an average year. The assessment was repeated for the driest year recorded between 1961 and 1978, as hydrological records in this period were the most complete. A water balance for 2013 and 2040 in the driest year in the mentioned period is shown in *Table 4-15: Water Balance Assessment in the driest year analysed*. From the table it is evident that if abstractions are attempted as estimated in all the sub-catchments then certain sub-catchments will have water deficits in very dry years.

Table 4-16: Water Balance Assessment with average annual potential and demands

2013		2040	
Sub-catchment ID	Name	Sub-catchment ID	Name
1	Ukutat	1	Ukutat
5	Chebonet-Atari	5	Chebonet-Atari
12	Lake Kochobo	12	Lake Kochobo
13	Apeduru-Apapi	13	Apeduru-Apapi
		2	Muchilmakat
		3	Kelim
		4	Taboki
		10	Lake Okolitorom
		11	Opeta-Bisina
		14	Mt. Napak

Table 4-17: Water Balance Assessment in the driest year analysed

Water Balance (MCM/Yr) in the driest year								
#	Sub-catchment	Driest Year	2013			2040		
			Flow available	Total water demand excl. EWR	Max annual deficit using only surface water	Flow available	Total water demand excl. EWR	Max annual deficit using only surface water
1	Ukutat	1971	0.09	3.15	-3.06	1.3	7.5	-6.25
2	Muchilmakat	1974	3.69	3.69	0	8.5	9.9	-1.48
3	Kelim	1965	5.1	5.1	0	11.8	12.6	-0.87
4	Taboki	1966	5.39	5.39	0	10.1	10.2	-0.12
5	Chebonet-Atari	1972	4.72	5.04	-0.32	7.5	7.9	-0.36
6	Sipi	1972	0.49	0.49	0	1.0	1.0	0
7	Muyembe	1972	0.79	0.79	0	1.3	1.3	0
8	Simu-Sisi	1972	1.25	1.25	0	1.7	1.7	0
9	Sironko	1972	4.46	4.46	0	5.0	5.0	0
10	L. Okolitorom	1972	1.59	1.59	0	0.7	1.6	-0.91
11	Opeta-Bisina	1970	1.46	1.46	0	-11.2	1.5	-12.66
12	L. Kochobo	1975/1961	-33.13	1.67	-34.8	-157.6	1.7	-159.31
13	Apeduru-Apapi	1966/1965	0.87	0.9	-0.03	-1.4	0.9	-2.25
14	Mt. Napak	1966	0.42	0.42	0	0.4	0.4	-0.05
<b>Awoja</b>		<b>-2.81</b>	<b>35.40</b>	<b>-38.21</b>	<b>-120.98</b>	<b>63.28</b>	<b>-184.26</b>	

The sub-catchments that are expected to experience water deficits in a dry year are indicated in Table 4-16: Sub-catchments that are expected to experience water deficits in a dry year.

**Table 4-18: Sub-catchments that are expected to experience water deficits in a dry year**

2013		2040	
Sub-catchment ID	Name	Sub-catchment ID	Name
1	Ukutat	1	Ukutat
5	Chebonet-Atari	5	Chebonet-Atari
12	Lake Kochobo	12	Lake Kochobo
13	Apeduru-Apapi	13	Apeduru-Apapi
		2	Muchilmakat
		3	Kelim
		4	Taboki
		10	Lake Okolitorom
		11	Opeta-Bisina
		14	Mt. Napak

By 2040, the only sub-catchments that will not experience water deficits in a dry year are those on the slopes of Mount Elgon.

Climate change related trend in rainfall could not easily be detected but local rainfall seasonality and elevation (lower temperatures) may impose limitations on crop portfolios and their vulnerability. There is a potential for increase in the frequency of extreme events as hydrological cycles intensify in a warming atmosphere. The impact may be very similar over a small area such as Awoja Catchment and the vulnerable catchments are deemed to be the same with climate change effects.

## 4.5 Social and Environmental State

This social and environmental analysis provides the situational assessment from a wealth of information, which informs and/or influences the interventions for catchment management. The key vulnerabilities in the catchment mainly originating from social-economic activities coupled with the growing population are identified, and linkages, cumulative impacts and options for mitigation are assessed and presented in this section of the report.

### 4.5.1 Demography

The 2013 population for the Awoja Catchment is estimated at 1,438,908 people<sup>4</sup>, with population densities indicated in Figure 4-11.

<sup>4</sup> Population growth trends were updated, as the previous population census was conducted in 2002. Applying the historical growth trends between 1991 and 2002, per district, the current 2013 population and the future population up until 2040 were projected. As the census was conducted according to earlier district delineations and as the hydrological catchment boundary of the Awoja catchment does not follow district boundaries, pre-processing of the population information was done to determine the population for the newer district delineations, for the portion of districts falling within the Awoja catchment and for the sub-catchments. Certain areas deemed to be uninhabitable (or at least have very low populations) such as game reserves, national parks, forest reserves, lakes and wetlands were excluded during the process of transferring old district population to new district delineations and sub-catchments. The process employed is discussed in detail in the Water Balance report.

For the purpose of this study, urban areas were defined as in the 2002 Census as: "...gazetted cities, municipalities and town councils as per the Local Government Act 2000..." To transfer the source information to the newer district delineations the urban population figures for town councils, municipalities and cities from 2002 were matched to the new districts in which they fall.

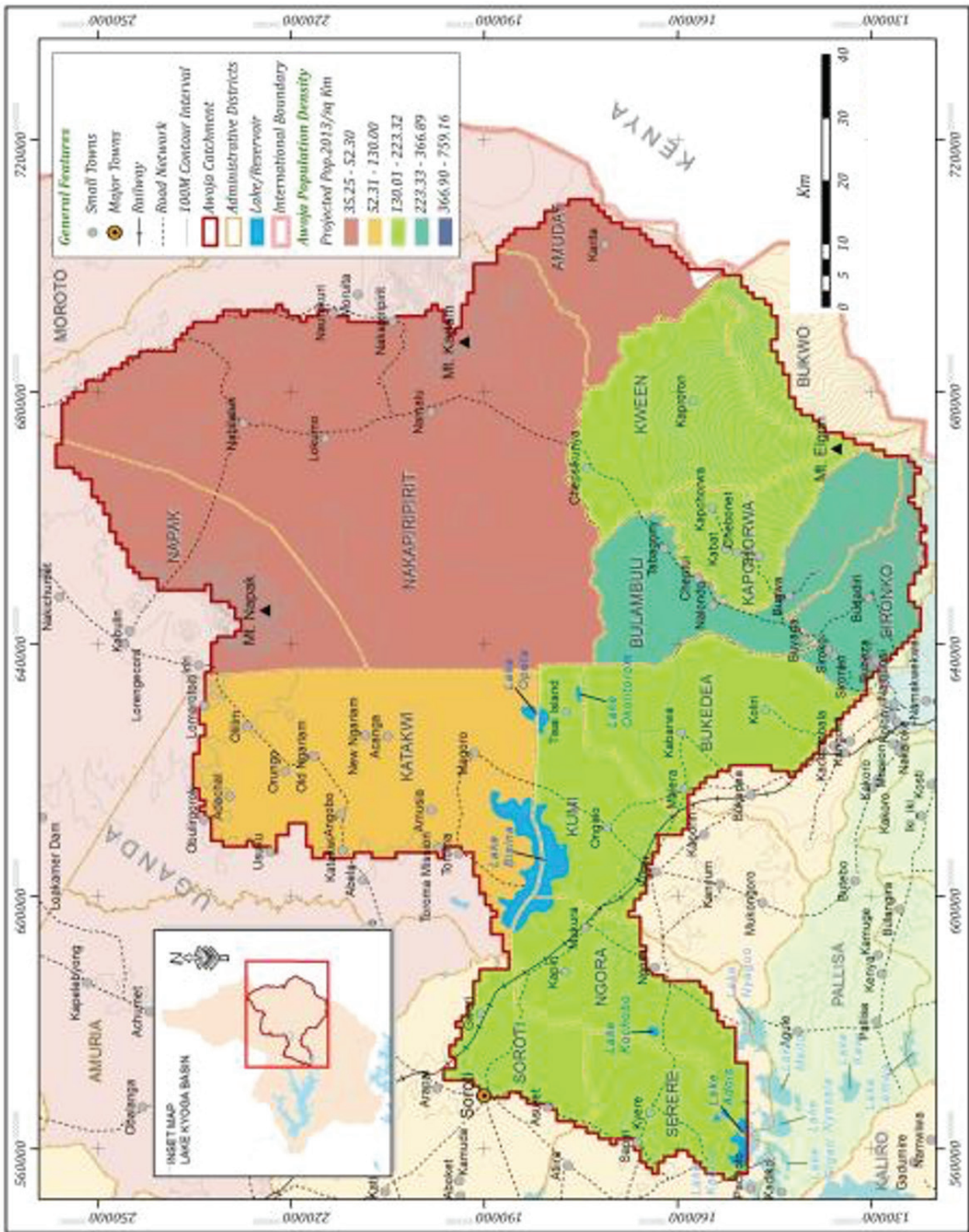


Figure 4-13: Population density in Awoja catchment

The Lake Kyoga Basin has an average population density of 134 inhabitants per a square kilometre (inhabitants/km<sup>2</sup>) ranging from 50 to 250 inhabitants/km<sup>2</sup> in several districts. The south-eastern part of the region is densely populated with the slopes of Mount Elgon (parts of Kween, Kapchorwa, Bulambuli, and Sironko) being overpopulated, the inhabitants benefiting from rich volcanic soils, but living on small plots of land, mainly as subsistence farmers. This pattern increases the risks of erosion, landslides, and food shortages. In contrast to this, the cattle corridor is generally a sparsely populated area. This region includes the Karamoja (Nakapiripirit, Napak, and Amudat), which is inhabited by nomadic pastoralists and characterised by difficult environmental and economic conditions as well as a history of insecurity.

The average annual historic growth rates for the population, calculated between 1991 and 2002 are shown in *Table 4-17: Historical population growth rates by District*. Katakwi, Amudat, Nakapiripirit, and Napak districts have the highest growth rates.

**Table 4-19: Historical population growth rates by District**

District	Population growth rate (%)	District	Population growth rate (%)
Amudat	5.9%	Kween	4.2%
Bukedea	4.3%	Nakapiripirit	5.9%
Bukwa	4.2%	Napak	5.8%
Bulambuli	2.5%	Ngora	4.3%
Kapchorwa	4.2%	Serere	5.1%
Katakwi	6.2%	Sironko	2.5%
Kumi	4.3%	Soroti	5.1%

By 2040 the population is expected to triple, reaching a total of 4,790,044 people. The current population is almost entirely rural (over 90 %) with Soroti being the only district with a large urban town. The rural population lives in dispersed villages characterised by traditional building structures often made of mud and/or grass roofing with dust floors. There is no vision for the development of large urban growth nodes, although the population of towns may increase disproportionately as rural resources become more thinly stretched. The estimated population within the Awoja Catchment is shown at five-year intervals in *Table 4-18: Estimated current and future population of Awoja*.

**Table 4-20: Estimated current and future population of Awoja**

Year	Rural population	Urban population	Total population
2013	1,362,377	76,531	1,438,908
2018	1,688,349	95,504	1,783,853
2023	2,099,997	119,509	2,219,506
2028	2,621,490	149,940	2,771,430
2033	3,284,178	188,594	3,472,772
2035	3,597,537	206,855	3,804,392
2040	4,528,997	261,048	4,790,044

#### 4.5.2 Economic activities

As already mentioned the section above, the population of Awoja is almost entirely rural, with district populations between 82% and 99% depending on agriculture for their livelihoods. No major towns are located within the Awoja Catchment<sup>5</sup>. Livelihoods are, therefore, almost exclusively based on the natural resources of the catchment, with subsistence agriculture being the primary source of food and income. The key environmental distinctions within Awoja are (a) the high-rainfall mountain areas, (b) lowland plains with sufficient rainfall to support rainfed agriculture, (c) extensive wetlands and lakes, and (d) the dry northern cattle corridor occupied by pastoralists. Most

<sup>5</sup> Soroti town, with 66,000 people (UBOS, 2011) is only partially within the catchment. Kumi is the next largest town with a population of 13,000 in 2011. In 2013 the catchment population was estimated at 1,362,377 rural (95%) and 76,531 urban (5%).

agriculture within the catchment is rainfed. The current land-use practices of the Awoja catchment are depicted in Figure 4 -12.

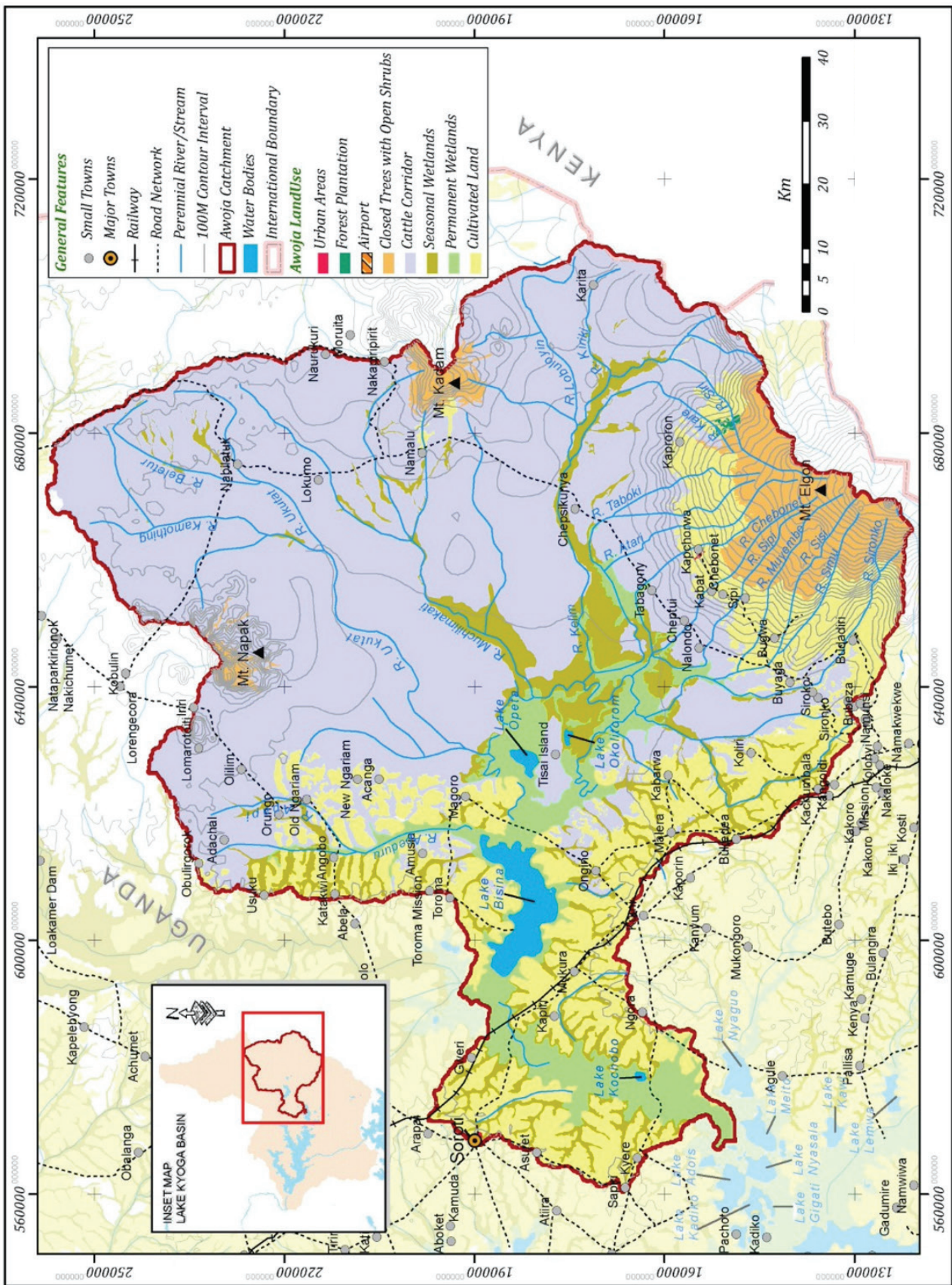


Figure 4-14: Land use practices in the Awoja Catchment



Crop farming and the sale of surplus crops, cattle keeping, fisheries and charcoal provide additional livelihood strategies.

There is no mining, manufacturing or value addition at commercial scale (sand mining is for local use only). Ecotourism potential has been identified for Lake Bisina and Mount Elgon.

#### 4.5.3 Land Ownership

Land is the fundamental asset in agricultural and rural development. Access, tenure security and gender equity are essential for the effective use of the land as a productive asset.

In the Awoja Catchment a combination of land tenure systems exist:

- 1) Freehold (with full rights registered ownership),
- 2) State leasehold (land leased for a specific period under certain conditions), and
- 3) Community-based / customary tenure (whereby land is regulated by customary rules often determined by clan or family leaders).

Some institutions such as churches, schools, and government institutions hold land on freehold. However, the customary land tenure system, which does not favour investment predominates, but freehold is on the increase in rural areas. In contrast to this, individuals basically own land on leasehold basis in urban areas. In all the existing systems, except for freehold title, women have been excluded from owning land. Of the estimated titled 10% of the total land of Uganda, 20% is owned by women, although most of this is low value cropland<sup>6</sup>. This accords with findings from interviews with Awoja women during the reconnaissance visit, which indicated that although women own land, in most cases they own the land away from rivers, where it is not possible to irrigate. This situation has an impact on women's economic situation and they must be given equitable opportunity as beneficiaries in developing irrigation infrastructure. There are also other pressures behind the different types of land ownership like the regulation by local customs, land fragmentation, lack of written records on customary tenure, lack of observance of land use control and a complicated process in the acquisition of a leasehold.

#### 4.5.4 Agriculture

The majority of farming is small scale and rainfed, where productivity is low and vulnerability to climate variability (including floods and droughts) is high. Food insecurity impacts a majority of the population, particularly in Karamoja. Three farming systems dominate in the Awoja Catchment, namely the Montane System, the Teso System and the Pastoral system.

The **Montane farming system** is practiced at higher altitudes (1,500 to 1,750masl.) such as in Kapchorwa, in the Mount Elgon region. This area receives high and effective rainfall and cloud cover, supporting cultivation of staple foodstuffs such as banana, sweet potatoes, cassava, and Irish potatoes. Arabica coffee is also grown above 1,600 metres. Temperate crops such as barley and wheat are also produced. Because of the soil fertility, areas within this farming system are densely populated and agriculture is intensive, dominated by smallholdings of about 1.5 hectares. As a common practice, crop residues are used as livestock feeds.

The **Teso farming system** is more common to the west, in the districts of Soroti and Kumi. This area has sandy-loams of medium to low fertility and rainfall is bimodal. The dry season, from December to March, is longer than in other areas. The area is characterised by moist vegetation and grass savannahs with short grassland, ideal for grazing. The staple foods are millet, maize, and sorghum. Other crops are oil seed crops (groundnuts, simsim, and sunflower) with cotton as the major cash crop. People within this area practice mixed agriculture (crops and livestock). There is no mechanisation and land is tilled using oxen. The average farm size in this area is about three hectares. Similar to the Montane system, crop residues are commonly used as livestock fodder.

The **Pastoral farming system** applies to the northern and north-eastern part of the catchment. Here rainfall is inadequate for crop-dependent livelihoods although drought-tolerant crops are cultivated, including finger millet, simsim, cassava, and sorghum. Tobacco and cotton are major cash crops. The grassland is short and used for communal grazing. This area is well known for its pastoral system with semi-nomadic cattle herding, with the

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<sup>6</sup> National Development Plan, 2010.

lack of permanence providing a challenge for water resources planning. Pastoral areas are often overgrazed as livestock keepers overstock as a survival strategy for times of drought. This has led to land degradation.

Irrigation is supplementary in that crops also make use of natural rainfall. This category of supplementary irrigation to improve rainfed agriculture is for areas where crops can be grown, at least some of the time, without any irrigation – but where benefit to production or significant reduction in risk can be achieved through supplementary water supply at critical times. Watering is, therefore, aimed at avoiding the worst impacts of droughts. Some existing irrigation schemes at the foothills of Mount Elgon as well as a few potential irrigation sites are indicated in Figure 4-13.

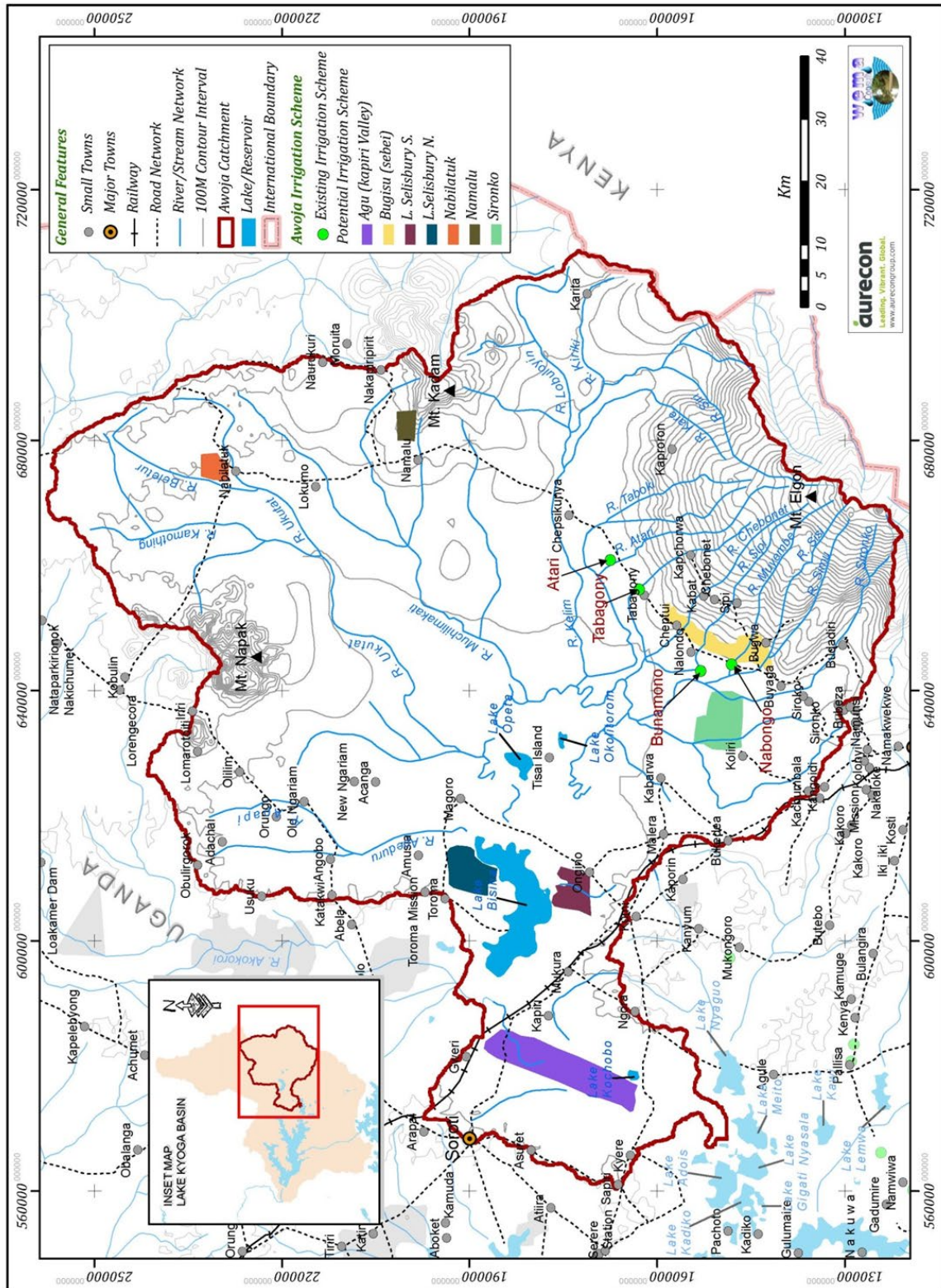


Figure 4-15: Existing and potential irrigation sites in Awoja catchment

It is estimated that the total potential for “Type A” irrigation (good soil and close to water) in the Awoja Catchment is 28,368ha and the total potential for “Type B” (suitable soils that can be used if water can be made available) irrigation is 13,344ha. The total irrigation potential in Awoja is estimated to be 41,712ha.

Crop areas cultivated in each sub-catchment are shown in *Table 4-19* Rainfed crop areas per sub-catchment.

**Table 4-21** Rainfed crop areas per sub-catchment

Sub-catchment number	Sub-catchment	Rainfed crop area (km <sup>2</sup> )
1	Ukutat	711
2	Muchilmakat	612
3	Kelim	531
4	Taboki	324
5	Chebonet-Atari	287
6	Sipi	34
7	Muyembe	51
8	Simu-Sisi	64
9	Sironko	162
10	Lake Okolitorom	642
11	Opeta-Bisina	545
12	Lake Kochobo	503
13	Apeduru-Apapi	622
14	Mt. Napak	283
	<b>Awoja</b>	<b>5,371</b>

#### 4.5.5 Livestock

While the districts within the cattle corridor (Napak, Nakapiripirit, Kumi, Katakwi, Ngora, Amudat, Bukedea, and the top part of Bulambuli) are highly dependent on livestock and hence also on stock-watering facilities, livestock also complements cultivation in the central and southern parts of the catchment. Livestock keeping in which cattle, sheep, goats and pigs are included is thus an important cash earning resource of the farm household within the Awoja Catchment. It is also one of the reliable sources of livelihood. In tsetse-fly free areas, livestock are extensively kept. Nakapiripirit is the largest among the districts with 41% of the total number of cattle in the region. In Katakwi, the number has gone down to 8%, which can partly be attributed to the former cattle looting by Karamajong warriors. Stakeholders acknowledged in consultations that overgrazing in some parts of the catchment such as Tisai, Ongino, Agu, Malarea, and Kolir (in Bukedea, Kumi, and Ngora) leads to destruction of vegetation cover, exposing water resources to erosion.

#### 4.5.6 Fisheries

Capture fisheries and fish farming provide another important opportunity for livelihoods. Capture fishing is practiced to a greater extent than aquaculture/fish farming. For capture fishing, small non-motorized canoes and either gillnets or seine nets are used, although the use of seine nets is now illegal. Wetlands are of particular importance to the fishing industry. The main fish products are catfish, carp, and tilapia.

Fishing continues throughout the year, although fish are scarce during periods of low flow. Extensive illegal and unrecorded fishing takes place and there is room for improvement in the management of fishing practices. Fisheries are an important agriculture subsector, being the second leading foreign exchange earner after coffee.

There is a widening gap between supply and demand for fish, indicating a growing opportunity for aquaculture on a larger scale, especially as the population demand grows. Large-scale aquaculture could potentially also support an export industry.

#### 4.5.7 Tourism

In the 1960s, Uganda was the main tourist destination in East Africa and tourism was one of the main economic sectors in the country. The political upheaval of the 1970s and 1980s led to looting of tourism infrastructure and hunting of wildlife in protected areas (NELSAP, 2012). The potential exists to re-establish tourism in Uganda and in the Awoja Catchment. The mountains of the northeast, including the Mount Elgon National Park, offer sight-seeing and hiking opportunities. Lake Opeta and Lake Bisina already draw many bird watchers and were declared Ramsar sites. Protected areas such as the Pian Upe Wildlife Reserve and the Mount Elgon National Park are shown in *Figure 4-14* (NELSAP, 2012). These protected areas as well as the mountains, Sipi waterfalls, and the Nyero Rock paintings hold potential for the development for tourism (NELSAP, 2012). The expansion of the tourism industry will lead to further livelihood opportunities through crafting and service industries.

Lake Bisina and Lake Opeta are Important Bird Areas (IBA) for shoebills, fox's weaver, papyrus gonoleks, white-winged warbler and others thus making them conservation areas of high significance. The lakes' system is also important as a refuge for fish species that have gone extinct in the main lakes like Lake Victoria and Lake Kyoga. Furthermore, the lakes play a major role for the socio-economic activities like fishing, transport, water supply for domestic use and livestock of the surrounding communities.

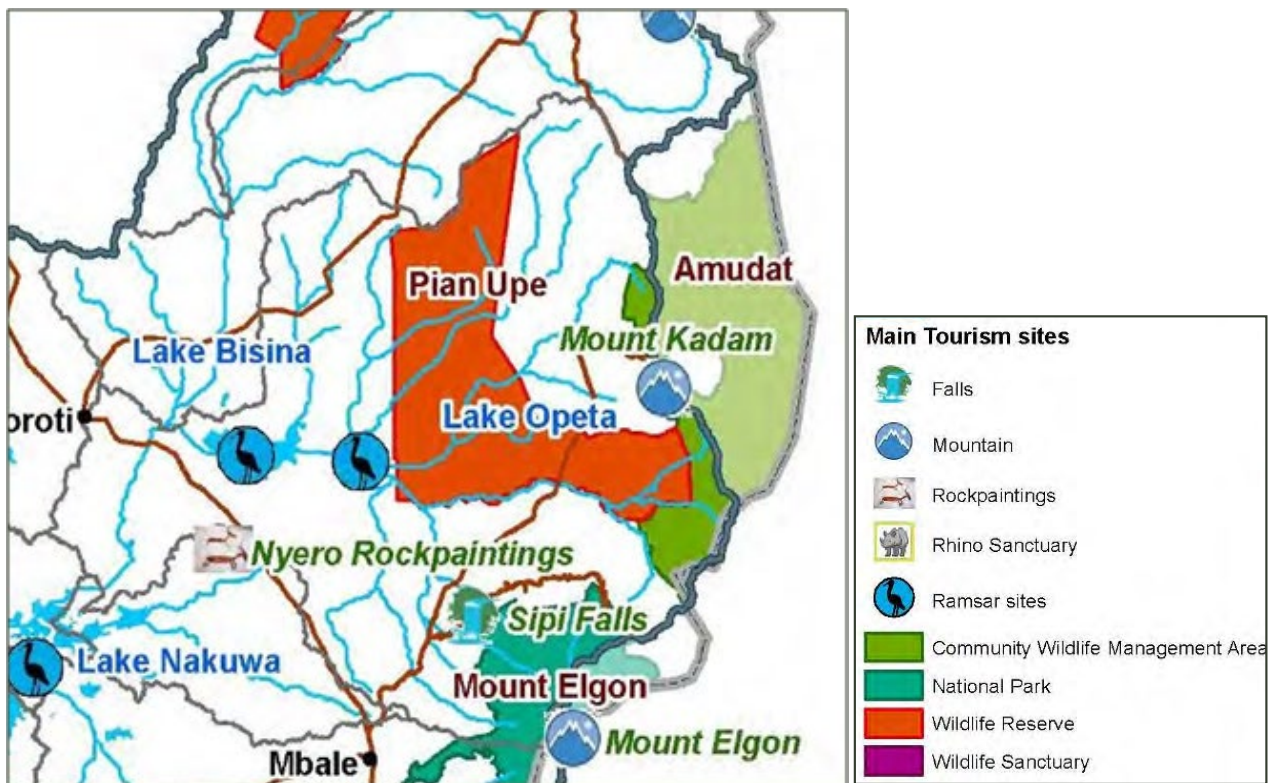


Figure 4-16: Potential tourism areas in the Awoja catchment

#### 4.5.8 Vegetation / Land cover

Most of the Awoja Catchment is covered by open shrubs with grassland, especially in the central, northern and eastern part of the catchment. In the western part of the catchment, the land cover is dominated by small herbaceous fields with crops and sparse trees. The Mount Elgon region has open shrub land, grasslands, and herbaceous fields on the mountain peaks. Trees and shrubs cover the mountain slopes. Where the slopes flatten out; there are crops, small herbaceous fields, and some trees. Mount Kadama is also covered by open trees and shrubs. The land cover for the Awoja Catchment is shown in *Figure 4-15*. The land is highly cultivated by subsistence farmers, especially in the Mount Elgon region.

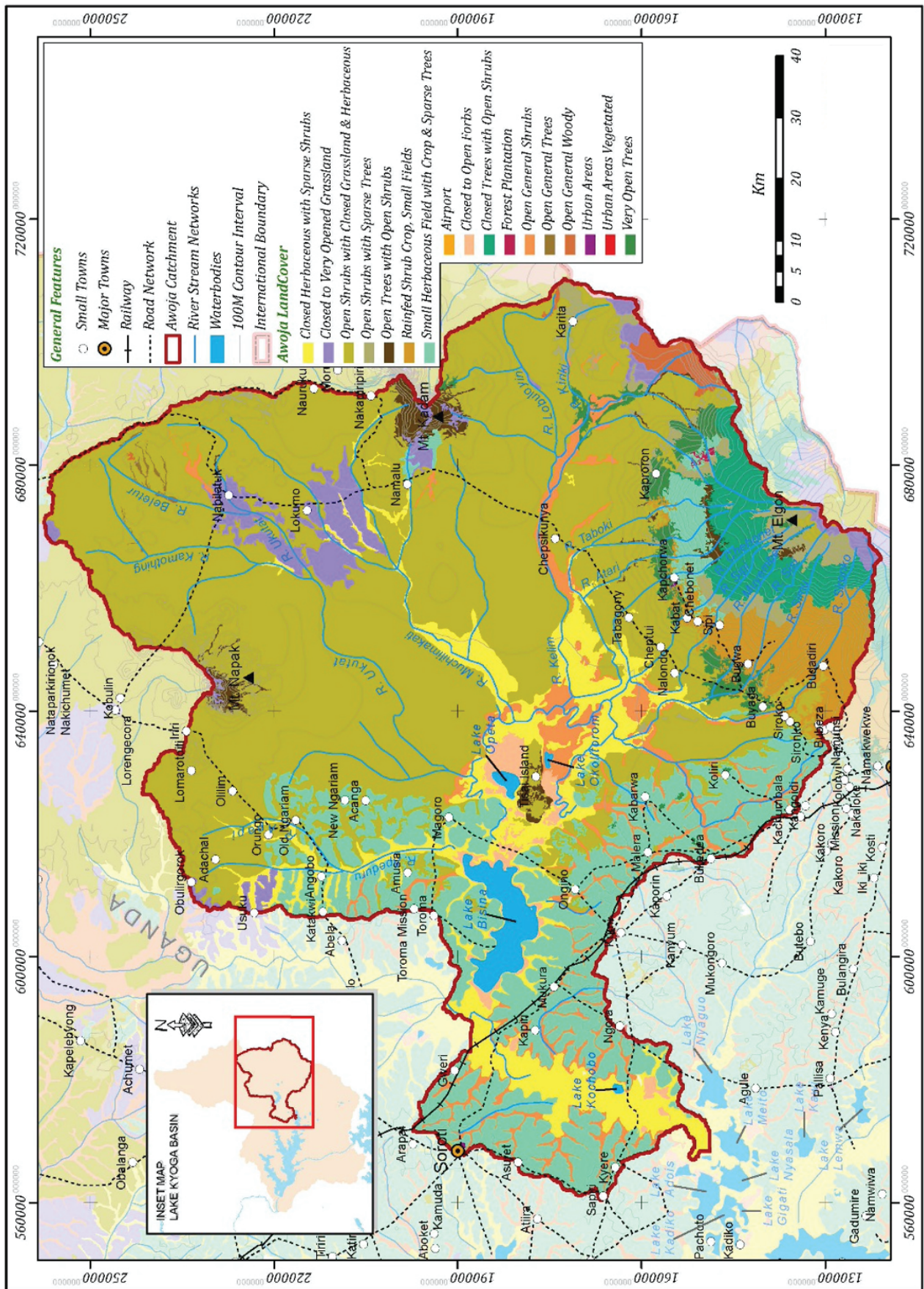


Figure 4-17: Land cover within the Awoja Catchment

Key features in the land cover of the Awoja are the extent of human encroachment in the natural landscape – reflected in both cultivation and deforestation – the dry cattle corridor to the north, and the importance of wetlands. There is limited natural forest and no commercial timber production.

#### 4.5.9 Nature conservation and protected areas

Significant parts of the catchment are covered by formal nature conservation and protected areas such as game reserves, central forest reserves, national parks, local forest reserves, and hunting areas (in the Northern parts of Nakapiripirit (approximately 50%), Kween (65%), Kapchorwa (50%) districts, eastern parts of Bukwa (45%), and Katakwi (40%) districts as well as 90% of Amudat district. The largest protected areas in Awoja are the Pian Upe Wildlife Reserve and the smaller Mount Elgon National Park being situated in **Kapchorwa, Bulambuli, Kween, Bukwa, and Sironko** districts and consisting of a range of vegetation zones including afromontane forest. Smaller community wildlife management areas and some forest reserves have also been set aside. However, due to the increasing population pressure protected areas are being encroached upon as land to settle on becomes scarce, especially in the northern part of the catchment. Harvesting of forest products is forbidden, but local people continue to harvest firewood and other forest products resulting in conflict with Park authorities. The forest reserves in the catchment are both central and local. However, a number of these have been encroached upon for cropping, grazing, and the harvesting of natural resources.

The major protected areas as well as the lake and wetland areas (white,) which limit the habitable area in the catchment considerably are shaded in white in the map in *Figure 4-16*.



*Figure 4-18: Inhabitable areas of the Awoja catchment (green)*

#### 4.5.10 Limits to land and food production

The impact of the rapidly growing population on the demand for food can be deduced from *Figure 4-17*. In this figure, the maximum arable land is indicated, along with the possible growth in rainfed agriculture up until 2040 without improved cultivation practices. The total available inhabitable area in Awoja is also indicated. From the graph, it can be deduced that the area currently remaining for rainfed agriculture development will reach its limit by 2015. Therefore, other opportunities to enhance food security – crop and cultivation practice improvement, irrigation, and aquaculture will have to be implemented.

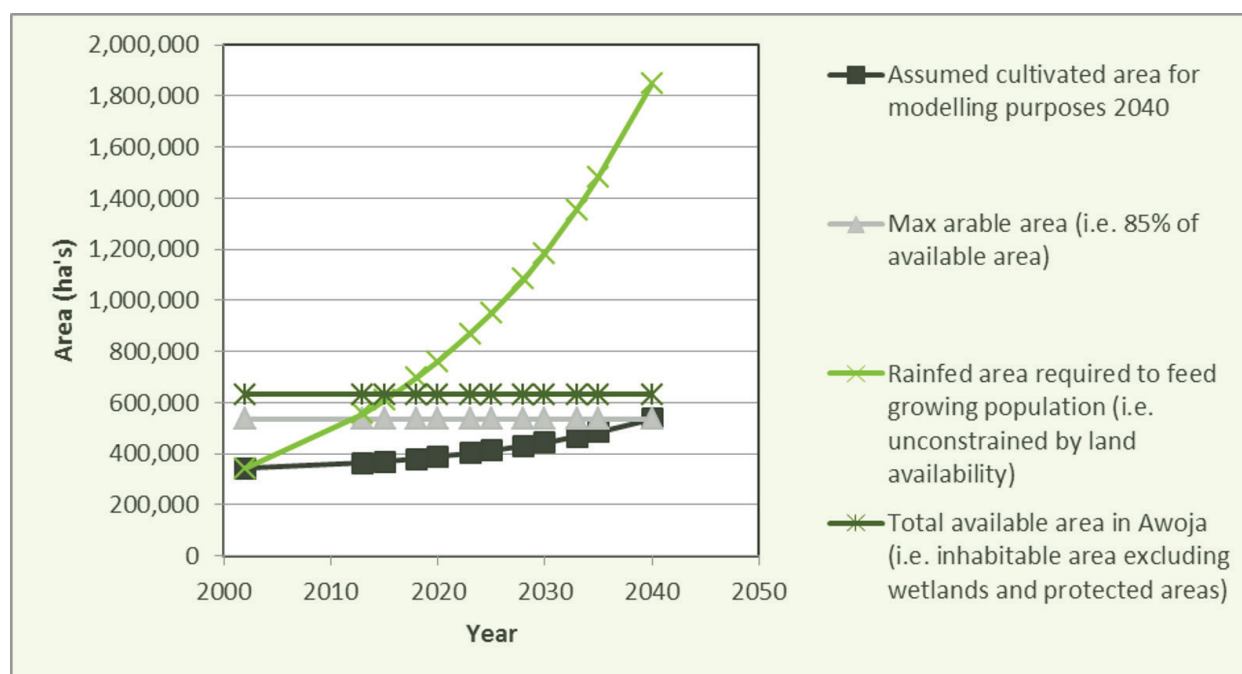


Figure 4-19: Comparison of potential rainfed area and required rainfed area to sustain population growth

#### 4.5.11 Social and Environmental Issues and Implications

Some of the social and environmental issues emanating from the characteristics of the catchment, population and important social aspects and economic activities are indicated in *Table 4-20 Social and Environmental Issues and Implications*.

Table 4-22 Social and Environmental Issues and Implications

Issues	Background and Implications
<b>High population density and growth rate</b>	The Awoja catchment has a fast growing population, currently estimated at 1.4 million people, but, if the growth rate, which varies between 4% and 6% in the catchment, is not contained, this will increase to 4.8 million people by 2040.
<b>High poverty levels</b>	In the Awoja Catchment poverty and food insecurity are worse than the national average. (North-eastern Uganda, which includes part of the Kyoga Basin, is the poorest region in the country, with a poverty level at 75.8% of the population). The cattle corridor is also significantly poorer than the wetter parts of the basin. There is an obvious need to raise the catchment's socio-economic status.
<b>Limited land ownership</b>	Landholdings are small. Large areas of the catchment were set aside for conservation and there are extensive lakes and wetlands that limit habitable land. Some changes are made from the traditional land tenure systems, but generally there are still some uncertainties on ownership that hamper private development. The diminishing land holdings add to low productivity and poverty. The cattle corridor is occupied by pastoralists, some of whom are still nomadic.

Issues	Background and Implications
<b>Livelihoods- subsistence agriculture with low productivity</b>	The population is almost entirely rural and more than 85% of livelihoods are dependent on agriculture. Most of the agriculture is subsistence, with low productivity levels relying on rainfed 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 formalised irrigation schemes. The Awoja Catchment does not have significant mineral or other resources that can be harnessed.
<b>Livelihoods – cattle farming</b>	Livestock including cattle, sheep, goats and pigs are important cash earning resources of the farm households within the Awoja Catchment. Overgrazing in some parts of the catchment leads to the destruction of the vegetation cover exposing rangeland to degradation by erosion.
<b>Limited access to basic services</b>	Limited access to clean, potable water. Very few people have water to put to productive use. Poor quality water due to upstream soil erosion and upstream local pollution (especially faecal pollution). The Karamoja region needs special attention to address deep poverty and lack of social services.
<b>Natural disasters</b>	Droughts - mainly related to the Karamoja region - and floods occurring in all low lying areas, now seemingly exacerbated by climate change are features of the landscape. Landslides and mudslides caused by cultivation of steep slopes leads to loss of life, land and infrastructure and are repeatedly experienced in the districts around Mount Elgon.
<b>Land degradation</b>	Overgrazing and exceedance of carrying capacities of land types lead to erosion and soil loss as already confirmed by some districts e.g. Amudat.
	Damage to wetlands due to encroachment activities. Deforestation caused by uncontrolled harvesting of timber and biomass in the whole catchment.
<b>River degradation</b>	Land use (cultivation and livestock) up to river edges, a common phenomenon in Awoja causes loss of riparian vegetation and destabilising of river banks, adding to soil erosion and sediment loads downstream.
<b>Wetlands</b>	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.

Water is the one decisive asset: there are some opportunities for small-scale hydropower on the lower slopes of Mount Elgon, with feasibility studies under way. No large dams were proposed, nor do any suitable sites for such dams present themselves. The future of social development in the Awoja catchment is dependent on sound environmental management, moderate utilisation, and people-based development programmes.

## 4.6 Stakeholders

Stakeholders are essential throughout the respective activities of the development and implementation of the catchment management plan. Engagement of stakeholders during this work concentrated on those with direct interest or involvement in support and implementation of water resources measures within the Awoja Catchment.

### 4.6.1 Identification and Analysis of Stakeholders

Identifying the stakeholders is key to the overall success of engagement in catchment management planning. Stakeholder identification was undertaken to determine all organisations and communities which may be affected (positively or negatively) by the water resources management in the catchment and who may be able to contribute to the programme of work due to their expert knowledge and or experience in the project areas. The operational environment of the Kyoga WMZ team, in terms of stakeholders in the use, development and management of water resources in the catchment was evaluated, and key stakeholders identified and analysed.

The project for the development of the Awoja Catchment Management Plan was launched during a week-long series of workshops that included the following:

- Draft National Water Resources strategy
- Catchment Planning Guidelines



- Water Source Protection guidelines
- Launch of Awoja Catchment Management Plan.

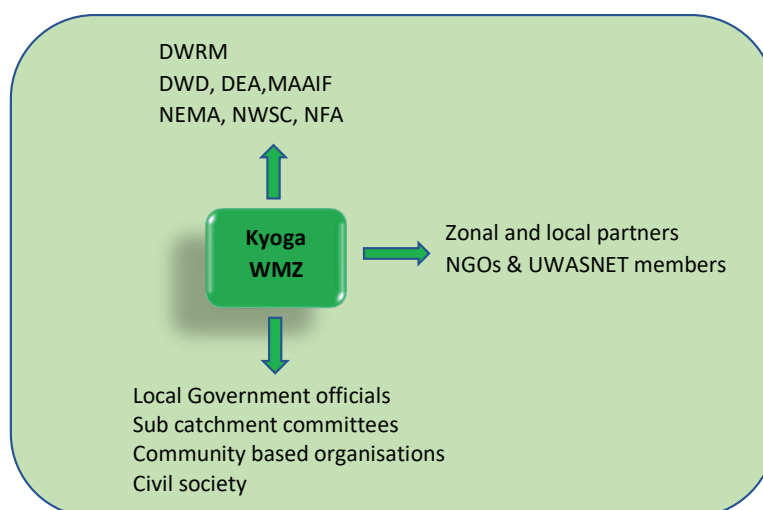
The Kyoga WMZ team and key stakeholders present were introduced at these meetings. Lists of attendees for the respective workshops were obtained. Individual discussions were held with key stakeholders.

Most of their interaction with stakeholders was in the southern, more populated area, and around Mbale. Not much interaction was yet done with stakeholders in the Awoja Catchment. They regarded the respective ministries and district officials as the primary stakeholders. Contacts with stakeholders met at the catchment plan launch workshop and National Water Resources Plan workshop were followed up to obtain more contacts. The UWASNET was especially very helpful. At Serere and Soroti, the regular Joint Water and Sanitation Advocacy Committees were being held when visiting the area. The program of field visits was adjusted to be able to attend part of these meetings organised by the Technical Support Unit (TSU). Some key stakeholders involved in the water supply and sanitation sector were met and discussions held.

The following actors were identified to play a key role in the formulation and implementation of the catchment management plan:

- a) Water and water-related departments of the state:
  - i) Ministry of Water and Environment (MWE) with its respective divisions
  - ii) Ministry of Agriculture Animal Industry and Fisheries (MAAIF)
  - iii) Ministry of Energy & Mineral Development (MEMD)
- b) National Environment Management Authority (NEMA)
- c) National Forestry Authority (NFA)
- d) District authorities
- e) Water services providers, for drinking water supply and sanitation
- f) Regional and National NGOs and CSOs
- g) Professional organisations
- h) Users and user groups including water users committees, youth, women and farmers.

The team indicated that the districts are the key stakeholders in the area as they are responsible for implementation of the bulk of projects and services relating or affecting water resources. It was suggested that the Chief Administration Officers (CAO), water development officers and environmental officers of the respective district offices would be important stakeholders to work closely with. *Figure 4-18* indicates the respective levels of interaction of stakeholders with the Kyoga WMZ team.



*Figure 4-20: Stakeholder interaction with the Kyoga WMZ team*

Stakeholders can be expected to put forward a range of concerns/issues, which have a specific relation to their respective areas. Different issues are likely to emerge as primary for different stakeholders. The MWE's Kyoga WMZ team, together with the consultant, identified important stakeholders who would be helpful in developing the catchment management plan. Stakeholders identified comprised lead agencies in ministries and district local government administrations within the 14 districts, NGOs, CBOs, and local communities.

The interaction of key stakeholders with the Kyoga WMZ Team and their involvement in developing and managing water and related activities in the catchment is shown in *Figure 4-19*. More detail on these stakeholders is provided below.



*Figure 4-21: Stakeholder groups interacting with Kyoga WMZ*

#### 4.6.2 Community groups

Water user groups, youth, women, and farmers were also identified as key stakeholders. These were included in the first instance to ensure that the voices and interests of weak and vulnerable stakeholders are heard and can influence the decision-making process. Secondly, public participation creates increased accountability for the policy makers. Both of these outcomes enhance environmental governance. Furthermore, public participation strengthens democratic institutions by reducing the ability of vested interests to misrepresent their interests as those of the public at large.

Key stakeholders to include in developing and managing water and related activities in the catchment were identified, *Table 4-21: Key stakeholder groups identified in process of development of CMP*. These stakeholders were invited to the stakeholder forum meetings.

**Table 4-23: Key stakeholder groups identified in process of development of CMP**

<b>Government Institutions</b>	<b>Public and private sector Organisations</b>	<b>NGOs and Civil Society Organisations</b>	<b>Public</b>
Governmental organisations with a direct interest in IWRM outcomes and/or that are able to provide support	Public and private sector organisations	Organised groups involved in specific locations or issues in the catchment including NGOs and community service organisations	Individuals in the catchment or region representing user groups with interest in water management
<ul style="list-style-type: none"> <li>• District officials in the 14 districts</li> <li>• Ministry of Water &amp; Environment (MWE)</li> <li>• Department of Rural water supply in MWE</li> <li>• Ministry of Agriculture, Animal Industry and fisheries (MAAIF) – Directorate of Irrigation</li> <li>• Directorate of Fisheries</li> <li>• Wetlands Management Directorate in MWE</li> <li>• Directorate of Water Development (DWD)</li> <li>• Directorate of Water Resource Management (DWRM)</li> <li>• Ministry of Energy &amp; Mineral Development (MEMD)</li> </ul>	<ul style="list-style-type: none"> <li>• IUCN</li> <li>• Veritas</li> <li>• Radio Kapchorwa</li> <li>• Voice of Teso</li> <li>• Teso Broadcasting Services (TBS Radio)</li> </ul>	<ul style="list-style-type: none"> <li>• UWASNET</li> <li>• Soroti Catholic Diocese Integrated Development Organisation (SOCADIDO)</li> <li>• Uganda Muslim Rural Development Association (UMURDA)</li> <li>• WaterAid</li> <li>• HorizonT3000</li> <li>• German Technical Cooperation (GIZ)</li> <li>• SNV</li> <li>• Christian Action to End Poverty (CATEP)</li> <li>• Temele Development Organization (TEMEDO)</li> <li>• ACTED</li> <li>• Drop in the bucket</li> </ul>	<ul style="list-style-type: none"> <li>• Fishermen</li> <li>• Farmer groups</li> <li>• Soroti Catholic Diocese Integrated Development Organisation (SOCADIDO)</li> <li>• Uganda Muslim Rural Development Association (UMURDA)</li> <li>• WaterAid</li> <li>• HorizonT3000</li> <li>• German Technical Cooperation (GIZ)</li> <li>• SNV</li> <li>• Christian Action to End Poverty (CATEP)</li> <li>• Temele Development Organization (TEMEDO)</li> <li>• ACTED</li> <li>• Drop in the bucket</li> </ul>

#### **4.6.3 Stakeholder Issues' mapping**

From discussions with the stakeholders it was evident that measures are being taken to address water resources, catchment management and livelihoods issues – by Government Departments, Districts, NGOs, and other institutions. Various national and other large programmes provide support, but ground-level activities are being undertaken at the district level. The following are examples of these:

- Every District has an active borehole rehabilitation and development scheme
- Some valley dams and tanks are being de-silted
- Piped water schemes are being installed
- Tree planting/reforestation programmes were initiated
- There are some catchment rehabilitation projects (catchment or source protection) in place (riverbank erosion, tree planting and contouring). These are all elements of catchment source protection
- Rainwater harvesting projects are being initiated

- Every district reports its engagement in sensitisation and awareness raising
- Water quality monitoring was addressed (although at very low level)
- The Department of Agriculture is engaged through the NAADS Programme in seeking to improve agricultural production through improvements to crops, stock and farming methods.

An overview of the challenges and issues culminating from the spectrum of stakeholders with the causes and consequences is detailed in *Table 4-22: Issues arising from stakeholder interaction*. These issues are later analysed and options identified which translate into interventions within the catchment management plan.

*Table 4-24: Issues arising from stakeholder interaction*

Issue	Causes	Consequences
Soil erosion	<ul style="list-style-type: none"> <li>▪ Agricultural practices</li> <li>▪ Land degradation</li> <li>▪ Riverbank degradation</li> <li>▪ Deforestation</li> <li>▪ Overgrazing</li> </ul>	<ul style="list-style-type: none"> <li>▪ Siltation</li> <li>▪ Water quality</li> <li>▪ Flooding</li> <li>▪ Wetland degradation</li> <li>▪ Landslides</li> </ul>
Population growth	<ul style="list-style-type: none"> <li>▪ Inadequate Family Planning Facilities</li> <li>▪ Improvement in Public Health – Lower Mortality Rate</li> </ul>	<ul style="list-style-type: none"> <li>▪ Pressure on available land (livelihoods, encroachment, pollution)</li> <li>▪ Increase in needs for food, water, health care, housing, technology and education</li> </ul>
Rural / domestic water supply	<ul style="list-style-type: none"> <li>▪ Lack of infrastructure</li> <li>▪ Lack of maintenance</li> </ul>	<ul style="list-style-type: none"> <li>▪ Livelihoods</li> <li>▪ Health</li> </ul>
Water quality	<ul style="list-style-type: none"> <li>▪ Soil erosion</li> <li>▪ Poor sanitation</li> <li>▪ Pollution</li> </ul>	<ul style="list-style-type: none"> <li>▪ Siltation</li> <li>▪ Water supply</li> <li>▪ Health</li> <li>▪ Declining fish stocks</li> </ul>
Flooding	<ul style="list-style-type: none"> <li>▪ Natural rainfall cycles</li> <li>▪ Upstream land degradation</li> <li>▪ Siltation</li> <li>▪ Deforestation</li> </ul>	<ul style="list-style-type: none"> <li>▪ Displacement</li> <li>▪ Crop damage</li> <li>▪ Limited food security</li> </ul>
Drought	<ul style="list-style-type: none"> <li>▪ Natural seasonal rainfall cycles</li> <li>▪ Lack of preparedness</li> </ul>	<ul style="list-style-type: none"> <li>▪ Livelihoods</li> <li>▪ Limited food security</li> </ul>
Climate change	<ul style="list-style-type: none"> <li>▪ Global warming</li> </ul>	<ul style="list-style-type: none"> <li>▪ Need for adaptation</li> </ul>
Access to markets/ remoteness	<ul style="list-style-type: none"> <li>▪ Transport infrastructure</li> <li>▪ Communications</li> <li>▪ Lack of electricity</li> </ul>	<ul style="list-style-type: none"> <li>▪ No markets</li> <li>▪ Poverty</li> </ul>
Lack of awareness	<ul style="list-style-type: none"> <li>▪ Education and information</li> </ul>	<ul style="list-style-type: none"> <li>▪ Poor practice</li> </ul>
Development needs	<ul style="list-style-type: none"> <li>▪ Economic viability of population</li> </ul>	<ul style="list-style-type: none"> <li>▪ Improved livelihood</li> <li>▪ Poverty alleviation</li> </ul>
Institutional weakness	<ul style="list-style-type: none"> <li>▪ Capacity of institutions</li> <li>▪ Limited knowledge base</li> </ul>	<ul style="list-style-type: none"> <li>▪ Impact on development/service delivery</li> </ul>
Law enforcement	<ul style="list-style-type: none"> <li>▪ Capacity</li> <li>▪ Political will</li> </ul>	<ul style="list-style-type: none"> <li>▪ Degradation of natural resources</li> <li>▪ Community instability</li> </ul>

Issue	Causes	Consequences
Water resource information	<ul style="list-style-type: none"> <li>▪ Weak hydro-meteorological data network</li> <li>▪ No monitoring</li> </ul>	<ul style="list-style-type: none"> <li>▪ Poor data / information</li> <li>▪ Inaccurate yield estimation</li> </ul>
Sustainability	<ul style="list-style-type: none"> <li>▪ Lack of knowledge/information</li> <li>▪ Rural inequalities</li> <li>▪ Resource imbalances</li> <li>▪ Unsustainable technologies</li> </ul>	<ul style="list-style-type: none"> <li>▪ Impact on quality of life</li> </ul>

A SWOT analysis *Table 4-23: SWOT analysis table of the situation in Awoja Catchment* was compiled on the basis of the situation as understood for the Awoja Catchment. This analysis was informed by the input through participation by stakeholders, the water resources assessment report as well as the social and environmental assessment.

*Table 4-25: SWOT analysis table of the situation in Awoja Catchment*

<p><b>STRENGTHS</b></p> <ul style="list-style-type: none"> <li>▪ <b>Good rainfall</b></li> <li>▪ <b>Available water</b></li> <li>▪ <b>Suitable land for development</b></li> <li>▪ <b>Wetlands</b></li> <li>▪ <b>Extensive natural areas</b></li> <li>▪ <b>Rainfed cropping is possible</b></li> </ul>	<p><b>WEAKNESSES</b></p> <ul style="list-style-type: none"> <li>▪ <b>Highly erosive soils</b></li> <li>▪ <b>Transport infrastructure</b></li> <li>▪ <b>Lack of electricity</b></li> <li>▪ <b>Very little development</b></li> <li>▪ <b>No significant towns</b></li> <li>▪ <b>Distance to markets</b></li> <li>▪ <b>No significant dams</b></li> <li>▪ <b>Limited culture of payment for services</b></li> </ul>
<p><b>OPPORTUNITIES</b></p> <ul style="list-style-type: none"> <li>▪ Hydropower (SHPs)</li> <li>▪ Improved rainfed agriculture</li> <li>▪ Irrigated agriculture</li> <li>▪ Ecotourism</li> </ul>	<p><b>THREATS</b></p> <ul style="list-style-type: none"> <li>▪ Population growth outstrips water provision</li> <li>▪ Stock numbers exceeding carrying capacity of land</li> <li>▪ Land degradation – soil erosion, deforestation, overgrazing</li> <li>▪ Variable climate – droughts and floods</li> <li>▪ Climate change</li> <li>▪ Riverbank erosion</li> <li>▪ Wetland encroachment</li> <li>▪ Siltation of wetlands</li> </ul>

The following development and management options were distilled from the input gained by the stakeholders to be further investigated and screened in the Options phase of the planning process.

Table 4-26: Development and Management options identified by stakeholders

DEVELOPMENT

DEVELOPMENT OPTIONS	TO INCLUDE	PURPOSE
Infrastructure refurbishment	<ul style="list-style-type: none"> <li>▪ Rehabilitation of valley dams, valley tanks, boreholes, pumps, pipelines and canals</li> </ul>	To secure original investment and to optimise efficiency and use
Construction of valley dams and tanks	<ul style="list-style-type: none"> <li>▪ Valley dams, valley tanks, stock watering dams, reservoirs</li> </ul>	Multipurpose
Piped water schemes	<ul style="list-style-type: none"> <li>▪ Diversions, pumps</li> </ul>	Water to villages
Groundwater development	<ul style="list-style-type: none"> <li>▪ Boreholes and pumps</li> <li>▪ Shallow wells</li> <li>▪ Spring protection</li> <li>▪ Artificial recharge</li> </ul>	Domestic water Emergency stock-watering
Rainwater harvesting	<ul style="list-style-type: none"> <li>▪ Household water tanks (concrete or plastic)</li> <li>▪ Also on public buildings</li> </ul>	Household water security
Sand Dams		Erosion control and water supply
Irrigation	<ul style="list-style-type: none"> <li>▪ Scheme irrigation (valley dams, abstraction from lakes and rivers)</li> <li>▪ Homestead irrigation</li> </ul>	Food security (seasonal droughts)
Small Hydro Power		Power supply
Aquaculture	<ul style="list-style-type: none"> <li>▪ Pond revitalization</li> <li>▪ Small farm aquaculture</li> </ul>	Food security
Buffer zone set-asides	<ul style="list-style-type: none"> <li>▪ Riparian protection zones</li> <li>▪ Roadside protection zones</li> </ul>	Source protection
Legislation and enforcement	<ul style="list-style-type: none"> <li>▪ Water use (abstraction)</li> <li>▪ Wetlands protection</li> <li>▪ Waste discharge</li> <li>▪ Fisheries – BMUs</li> <li>▪ Buffer zone set asides</li> <li>▪ Sand mining</li> <li>▪ Environmental flows</li> </ul>	Source protection and utilisation
Sustainable land management programme	<ul style="list-style-type: none"> <li>▪ Catchment rehabilitation</li> <li>▪ Wetland utilisation</li> <li>▪ Riverbank stabilisation</li> <li>▪ Guidelines for sustainable land management</li> <li>▪ Reforestation and grazing management (stand-alone options)</li> </ul>	Source protection Soil and water conservation
Reforestation programme	<ul style="list-style-type: none"> <li>▪ Protection of sensitive areas</li> <li>▪ Agro-forestry</li> <li>▪ Reforestation programmes</li> <li>▪ Woodlots</li> </ul>	Source protection Energy source
Sanitation systems	<ul style="list-style-type: none"> <li>▪ Awareness/ sanitation culture</li> <li>▪ Eco and composting toilets</li> <li>▪ Storm water retention</li> <li>▪ Waste discharge management</li> </ul>	Water quality and health

DEVELOPMENT OPTIONS	TO INCLUDE	PURPOSE
Energy supply (in addition to SHPs)	<ul style="list-style-type: none"> <li>▪ Alternative energy sources</li> <li>▪ Energy efficiency (e.g. stoves)</li> </ul>	
Water use efficiency	<ul style="list-style-type: none"> <li>▪ Repairs to infrastructure</li> <li>▪ Irrigation systems</li> <li>▪ Controls over water use</li> </ul>	This is a baseline activity.
Awareness raising	<ul style="list-style-type: none"> <li>▪ Sensitisation programmes</li> </ul>	Sanitation Sustainable land management Deforestation Wetlands Over-grazing etc
Flood management and preparedness	<ul style="list-style-type: none"> <li>▪ Early warning systems</li> <li>▪ Flood preparedness plans</li> <li>▪ Disaster management planning</li> </ul>	Flood protection
Cattle keeping practices	<ul style="list-style-type: none"> <li>▪ Determine carrying capacity</li> <li>▪ Design grazing programmes</li> <li>▪ Animal improvement</li> <li>▪ Stock watering</li> </ul>	Source protection including wetlands
Extension services (information and training)	<ul style="list-style-type: none"> <li>▪ Water use efficiency</li> <li>▪ Sustainable land management and reforestation</li> <li>▪ Agronomic practice</li> <li>▪ Crop improvement</li> <li>▪ Rangeland utilisation</li> </ul>	
Monitoring	<ul style="list-style-type: none"> <li>▪ Climate and streamflow</li> <li>▪ Water quality</li> </ul>	Knowledge base
Institutional capacity building	<ul style="list-style-type: none"> <li>▪ Staff, logistics, equipment</li> <li>▪ Training/guidelines/handbooks</li> </ul>	

# 5. VISION, OBJECTIVES AND ANALYSIS OF OPTIONS

## 5.1 Principles Guiding Development

Development based on growth is a workable paradigm where there is room for growth. It has become apparent that unchecked growth becomes unsustainable and limits to growth need to be identified in this new paradigm. This applies both globally and to the Awoja Catchment. Resolving immediate demands does not resolve the future. Rather than encouraging yet further expansion in the demand for resources, development should aim at stability and harmony in utilisation of all that the environment has to offer..

- Stability brings Sustainability. Projects reliant on continuous growth are by definition not sustainable.
- Resources are finite and this limits the number of people that can live off natural resources.
- Limits to growth are set by carrying capacity and sustainable utilisation.
- Infrastructure is not sustainable without long-term maintenance.
- Infrastructure that is not maintained brings problems, worry, and risk - and little benefit. Kokuwam Valley Dam on the Namalu River in Nakapiripirit is an example.
- The root causes of soil erosion must be addressed.
- Food security can be enhanced by innovation and technology.
- Legislation is of little value without enforcement.
- A long-term perspective is required.

## 5.2 Catchment Issues

During the stakeholder workshop in Soroti on the 18th July 2013, the stakeholders listed and prioritised the most important issues regarding the water resources in their districts. The results are shown in *Table 5-1*. Other issues, which were not prioritised, but stated by the stakeholders are added in the table.

*Table 5-1: Issues prioritised by stakeholders (Soroti Workshop, 18 July 2013)*

Priority	Bukwo, Kween, Kapchorwa	Sironko, Bulambuli	Bukedea, Kumi, Ngora, and Katakwi	Napak, Amudat, Nakapiripirit
1	Deforestation	Deforestation	Flooding	Food insecurity
2	Soil erosion	Soil erosion and siltation	High population growth rate	Lack of awareness / Attitude change
3	Floods	Droughts, floods and landslides	Limited tree coverage/ Deforestation	Encroachment a. Deforestation b. Land reclamation c. Charcoal burning, commercialisation d. Bush burning
4	Shortage of energy	Riverbank degradation	Wetlands degradation	Inadequate water resource information



Priority	Bukwo, Kween, Kapchorwa	Sironko, Bulambuli	Bukedea, Kumi, Ngora, and Katakwi	Napak, Amudat, Nakapiripirit
5	Lack of awareness on environmental management	Regulation and enforcement	Poor agronomic practices	Insecurity
6	Overgrazing	Limited awareness		Floods / Droughts
<b>Additional issues listed but not prioritised by stakeholders</b>				
	<ul style="list-style-type: none"> <li>a. Siltation</li> <li>b. Drought</li> <li>c. Population</li> <li>d. Water Pollution</li> <li>e. Poverty</li> <li>f. Landlessness</li> <li>g. Weak institutional regulation and enforcement</li> <li>h. Low safe water coverage and poor sanitation</li> </ul>	<ul style="list-style-type: none"> <li>a. Institutional capacity</li> </ul>	<ul style="list-style-type: none"> <li>a. Soil erosion</li> <li>b. Overgrazing</li> <li>c. Domestic water supply</li> <li>d. Water for production</li> <li>e. Traditional cultural growth of short term crops</li> <li>f. Customary land tenure</li> </ul>	<ul style="list-style-type: none"> <li>a. Lack of alternative energy sources</li> </ul>

In order to sort and classify the issues and provide an additional perspective, they are put into categories or themes *Table 5-2*. Additionally, they are linked to their respective strategic implications and first possible measures to mitigate issues that are identified including suggestions from the stakeholders. Thus, this prepares/provides the path to develop options to address the issues.

**Table 5-2: Issues, strategic implications, and possible measures**

**Climate related issues**

Issues	Strategic Implications	Possible measures
Drought hazard	<ul style="list-style-type: none"> <li>▪ Starvation – especially in the cattle corridor.</li> <li>▪ Food security</li> </ul>	<ul style="list-style-type: none"> <li>▪ Irrigation schemes and irrigation technologies (especially pump technology)</li> <li>▪ Small-scale irrigation</li> <li>▪ Stock watering dams, especially their density</li> <li>▪ Improvement of monitoring networks</li> </ul>
Flood hazard	<ul style="list-style-type: none"> <li>▪ Flood damage, loss of crops, property, lives</li> </ul>	<ul style="list-style-type: none"> <li>▪ Review of the reasons for increased flooding</li> <li>▪ Flood warning systems</li> <li>▪ River protection works</li> <li>▪ Improvement of monitoring networks</li> </ul>
Landslides	<ul style="list-style-type: none"> <li>▪ Loss of life, land, crops, infrastructure</li> <li>▪ Erosion</li> </ul>	<ul style="list-style-type: none"> <li>▪ Land use planning. Comprehensive and integrated reforestation and rehabilitation, Implementation of Sustainable Land Management Programme</li> <li>▪ Establishment of siltation monitoring system for future planning</li> </ul>

### Catchment Management

Issues	Strategic Implications	Possible measures
Soil erosion	<ul style="list-style-type: none"> <li>▪ Siltation of lakes</li> <li>▪ Deterioration of water quality</li> <li>▪ Flooding</li> </ul>	<ul style="list-style-type: none"> <li>▪ Land use planning</li> <li>▪ Reforestation</li> <li>▪ Protection</li> <li>▪ Rehabilitation</li> <li>▪ Field management (contouring, buffer zones for river banks and roads)</li> <li>▪ River bank protection</li> <li>▪ Road drainage</li> <li>▪ Grazing strategies</li> </ul>
Deforestation	<ul style="list-style-type: none"> <li>▪ Global warming</li> <li>▪ Soil erosion</li> <li>▪ Fewer resources for future use</li> </ul>	<ul style="list-style-type: none"> <li>▪ Demarcation of rehabilitation zones</li> <li>▪ Reforestation</li> <li>▪ Projects to reduce demand (for charcoal, building, firewood – including energy efficient stoves and alternative sources of energy)</li> </ul>
Riverbank erosion	<ul style="list-style-type: none"> <li>▪ Flooding</li> <li>▪ Soil loss</li> </ul>	<ul style="list-style-type: none"> <li>▪ Buffer zone policy</li> </ul>
Grazing	<ul style="list-style-type: none"> <li>▪ Loss of vegetation cover</li> </ul>	
Maintenance of infrastructure	<ul style="list-style-type: none"> <li>▪ Infrastructure lifespan is shortened</li> </ul>	<ul style="list-style-type: none"> <li>▪ Management</li> <li>▪ Capacity building</li> </ul>

### Wetlands (Environmental Services)

Issues	Strategic Implications	Possible measures
<ul style="list-style-type: none"> <li>▪ Siltation</li> <li>▪ Degradation</li> <li>▪ Flooding</li> <li>▪ Encroachment and exploitation</li> <li>▪ Rice growing in seasonal wetlands and consequent vulnerability to flooding</li> </ul>	<ul style="list-style-type: none"> <li>▪ Wetlands lose their ecological functionality - Loss of ability to filter water to lakes</li> <li>▪ Displacement of people and loss of crops</li> </ul>	<ul style="list-style-type: none"> <li>▪ Framework Management Plan for Awoja Wetland System</li> <li>▪ Support to Wetlands Rehabilitation and Management Programme.</li> <li>▪ Monitoring of wetlands conditions and functionality and impacts of upstream management</li> <li>▪ Conversion of paddy rice to upland rice varieties.</li> <li>▪ Implementation of controls for over grazing and encroachment (by-laws)</li> </ul>

### Providing Water to People

Issues	Strategic Implications	Possible measures
<ul style="list-style-type: none"> <li>▪ 90% of the population does not have ready access to clean, potable water</li> <li>▪ Very few people have water to put to productive use</li> <li>▪ Poor quality water due to upstream soil erosion and upstream and local pollution (especially faecal pollution)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Health, water for productive use (subsistence and economy)</li> <li>▪ Vulnerability to drought – food security</li> <li>▪ Water needs treatment – but there are few treatment facilities. Silt fills dams and clogs wetlands. Pumps breakdown due to silt.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Dams (large, small, multipurpose, valley dams and tanks)</li> <li>▪ Piped water supply</li> <li>▪ Boreholes</li> <li>▪ Rainwater harvesting</li> <li>▪ Shallow wells and springs</li> <li>▪ Water quality monitoring.</li> <li>▪ Implementation of comprehensive land management programmes</li> <li>▪ Guidelines and plans for rainwater harvesting (roof water tanks and larger underground tanks)</li> </ul>

### **Agriculture - Irrigated and Rainfed**

<b>Issues</b>	<b>Strategic Implications</b>	<b>Possible measures</b>
<ul style="list-style-type: none"> <li>▪ Irrigation schemes not maintained</li> <li>▪ No storage dams</li> <li>▪ Difficulty in accessing water</li> <li>▪ Distance and access to markets</li> <li>▪ Valley dams non-functional</li> <li>▪ Limited use of groundwater</li> </ul>	<ul style="list-style-type: none"> <li>▪ Opportunity cost and wasted investment</li> <li>▪ Dry season shortages</li> <li>▪ Water may be available but cannot be used</li> <li>▪ Even if water is available – can the product be sold?</li> </ul>	<ul style="list-style-type: none"> <li>▪ Maintenance, planning and funding</li> <li>▪ Matching of dams to need</li> <li>▪ Introduction of technologies that can be used by small farmers (e.g. treadle pumps)</li> <li>▪ Refurbishment of roads</li> <li>▪ Sustainability plans</li> </ul>
<ul style="list-style-type: none"> <li>▪ Dependence on rainfed agriculture</li> <li>▪ No rainfed cash crops such as cotton or tobacco have been introduced or promoted</li> <li>▪ Rice, an important cash crop, is planted in the wetlands</li> </ul>	<ul style="list-style-type: none"> <li>▪ Requires systems focused on rainfed crops</li> <li>▪ Little opportunity for large scale commercial development unless rainfall reliably supports high value crops</li> <li>▪ Wetland degradation due to rice planting</li> </ul>	<ul style="list-style-type: none"> <li>▪ Crop selection, seed selection</li> <li>▪ Management of the land to optimise rainfall and soil moisture</li> <li>▪ Shift to upland rice cultivars</li> <li>▪ Subsidies - including seeds and fertiliser</li> <li>▪ Assurance of agricultural extension workers</li> </ul>

### **Cattle Keeping**

<b>Issues</b>	<b>Strategic Implications</b>	<b>Possible measures</b>
Overgrazing	<ul style="list-style-type: none"> <li>▪ Loss of vegetation cover, resulting in soil loss</li> <li>▪ Damage to wetlands</li> <li>▪ Poor quality livestock</li> </ul>	<ul style="list-style-type: none"> <li>▪ Stock enumeration</li> <li>▪ Determination of carrying capacities of different land types</li> <li>▪ Revision of grazing strategies</li> </ul>
Conflict with conservation	<ul style="list-style-type: none"> <li>▪ Less land for people and animals</li> </ul>	<ul style="list-style-type: none"> <li>▪ Revision of conservation policies</li> <li>▪ Negotiations regarding encroachments</li> </ul>
Cattle corridor – nomadic nature of cattle keepers	<ul style="list-style-type: none"> <li>▪ Difficult to provide services. Need to accommodate these differences.</li> </ul>	

### **Aquaculture**

<b>Issues</b>	<b>Strategic Implications</b>	<b>Possible measures</b>
Decline of fish stocks	<ul style="list-style-type: none"> <li>▪ Loss of income</li> <li>▪ Food security.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Resource management</li> </ul>
Marketing	<ul style="list-style-type: none"> <li>▪ Economic value of the resource.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Improvements to infrastructure (transport and access to information)</li> </ul>

### **Hydro-Electric Power**

<b>Issues</b>	<b>Strategic Implications</b>	<b>Possible measures</b>
Shortage of energy (supply and distribution)	<ul style="list-style-type: none"> <li>▪ Fatal flaw for development: Inability to run irrigation pumps, cold chains.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Hydropower installations; Multipurpose dams that provide power.</li> <li>▪ Investigation into alternative pumping technologies (small-scale irrigation)</li> <li>▪ Promote alternative energy (solar).</li> <li>▪ Energy efficient technologies.</li> </ul>

### **Institutional**

<b>Issues</b>	<b>Strategic Implications</b>	<b>Possible measures</b>
Lack of capacity	<ul style="list-style-type: none"> <li>▪ Limited ability to implement programmes</li> </ul>	<ul style="list-style-type: none"> <li>▪ Capacity building at all levels of planning and action</li> <li>▪ Training and capacity building in NGOs</li> </ul>
Lack of knowledge and understanding of impacts of day-to-day livelihoods on the landscape	<ul style="list-style-type: none"> <li>▪ Environmental degradation as a consequence of human behaviour that could be mitigated.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Awareness raising</li> </ul>
Failure to maintain infrastructure	<ul style="list-style-type: none"> <li>▪ Wasted investment</li> <li>▪ Failed projects</li> </ul>	<ul style="list-style-type: none"> <li>▪ Maintenance planning and budget provision must accompany all development plans</li> <li>▪ Entrenchment of principles of maintenance and assurance that this requirement becomes policy and thence practice</li> </ul>

### **Management**

<b>Issues</b>	<b>Strategic Implications</b>	<b>Possible measures</b>
Enforcement of legislation	<ul style="list-style-type: none"> <li>▪ Without enforcement legislation becomes meaningless.</li> <li>▪ Many important issues have already been addressed in legislation</li> </ul>	<ul style="list-style-type: none"> <li>▪ Include legislation in awareness raising and create a culture of adherence to legislation.</li> <li>▪ Government support for enforcement</li> <li>▪ Law enforcement</li> </ul>
Lack of infrastructure and maintenance	<ul style="list-style-type: none"> <li>▪ Loss of functionality</li> <li>▪ Opportunity cost</li> <li>▪ Wasted investment</li> <li>▪ Project failures</li> </ul>	<ul style="list-style-type: none"> <li>▪ Participatory engagement in the development of programmes</li> <li>▪ Funding must include a maintenance plan</li> <li>▪ Awareness raising</li> <li>▪ Capacity building in respective maintenance</li> </ul>
Lack of capacity	<ul style="list-style-type: none"> <li>▪ Failure to implement plans</li> </ul>	<ul style="list-style-type: none"> <li>▪ Training</li> <li>▪ Development of guidelines</li> </ul>
Lack of finance	<ul style="list-style-type: none"> <li>▪ Inability to implement plans</li> </ul>	<ul style="list-style-type: none"> <li>▪ Fund-raising</li> <li>▪ Proposal writing</li> <li>▪ Practical, reasonably and visibly sustainable plans</li> </ul>
Poor monitoring	<ul style="list-style-type: none"> <li>▪ Without monitoring there can be no management</li> </ul>	<ul style="list-style-type: none"> <li>▪ Develop M&amp;E Programme</li> <li>▪ Prioritise monitoring activities</li> <li>▪ Training</li> </ul>

#### **5.2.1 Analysis of Issues**

These issues and first possible measures can be embedded into a wider context clarifying the broader situation in the Awoja Catchment. An analysis of the strengths, weaknesses, opportunities and threats (SWOT) of the Awoja Catchment *Table 5-3* gives a comprehensive picture. The threats are at the same time driving factors for the state of the water resources and the situation in which the population has to earn its livelihoods.

Table 5-3: Catchment SWOT Analysis

<p><b><u>STRENGTHS</u></b></p> <ul style="list-style-type: none"> <li>▪ Available water (surface water and groundwater)</li> <li>▪ Favourable climate</li> <li>▪ Suitable land</li> <li>▪ Willing farmers</li> <li>▪ Extensive wetlands</li> <li>▪ Extensive natural areas</li> <li>▪ Rainfed cropping is possible</li> <li>▪ Good environmental legislation</li> </ul>	<p><b><u>WEAKNESSES</u></b></p> <ul style="list-style-type: none"> <li>▪ High levels of poverty</li> <li>▪ Erosive soils</li> <li>▪ Poor transport infrastructure</li> <li>▪ Lack of electricity</li> <li>▪ Very little development/weak infrastructure</li> <li>▪ No significant towns</li> <li>▪ Distance to markets</li> <li>▪ No significant dams/no obvious dam sites</li> <li>▪ Lack of maintenance of infrastructure</li> <li>▪ Non-payment for services</li> <li>▪ Poor enforcement</li> <li>▪ Very limited monitoring; no data for planning</li> </ul>
<p><b><u>OPPORTUNITIES</u></b></p> <ul style="list-style-type: none"> <li>▪ Hydropower potential (SHPs)</li> <li>▪ Surface and groundwater development</li> <li>▪ Irrigation potential</li> <li>▪ Ecotourism</li> <li>▪ Catchment regeneration</li> <li>▪ Reforestation</li> <li>▪ Utilisation of lakes</li> <li>▪ Aquaculture</li> </ul>	<p><b><u>THREATS</u></b></p> <ul style="list-style-type: none"> <li>▪ Population growth outstrips water provision and food production</li> <li>▪ Variable climate – droughts and floods</li> <li>▪ Climate change</li> <li>▪ Land degradation – soil erosion, deforestation, overgrazing</li> <li>▪ Riverbank erosion</li> <li>▪ Wetland encroachment</li> <li>▪ Siltation of wetlands and rivers</li> <li>▪ Degradation of the water quality</li> </ul>

## 5.3 Vision and strategic objectives

### 5.3.1 Vision

To develop a common direction and understanding for a sustainable, integrated management and development of Awoja for the socio-economic benefit of its people and its environment in light of the current situation, a vision for the catchment and strategic objectives in support of the vision were developed by working groups of the participants at the stakeholder workshop in Soroti on 18th July 2013. The process took into account the issues, strategic implications and catchment driving factors.

The vision for the Kyoga WMZ had earlier been formulated (NELSAP, 2012) and is included here to ensure synchronisation with the catchment vision. The WMZ vision is:

#### ***Vision for the Kyoga WMZ***

***To ensure that by 2035, water resources development and management investments in the Lake Kyoga basin are integrated and optimised across a wide range of economic sectors leading to poverty reduction and improved livelihoods.***

The proposed visions from the Awoja stakeholder workshop groups were:

1. A healthy, wealthy community in a secure and sustainable environment by 2040
2. A catchment with adequate water and environmental resources for socio-economic needs of present and future generations
3. A productive, healthy and sustainably utilised Awoja Catchment Area; and
4. A dignified community living in a sustainable ecosystem.

Bringing the key elements of all of the above visions together encapsulated the following catchment vision:

***Awoja Catchment Vision***  
***Sustainably manage and utilise the water resources and related sources of the Awoja catchment by 2040.***

### **5.3.2 Strategic Objectives**

To achieve the above vision the objectives put forward by the Awoja Catchment representatives at the stakeholder workshop of 18th July 2013 in Soroti were as follows:

*To meet community needs for water and food security:*

1. To provide safe and clean water
2. To improve on productivity and production for food security
3. To promote water harvesting technologies.

*And to ensure the sustainable capacity of the Awoja Catchment to provide for these needs by:*

4. Promoting sustainable use of Awoja's wetlands
5. Promoting soil and water conservation practices
6. Promoting mitigation measures for drought and floods
7. Increasing forest cover in the catchment.

*And to engage with both government and community in implementing the following strategies:*

8. Building the capacity of stakeholders in integrated water resource management
9. Promoting manageable family sizes
10. Promoting community awareness on environmental management
11. Providing alternative sources of energy so as to protect the environment
12. Enforcing existing policy regulations
13. Revitalising institutional capacities
14. Peace building and conflict resolution among communities.

*With approaches to include:*

- Creating opportunities for alternatives; lobbying and advocacy
- Introducing modern agricultural technologies and techniques in the catchment.

The management and development of water resources must be of benefit to the improvement of the socio-economic development of the catchment in a sustainable manner now and in the future. Although energy was not highlighted specifically by stakeholders, the consequences such as deforestation necessitated the inclusion of energy needs in the strategic objectives. This improvement of benefits and service delivery through IWRM provides broad strategic catchment objectives.

The strategic catchment objectives proposed by stakeholders were synthesised, encapsulating the key elements, and refined to generate four strategic objectives for the Awoja Catchment, *Table 5-4*.

*Table 5-4: Strategic objectives of the Awoja Catchment*

<b>1. Catchment Protection and Conservation:</b>
To protect and restore the catchment for sustainable delivery of goods and services
<b>2. Development for Socio-Economic Growth:</b>
To develop water resources for socio-economic growth through meeting community needs for water, energy, and food security
<b>3. Mitigation and Adaptation:</b>
To mitigate and adapt to the impacts of droughts, floods, and landslides
<b>4. Social and Institutional Development:</b>
To optimise catchment resources through capacity building, awareness, policy enforcement and institutional coordination

Both the vision and the objectives for the Awoja Catchment were discussed and validated in the stakeholder workshop on 14th- 15th May 2014.

### 5.4 Identification of potential options

Options are possible measures/interventions used to address (a) given issue(s) or problem(s) in a catchment, and they can be management and development in nature.

It is fundamental to the catchment planning process that options derived from the catchment issues for the sustainable development of the catchment are in line with its vision and objectives.

A range of potential options to consider in the catchment plan was collated from stakeholder interviews, workshops, Awoja CMP supporting assessments, literature as well as the Terms of Reference for the development of the Awoja CMP. This long-list of options included a number of specific development options put forward by stakeholders. Stakeholder preferences noted during the stakeholder engagement undertaken in the selection of districts and sub-counties within the catchment were also added to the long list.

Many actions are already being undertaken to address water resource, catchment management and livelihood issues – by Government departments, districts, NGOs, and other institutions. Others are planned by various institutions and/or organisations. Thus, the Framework Management Plan for the Awoja Wetlands System as well as the National Faecal Sludge Assessment for Small Towns in Uganda by the World Bank have been considered. Some activities were added to the long list of options.

Following careful evaluation of the potential options in the ‘long list’ in light of the catchment vision and objectives as well as practical considerations, the long-list of options was condensed into a more manageable list for screening and evaluation, the so-called ‘short-list’ taking into account needs, practicality and viability. These potential options were arranged according to the strategic objectives of the Awoja catchment, *Table 5-5*.

**Table 5-5: Management and Investment Options**

No	1. Catchment Protection and Conservation
1.1	Sustainable land and environmental management
1.2	Reforestation
1.3	Lakes and Wetlands management
1.4	Buffer zone set-asides

No	2. Development for Socio-Economic Growth
2.1	Sanitation systems
2.2	Refurbishment of infrastructure
2.3	Piped water schemes (Surface water)
2.4	Groundwater development
2.5	Rainwater harvesting (Roof water tanks and roof catchments)
2.6	Sand dams
2.7	Dams
	a. Small stock watering dams
	b. Valley dams and tanks
	c. Large dams
2.8	Enhancement of irrigation
2.9	Water use efficiency
2.10	Small hydropower
2.11	Alternative energy supply
2.12	Aquaculture
2.13	Socio-economic strengthening

No	3. Floods, Droughts and Landslides Mitigation and Adaptation
3.1	Flood management and preparedness for floods
3.2	Construction of infrastructure for flood control
3.3	Cattle keeping practices
3.4	Climate Smart Fisheries and Aquaculture development
3.5	Greenhouse Gas Monitoring

No	4. Social and Institutional Development
4.1	Monitoring
4.2	Extension services (information and training)
4.3	Awareness raising
4.4	Institutional capacity building
4.5	Legislation and enforcement
4.6	Governance and framework management plans
4.7	Risk management

Since the options are very broad and general, sub-options (implementation actions) were identified which are specific, suitable and tailored to the different areas in Awoja and contribute to achieve the objectives. They are described in *Table 5-6: Catchment Protection and Conservation Options* to *Table 5-9: Social and Institutional Development Options* grouped according to the catchment objectives and options as shown in *Table 5-5: Management and Investment Options*. For each sub-option, the catchment functions are described, followed by the specific actions identified for each option.



**Table 5-6: Catchment Protection and Conservation Options**

<b>1.1 Sustainable Land and Environmental Management</b>	
Constructing the building blocks for a catchment-wide soil and water conservation programme. Building blocks include establishing an alliance of local, national, and international soil and water conservation organisations that can offer support. Catchment protection, soil and water conservation and sustainable land and environmental management are almost synonymous terms, with Sustainable Land and Environmental Management best embracing the approach of a landholder-driven movement towards responsible management aimed at both protecting the environment and improving productivity. From this common understanding the next task is to develop an appropriate set of principles for sustainable land and environmental management, guidelines and practices.	
Implementation of a comprehensive integrated catchment management project directed at both source protection and improved farm production over the planning period. Although principally landholder driven this will require significant state support in training, farm planning support, conservation works, tree planting and managing protection zones. The identified sub-options are:	
1.1.1	The preparation and dissemination of a comprehensive Sustainable Land Management manual providing the technological approaches tailored for the Awoja Catchment and Kyoga WMZ.
1.1.2	Design and pilot of individual farms according to sustainable land and environmental management principles. Layout to include contouring, drain and waterway layout and improvements, road design, runoff management, woodlot and agroforestry planning.
1.1.3	Identification and regular (annual) eradication of floating islands / invasive alien plants.
1.1.4	Development of a fire risk, fire control and fire protection plan with controlled burning where required for grazing and biodiversity management.
1.1.5	Riverbank protection and stabilisation - gabions, management of cattle access points, protection of riparian vegetation.
1.1.6	Rehabilitation of degraded landscapes through construction of check dams, demi-lunes, swales, brush packs and stone packs and fanya juu etc.
1.1.7	On-farm rainwater harvesting - channeling of overland flow and excess runoff into underground storage tanks for household water excluding drinking and irrigation.
1.1.8	Ecological water requirements: revisiting legislation and catchment assessment.
1.1.8.1	Introduction of improved farming practices.
1.1.9	Build the capacity on conservation methods, especially for wetlands.
1.1.10	Monitoring the impacts of sustainable land management in terms of improved farming practices (individual benefit) and downstream water management.
1.1.11	Develop and implement climate change awareness creation strategy addressing sustainable land and environment management
1.1.12	Promote climate change planning across and among sectors at catchment and sub-catchment levels.
1.1.13	Promote climate smart integrated landscape management approaches
1.1.14	Promote uptake of disaster risk reduction and climate change tools for joint planning and implementation of sustainable land and environment technologies and practices at all levels.
1.1.15	Build capacity of land and environment users by supporting them in land suitability mapping, land use and farm planning, soil health improvement and soil & water conservation activities in micro and macro watersheds.

<b>1.2 Reforestation</b>	
Establish a catchment team responsible for forest protection, re-establishment and management. Create awareness relating to the sustainable management and utilisation of remaining wood resources. Demarcate vulnerable areas for protection and suitable areas to promote woodlots and small plantations, including riparian and roadside buffer zones. Develop and implement forestry management plans for surviving resources.	
1.2.1	Provide routine training (forestry handbook) to CMCs, forest management, land care and agricultural managers.
1.2.2	Establish nurseries for provision of seedlings and establish distribution, training and management systems - pilot projects.
1.2.3	Support the implementation of a Reforestation Programme aimed at restoring lost woodland and at establishing woodlots to reduce the pressure on natural forest. Link to agroforestry and sustainable land and environmental management.
1.2.4	Plant trees in degraded areas.
1.2.5	Promote woodlots and suitable climate smart agroforestry systems.
1.2.6	Promote use of practices for managed regeneration of trees to increase tree cover in degraded catchment and sub-catchment areas.
1.2.7	Establish Community forest management groups
1.2.8	Promote forest law enforcement and governance
1.2.9	Strengthen forest institutions responsible for forest management and development.
<b>1.3 Lakes and Wetlands management</b>	
Promote the guidelines on optimal utilisation of wetlands compiled by the Wetlands Department and implement the Framework Management Plan for Awoja Wetland System. Assemble information on the socio-economic and ecological values of Awoja's wetlands and use this knowledge in promoting awareness and the protection of wetlands. Monitor compliance with wetlands policy and legislation. Wetlands need to be very precisely mapped and zoned for protection and management purposes. Wetland Management and Action Plans must be implemented, potentially including putting enabling or supplementary legislation in place.	
1.3.1	Regular updating of district wetland inventories by districts.
1.3.2	Updating of demarcated protection zones and acceptable utilisation of wetlands, producing GIS maps of wetlands at various levels.
1.3.3	Study for the economic valuation of wetland resources and disseminate the results.
1.3.4	Restoration of vital (unique) critical (subject to on-going degradation) wetlands.
1.3.5	Implement wetland management/action plans.
1.3.6	Enhance wetlands and lake systems through integrated watershed management
1.3.7	Promote payment for ecosystem services for enhanced ecosystem management and benefits.
<b>1.4 Buffer zone set-asides</b>	
Prepare policy for roadside buffer zones, adopt and implement it. Identify all important catchment rivers requiring riparian buffer zones and implement existing protection policy. Map roadside buffer zones and implement protection policy.	
1.4.1	Mapping and demarcation of riparian and roadside protection zones and identify and implement source protection measures. Zone widths should be flexible to accommodate different physical and social economic circumstances and require independent mapping. Roadside protection zones can be allocated a set width and do not require mapping.
1.4.2	Identify and protect fragile ecosystems including steep slopes, river banks, fish breeding areas and wetlands.

*Table 5-7: Catchment Protection and Conservation Options*

<b>2.1 Sanitation Systems</b>	
Build internal expertise in approaches to sanitation. Support local government in identifying the need for new sanitation or waste water treatment works. Monitor functionality of existing works. Assist local government with planning and implement improved sanitation facilities for public facilities and meeting places - e.g. new ferry landing places constructed on Lake Bisina and Lake Opeta and village trading areas.	

2.1.1 Improve sanitation technology, support building materials and implement activities.
2.1.2 Improve faecal sludge management (collection, transportation, treatment, and re-use) through clustering of small towns (Kumi, Sironko, Kapchorwa, Nakapiripirit)
2.1.3 Develop & implement green management plans for business model innovations.
2.1.4 Undertake carbon stock assessment
<b>2.2 Refurbishment of Infrastructure</b>
Situation assessment audit, preparation of an inventory and evaluation of need, cost and benefit of refurbishment. Prioritise infrastructure rehabilitation programmes and work with responsible authorities.
2.2.2 Refurbishment of valley dams and valley tanks.
2.2.3 Refurbishment of springs, boreholes, pumps, hand pumps and piped systems.
2.2.4 Rehabilitation of those irrigation schemes where economically and socially justifiable. Bunamono and Labori (Soroti) schemes identified.
<b>2.3 Piped water schemes (Surface water)</b>
Through situation assessments ensure that responsible authorities effect efficient operation and management of piped water supply schemes. Identify feasible and necessary water supply projects.
2.3.1 Design and construction of River Agu scheme to supply Kumi and surrounds - water and wastewater works.
2.3.2 Soroti treatment and distribution - expand in stages.
2.3.3 Identification, design and construction of further piped water schemes for growing towns and villages at regional growth centres, including supply to larger industries.
<b>2.4 Groundwater development</b>
Develop approaches, guidelines and standards for groundwater development for Awoja. Minimum standards are required for borehole casings, pumps and monitoring systems. Review situation with regard to existing groundwater infrastructure, functionality, groundwater quality and use. The WMZ will require a catchment groundwater database to include borehole data, water levels, quality and yields and Awoja data can be used to pilot and populate this.
2.4.1 Feasibility studies of availability and supply for prioritised towns and settlements.
2.4.2 Design and construction of groundwater schemes for towns / settlements.
2.4.3 Groundwater schemes / boreholes for domestic and livestock supply - evaluation, design and construction (focus on Districts 1, 2 and 14).
<b>2.5 Rainwater harvesting - (Roof water tanks and roof catchments)</b>
Introduce appropriate low-cost rainwater harvesting technologies to harvest and store water for multiple use during dry seasons. Local government and NGOs to be made aware of the importance and value of rainwater harvesting as water supply technology.
2.5.1 Provision of subsidised rainwater tanks to willing buyers. Implementation should be based on a cost-sharing mechanism.
<b>2.6 Sand dams</b>
Facilitate the introduction of sand dams in the drier districts of Awoja (e.g. Nakapiripirit, Amudat, and Napak). Undertake needs identification for location of sand dams and associated abstraction facilities. Prioritise projects together with implementing agencies.
2.6.1 Feasibility studies and design of prioritised sand dams. Construction with cooperation and input from local communities.
<b>2.7 Dams (Small stock watering dams, valley dams and tanks, large dams)</b>
Facilitate the identification, evaluation and construction of dams, either for stock watering or for domestic/ industrial water supply. This could range from small stock watering dams, valley dams, valley tanks or multi-purpose dams.
2.7.1 Needs identification for location and type of dams and associated abstraction facilities.
2.7.2 Feasibility and design of prioritised dams for stock watering and human needs. Construction with cooperation and input from local communities.

<b>2.8 Enhancement of irrigation</b>
MWE to assess the allocable volumes of water for each river system and manage with permit system.
The CMC / WMZ must promote best management practices amongst irrigators to prioritise catchment protection (Sustainable land and environmental management) to reduce erosion. Provide guidelines so that all irrigation farms, especially those on slopes, are designed to sustainable land and environmental management principles (maximising infiltration and minimising runoff) thus optimising the benefits of rainfall.
2.8.1 Provide farmers with appropriate technologies for the abstraction of water from rivers and shallow boreholes. This would include facilitating access to treadle pumps and small motorised pumps and the construction of small diversion weirs. Prioritise the drier areas of Kapchorwa and Kween on the leeward side of Mount Elgon, Karamoja, and Teso.
2.8.2 Enhancement of rainfed agriculture.
2.8.3 New irrigation schemes: undertake feasibility studies of identified areas.
2.8.4 Construction of new irrigation schemes: Improved (seasonal) Wetland Schemes.
2.8.5 Construction of new irrigation schemes: Low-power pumped schemes that utilise water from nearby rivers, swamps and lakes.
2.8.6 Construction of new irrigation schemes: Simple gravity-fed schemes
2.8.7 Construction of new irrigation schemes: Type A Formal Irrigation.
2.8.8 Construction of new irrigation schemes: Type B Formal Irrigation.
<b>2.9 Water use efficiency</b>
Provide water efficiency targets. Promoting changes in crops or cropping patterns. Review losses in transference of water (leaking pipes, canals, off-channel dams) and highlight the need for repairs by responsible authorities. Target irrigation schemes for efficiency of use. Include a water use efficiency requirement as a condition for new or renewed water allocations.
2.9.1 Water efficiency evaluation and recommendations (such as promoting changes in crops or cropping patterns, improving efficiency or water deficit management).
<b>2.10 Small hydropower</b>
Determine status and progress with feasibility studies of small-scale hydropower schemes and make all information available.
2.10.1 Investment and implementation in hydropower installations and grid distribution.
<b>2.11 Alternative energy supply and energy efficiency</b>
Promote the planting of woodlots for fuelwood (forestry and agroforestry).
2.11.1 Promote additional and alternative sources of energy including low cost solar panels to be used for LED lighting, radios, and cell phones.
2.11.2 Promote use of energy efficient woodstoves by making the technology readily available.
<b>2.12 Aquaculture</b>
Determine the extent of aquaculture practice – both past and present, and determine reasons for the decline in fish farming. Identify additional areas where aquaculture can profitably be implemented. Provide farmers/communities with guidelines on aquaculture through the extension process.
2.12.1 Develop a manual on aquaculture techniques (building on available material).
2.12.2 Assist farmers with the rehabilitation of viable aquaculture ponds and in the construction of new ponds - allowance made for a pilot.
2.12.3 Train and assist farmers on the appropriate fishing techniques and equipment as well as the protection of breeding grounds

*Table 5-8: Floods and Droughts Mitigation options*

<b>3.1 Flood management and preparedness for floods</b>
Raise awareness of all residents of flood prone areas of the risk of flooding.
3.1.1 Demarcate areas considered unsafe for habitation or other use and warn inhabitants.
3.1.2 Development of an early flood warning system.
3.1.3 Development/Compilation of a hazard/risk map for landslides/sedimentation/floods.
<b>3.2 Construction of infrastructure for flood control</b>
Develop an implementation policy on the use of levees or embankments to prevent the flooding of wetlands. It is recommended that levees be disallowed except in situations where existing development and the potential loss of life renders this imperative.
3.2.1 Plan and implement flood retention structures with cooperation and input from local communities.
3.2.2 Plan and construct levees in areas where this can have optimal benefit with minimal disadvantage to users further downstream, with cooperation and input from local communities.
3.2.3 Assess structures within flood prone areas (roads, bridges, culverts) and their resistance to flooding. Then strengthen roads, bridges and culverts for better flood resistance and ensure that escape routes are not cut off.
<b>3.3 Cattle keeping practices</b>
Review drought hazards for stock farming, taking note of good land management strategies currently adopted by cattle farmers in dealing with droughts and promoting it among stock farmers.
3.3.1 Determine current stocking rates and assess carrying capacity of all districts. Develop a plan to keep the numbers of animals within the theoretical limits of carrying capacity.
3.3.2 Livestock improvement programme.
3.3.3 Promote dairy farming.

*Table 5-9: Social and Institutional Development Options*

<b>4.1 Monitoring</b>
Establish strong principles regarding the importance of monitoring and ensure that long-term funding is available to maintain a monitoring programme. Review existing water quantity and quality monitoring sites, their functionality, and how data is being captured, transferred, checked, stored and reported. A data base and data management system must be built at WMZ level.
4.1.1 Monitoring stations must be maintained and regularly calibrated. Gauge readers need to be trained and check mechanisms introduced to ensure stability and consistency in data.
4.1.2 Expand, rehabilitate and improve the water quality, evaporation, rainfall, groundwater and stream flow monitoring network systems and lake and wetland water-level monitoring gauges. Implement sedimentation monitoring.
4.1.3 Monitor surface and groundwater use and levels to prevent over-exploitation.
<b>4.2 Extension services (information and training)</b>
Identify the needs of extension service providers, improve the quality of their work by training extension service providers, and developing support material.
4.2.1 Train a committed cadre of extension service providers to render inter-disciplinary, integrated extension service including CMCs, CBOs etc.
4.2.2 Develop support materials for use by extension officers (building on currently available material).

<b>4.3 Awareness raising</b>
Assess current awareness raising initiatives and synergies between projects and institutions. Raise awareness of key stakeholders and the public on an ongoing basis. A range of awareness raising/stakeholder engagement required.
4.3.1 Develop training guidelines and awareness raising materials (building on currently available material).
4.3.2 Introduction of a community radio programme dedicated to environmental matters.
4.3.3 Sanitation project. Demonstration of ecosan and other sanitation systems. Provision of appropriate designs and training in construction. Support with provision of materials.
4.3.4 Implement demonstration projects - schools, model farms etc. (capital costed elsewhere).
4.3.5 Introduction of awareness raising programmes in schools.

<b>4.4 Institutional capacity building</b>
Review capacity and capacity constraints amongst relevant institutions. Build internal capacity through interaction and training.
4.4.1 Import expertise in the development of technology guidelines, training and other approaches.
4.4.2 Enhance and strengthen the capacity of BMUs.
4.4.3 Enhance and strengthen the capacity of rice grower associations.

<b>4.5 Legislation and enforcement</b>
Optimise awareness raising to minimise need for enforcement. Create a culture of people based land management and 'peer pressure enforcement' through awareness, a common vision and through reasonable action by authority.
4.5.1 Strengthen enforcement bodies with capacity, following identification of enforcement areas with the biggest needs. Develop specific tasks and roles for law enforcement but with recognition of IWRM and crosscutting responsibilities. Enforcement bodies should be trained in teaching corrective practices.

## 5.5 Evaluation of Shortlisted Options

Investment schemes should be evaluated in terms of their technical features and likely feasibility, estimated cost, reduction of risk, socio-economic and environmental considerations and other benefits and impacts, to at least a minimum base of information.

### 5.5.1 Off-Line Screening of Options

The management and development options, one with which all stakeholders could engage, need to be prioritised since some play a much more important role for the development and protection of the catchment than others and not all the options can be implemented at the same time. Furthermore, some options need to be piloted in order to evaluate their success and impact before the activity will be transferred to other areas of the catchment. Additionally, the different sub-catchments or districts have different needs and, therefore, different priorities. For this reason, an off-line screening tool was developed for the prioritisation of options. It provides a mechanism for the screening of options by the selection of weights against social, environmental, and economic screening criteria. In this regard, a scoring process was developed and the scores were allocated to different options.

However, the scores remain subjective, but in presence of good information about the options together with knowledgeable people applying the criteria, results become less subjective. This leads to an informed opinion on options, based on best understanding of the water resource situation and the social, environmental and economic circumstances prevailing.

Options are evaluated against a defined set of criteria, based on available information, which reflect the vision and objectives of the Awoja Catchment. During this process discussions and consensus are important means to avoid unreasonable subjectivity and strengthen transparency. The developed screening criteria and the respective associated scores are shown in *Table 5-10*.

Table 5-10: Screening criteria and impacts of the scores

Criterion		Impact	Score
1	Overall impact of option	Addresses one issue	1
		Addresses 2 - 3 issues	3
		Addresses more than 3 issues	5
2	Importance of issue(s) addressed	Low	1
		Medium	3
		High	5
3	Social Benefit	Low	1
		Medium	3
		High	5
4	Economic benefit	Low	1
		Medium	3
		High	5
5	Environmental cost (-ve)	High negative impact	-5
		Minimal negative impact	-3
		No impact	0
6	Environmental benefit (+ve)	No impact	0
		Minimal positive impact	3
		High positive impact	5
7	Opportunity costs (if any) (i.e. loss of opportunity to others as consequence of the development)	Very high	-3
		High	-2
		Limited	-1
		None	0
8	Ease of implementation (physical feasibility)	Very difficult	-3
		Difficult	-2
		Feasible / possible	2
		Very feasible	3
9	Cost / affordability	Prohibitive	-5
		Very expensive	-3
		Expensive	-1
		Reasonably affordable	3
		Very affordable	5
10	Capacity to implement	None / inadequate	-3
		Weak	-2
		Capacity to be built / recruited	-1
		Limited capacity	1
		Good – available	3
11	Consequences of failure to implement (reflect urgency of action)	None. Issue(s) will resolve naturally over time	-3
		Issue(s) increase but remain at same relative scale	0
		Escalation of issue(s)	3
12	Sustainability	Definite long-term sustainability	5
		Sustainable	3
		Uncertain - it depends	0
		Short-term only	-3
		Most unlikely	-5

The off-line criteria are mapped to the catchment objectives as indicated in *Table 5-11: Off-line criteria mapped to the catchment objectives*

*1 Note that some off-line criteria have been mapped against more than one objective. This shows that the criteria address all catchment objectives dealing with all options.*

**Table 5-11: Off-line criteria mapped to the catchment objectives**

Catchment objective	Off-line Criteria <sup>1</sup>
1. Catchment Protection and Conservation: To protect and restore the catchment for sustainable delivery of goods and services	<ul style="list-style-type: none"> <li>▪ Overall impact of option</li> <li>▪ Environmental cost</li> <li>▪ Environmental benefit</li> <li>▪ Sustainability</li> </ul>
2. Development for Socio-Economic Growth: To develop water resources for socio-economic growth through meeting community needs for water, energy, and food security	<ul style="list-style-type: none"> <li>▪ Social Benefit</li> <li>▪ Economic benefit</li> <li>▪ Opportunity costs</li> <li>▪ Ease of implementation (physical feasibility)</li> <li>▪ Cost / affordability</li> </ul>
3. Mitigation and Adaptation: To mitigate and adapt to the impacts of droughts, floods and landslides	<ul style="list-style-type: none"> <li>▪ Social Benefit</li> <li>▪ Economic benefit</li> <li>▪ Ease of implementation (physical feasibility)</li> <li>▪ Cost / affordability</li> </ul>
4. Social and Institutional Development: To optimise catchment resources through capacity building, awareness, policy enforcement, and institutional coordination	<ul style="list-style-type: none"> <li>▪ Capacity to implement</li> </ul>
All 4 objectives	<ul style="list-style-type: none"> <li>▪ Importance of issue(s) addressed</li> <li>▪ Consequences of failure to implement (reflects urgency of action)</li> </ul>

<sup>1</sup> *Note that some off-line criteria have been mapped against more than one objective*

The approach outlined above was used for screening the options, both investment options and management options using criteria, which cover a set of economic, environmental and social indicators. Options are screened to assess and evaluate the technical features, likely feasibility, estimated costs, reduction of risk, social economic, environmental considerations, and other benefits and impacts. The criteria take into account the number of prioritised issues addressed by an option.

Annex 1 shows the results of the screening of all the options in line with the four objectives.

## 5.6 From Options to Scenarios

The Guidelines for Catchment-based water resources planning in Uganda define a scenario as “a combination of assumptions about the options in place (which options are possible or assumed to be implemented); external factors that influence their performance (climate, economic conditions etc.); projections or forecasts of the future (population growth rate, urbanisation rate, agricultural productivity, water use or demand rates, economic parameters, etc.); and government policy effecting either selection or performance (priority, funding, regulations, institutional arrangements etc.).” Catchment scenarios are especially useful to provide perspective on development prospects and their impacts. Scenarios are, therefore, combinations of options.

These options cannot be seen separately from each other. They are all interrelated - tied into a complex web by the high population growth and the resultant increasing need to draw on the natural resources offered by the catchment. Some options may influence each other, some may depend on one another, some may be more important to some stakeholders than to others in the diverse areas of the catchment. This variety of options needs



structuring about possible future resource development opportunities, their risks, and their interactions.

By considering the various options and regrouping them, different scenarios are created focusing on topics. These are useful to provide a perspective on development prospects and their impacts. The question to be asked is what should be focused on in the development of the water resources and their protection during the coming years. Some options will have a more significant role to play than others, which should not be neglected and just assume a minor/border position. Another question to be dealt with is: which impact is created by different scenarios. The scenarios produce alternative pictures of the future based on the identified driving forces and allow for the planning of projects and actions to suit a desired or realistic future accommodating a certain level of uncertainty. Then the positive and negative effects need to be taken into consideration. The scenarios should further reflect the objectives and thus the vision and thereby meet the projected demands of the various water use sectors at specified levels of growth and development.

The biggest underlying issue is land pressure, resulting from population growth - with consequent land degradation, siltation and sedimentation. Scenarios were formulated taking into account the Awoja planning objectives and the vision. In this respect three scenarios were developed:

- **SC1:** Mitigation of floods through riverbank protection (focusing on structural measures),
- **SC2:** Reliable water supply to the users,
- **SC3:** Protect the environment through improved soil and water conservation.

The three scenarios were then compared using the ranked options and the objective functions of the scenarios. These are three different ways of meeting all the planning objectives while trying to maximise the objective function in each case. For example, scenario one addresses all the objectives while concentrating on the objective function of structural measures to mitigate floods through riverbank protection.

Having compared the three scenarios, SC3 (Protect the environment through improved soil and water conservation) emerged the best screened scenario with the highest score *Table 5-12*.

**Table 5-12: Comparison of the screening results of the 3 scenarios**

	<b>Options</b>	<b>SC1</b>	<b>SC2</b>	<b>SC3</b>
1.1.1	The preparation and dissemination of a comprehensive Sustainable Land and Environmental Management manual providing the technological approaches tailored for the Awoja Catchment and Kyoga WMZ.	25	25	25
1.1.2	Design and pilot of individual farms according to sustainable land and environmental management principles. Layout to include contouring, drain and waterway layout and improvements, road design, runoff management, woodlot and agroforestry planning			25
1.1.3	Identification and regular (annually) eradication of floating islands / invasive alien plants	31	31	31
1.1.4	Development of a fire risk, fire control and fire protection plan, with controlled burning where required for grazing and biodiversity management and implement it	24		24
1.1.5	Riverbank protection and stabilisation - gabions, management of cattle access points, protection of riparian vegetation	19	19	19
1.1.6	Rehabilitation of degraded landscapes through construction of check dams, demi-lunes, swales, brush packs and stone packs, fanya juu (Swahili for 'throw soil up' terraces, which are good for fodder grass that prevents soil erosion) etc.	26	26	
1.1.7	On-farm rainwater harvesting - channelling of overland flow and excess runoff into underground storage tanks for irrigation and household water excluding drinking		35	

	Options	SC1	SC2	SC3
1.1.8	Ecological water requirements: revisiting legislation and catchment assessment	26	26	26
1.1.8.1	Introduce improved farming practices			37
1.1.9	Build the capacity on conservation methods, especially for wetlands	26	26	26
1.1.10	Monitoring the impacts of sustainable land and environmental management in terms of improved farming practices (individual benefit), and downstream water management			8
1.2.1	Provide routine training (forestry handbook) to CMCs, forest management, landcare and agricultural managers:one training in each district every two years			18
1.2.2	Establish nurseries for provision of seedlings and establish distribution, training and management systems in all districts - pilot projects			28
1.2.3	Support the implementation of a Reforestation Programme aimed at restoring lost woodland and at establishing woodlots to reduce the pressure on natural forest. Link to agroforestry and sustainable land management			25
1.2.4	Plant trees in degraded areas	31		31
1.3.1	Regular updating of district wetland inventories by Districts		22	22
1.3.2	Updating of demarcated protection zones and acceptable utilisation of wetlands, producing GIS maps of wetlands at various levels		19	19
1.3.3	Study for the economic valuation of wetland resources and disseminate the results		20	20
1.3.4	Review and update the wetland management/action plans	17	17	17
1.3.5	Restoration of vital (unique) critical (subject to on-going degradation) wetlands			15
1.4.1	Mapping, demarcation of riparian and roadside protection zones, and identify & implement source protection measures	9	9	9
2.1.1	Improve Sanitation technology, and building material support and implement them	31	31	31
2.1.2	Improve faecal sludge management (collection, transportation, treatment and re-use) through clustering of small towns (Kumi Sironko, Kapchorwa, Nakapiripirit)			-1
2.2.2	Refurbish valley dams and tanks	23	23	23
2.2.3	Refurbish Springs, boreholes, pumps, hand pumps and piped systems		25	
2.2.4	Rehabilitate those irrigation schemes where economically and socially justifiable. Bunamono and Labori schemes identified		17	
2.3.1	Design and construct River Agu scheme to supply Kumi and surrounds - water and wastewater works		12	12
2.3.2	Soroti treatment and distribution - expand in stages (NWSC)		12	12
2.3.3	Identify, design, and construction of further piped water schemes for growing towns and villages at regional growth centres, including supply to larger industries	12	12	
2.3.4	Groundwater schemes/boreholes for domestic and livestock supply - evaluation, design, construction (focus on Districts 1,2 and 14)		25	
2.4.1	Feasibility studies of availability and supply for prioritised towns and settlements		25	
2.4.2	Design and construction of groundwater schemes for towns/settlements		24	
2.5.1	Provision of subsidised rainwater tanks to willing buyers. Implementation should be based on a cost-sharing mechanism		32	
2.6.1	Feasibility studies and design of prioritised sand dams. Construction, with cooperation and input from local communities	26	26	26

	Options	SC1	SC2	SC3
2.7.1	Needs identification for location and type of dams and associated abstraction facilities	30	30	30
2.7.2	Feasibility & design of prioritised dams for stock watering and human needs. Construction, with cooperation and input from local communities		21	21
2.8.1	Provide farmers with appropriate technologies for the abstraction of water from rivers and shallow boreholes. This would include facilitating access to treadle pumps and small motorised pumps and the construction of small diversion weirs. Prioritise the drier areas of Kapchorwa and Kween on the leeward side of Mt. Elgon, Karamoja and Teso		17	
2.8.2	Enhancement of rainfed agriculture	31	31	31
2.8.3	New irrigation schemes: undertake feasibility studies of identified areas	10	10	10
2.8.4	Construction of new irrigation schemes: Improved (seasonal) Wetland Schemes	7	7	7
2.8.5	Construction of new irrigation schemes: low-power pumped schemes that utilise water from nearby rivers, swamps and lakes	20	20	20
2.8.6	Construction of new irrigation schemes: simple gravity-fed schemes	20	20	20
2.8.7	Construction of new irrigation schemes: Type A Formal Irrigation	8	8	8
2.8.8	Construction of new irrigation schemes: Type B Formal Irrigation	5	5	5
2.9.1	Water efficiency evaluation and recommendations	24	24	24
2.10.1	Investment and implementation in hydropower installations and grid distribution	24	24	24
2.11.1	Promote additional and alternative sources of energy including low cost solar panels to be used for LED lighting, radios and cell phones	14	14	14
2.11.2	Promote use of energy efficient woodstoves by making the technology readily available			29
2.12.1	Develop a manual on aquaculture techniques (building on available material)		18	18
2.12.2	Assist farmers with the rehabilitation of viable aquaculture ponds and in the construction of new ponds - allowance made for a pilot		16	16
2.12.3	Train and assist farmers on the appropriate fishing techniques and equipment as well as the protection of breeding grounds			28
2.13.1	Create an ecological tourism organisation, train it and provide the necessary starting equipment e.g. a boat			22
2.13.2	Promote horticulture			15
2.13.3	Promote bee keeping			17
3.1.1	Demarcate areas considered unsafe for habitation or other use and warn inhabitants	36		36
3.1.2	Develop an early flood warning system	13	13	13
3.1.3	Development/Compilation of a hazard/risk map for landslides/ sedimentation/floods	22	22	22
3.2.1	Plan and implement flood retention structures, with cooperation and input from local communities	30		
3.2.2	Plan and construct levees in areas where this can have optimal benefit with minimal disadvantage to users further downstream, with cooperation and input from local communities	9		
3.2.3	Assess structures within flood prone areas (roads, bridges, culverts) and their resistance to flooding. Then strengthen roads, bridges and culverts for better flood resistance and ensure that escape routes are not cut off	30		
3.3.1	Determine current stocking rates and assess carrying capacity of all districts. Develop a plan to keep the numbers of animals within the theoretical limits of carrying capacity		27	27

	Options	SC1	SC2	SC3
3.3.2	Livestock improvement programme		22	22
3.3.3	Promote dairy farming			4
4.1.1	Monitoring stations must be maintained and regularly calibrated. Gauge readers need to be trained and check mechanisms introduced to ensure stability and consistency in data.	34	34	34
4.1.2	Expand, rehabilitate, and improve the water quality, evaporation, rainfall, groundwater and streamflow monitoring network systems and lake and wetland water-level monitoring gauges. Implement sedimentation monitoring.	30	30	30
4.1.3	Monitor surface and groundwater use and levels to prevent over-exploitation	32	32	32
4.2.1	Train a committed cadre of extension service providers to render interdisciplinary, integrated extension service to include (CMCs), CDOs, etc.	39	39	39
4.2.2	Develop support materials for use by extension officers (building on currently available material)	36	36	36
4.3.1	Develop training guidelines and awareness raising materials (building on currently available materials)	34	34	34
4.3.2	Introduction of a community radio programme dedicated to environmental matters	33	33	33
4.3.3	Sanitation project. Demonstration of ecosan and other sanitation systems. Provision of appropriate designs, and training in construction. Support with provision of materials		22	22
4.3.4	Implement demonstration projects - schools, model farms etc. (capital costed elsewhere)	27	27	27
4.3.5	Introduction of awareness raising programmes in schools	35	35	35
4.4.1	Import expertise in the development of technology guidelines, training, and other approaches	28	28	28
4.4.2	Enhance and strengthen the capacity of BMUs			27
4.4.3	Enhance and strengthen the capacity of rice grower associations			14
4.5.1	Strengthen enforcement bodies with capacity	34	34	34
	<b>Total</b>	<b>1021</b>	<b>1272</b>	<b>1436</b>
	<b>Rank</b>	<b>3</b>	<b>2</b>	<b>1</b>

## 6. MANAGEMENT AND INVESTMENT ACTIONS

The analysis of the options, which originated from the assessment of issues, available opportunities, and threats within the Awoja catchment led to the identification of management and investment interventions that contribute to attainment of the catchment vision and objectives. This set of agreed interventions form the main body of the Awoja catchment management plan. The intervention sites, implementation plan, and the investment plan are presented in the sections that follow.

### 6.1 Intervention Sites

Intervention sites were defined to village level, if possible, with the respective structures and their numbers to the various options for the best ranked scenario; scenario 3. Some options do not apply to all districts due to their nature while others are general and concern all districts like the development of a manual and, therefore, do not require any intervention sites. The latter are marked “not applicable (N/A)” in the intervention site lists. *Table 6 1* shows the total number of administrative units (sub-counties, parishes, and villages) that will be reached by each intervention. The full lists of intervention sites for each district are shown in Annex 2.

*Table 6-1: Number of Administrative Units covered by the Interventions*

Ref. No.	Options	Numbers Covered in the whole catchment		
		Sub-counties	Parishes	Villages
1.1.1	The preparation and dissemination of comprehensive and sustainable land and environmental management manual providing the technological approaches tailored for the Awoja catchment and Kyoga WMZ	N/A	N/A	N/A
1.1.2	Design and pilot of individual farms according to sustainable land and environmental management principles. Layout to include contouring, drain and waterway layout and improvements, road design, runoff management, woodlot and agroforestry planning	35	54	105
1.1.3	Identification and regular (annually) eradication of floating islands / invasive alien plants	8	15	16
1.1.4	Development of a fire risk, fire control and fire protection plan, with controlled burning where required for grazing and biodiversity management and implement it	20	60	98
1.1.5	River bank protection and stabilisation - gabions, management of cattle access points, protection of riparian vegetation	53	77	112
1.1.8	Ecological water requirements: Revisiting legislation and catchment assessment	N/A	N/A	N/A
1.1.8.1	Introduce improved farming practices	43	59	115
1.1.9	Build the capacity on conservation methods, especially for wetlands	34	50	73

Ref. No.	Options	Numbers Covered in the whole catchment		
		Sub-counties	Parishes	Villages
1.1.10	Monitoring the impacts of sustainable land and environmental management in terms of improved farming practices (individual benefits) and downstream water management	1	2	2
<b>1.1.11</b>	Develop and implement climate change awareness creation strategy addressing sustainable land and environment management	42	251	2083
<b>1.1.12</b>	Promote climate change planning at sector, catchment and sub-catchment levels	42	251	2083
<b>1.1.13</b>	Promote climate -smart -integrated landscape management approaches.	27	130	136
<b>1.1.14</b>	Uptake of climate change and disaster risk reduction tools for joint planning and implementation of sustainable land and environmental technologies and practices at catchment and sub-catchment levels	27	130	136
<b>1.1.15</b>	Build capacity of communities, land and environment users by supporting them in land suitability mapping, land use and farm planning, soil health improvement, soil and water conservation activities in micro and macro watersheds.	27	130	136
<b>1.1.16</b>	Develop green management plans for business models	All	All	All
<b>1.1.17</b>	Undertake carbon stock assessment	All	All	All
<b>1.1.18</b>	Conduct natural resource accounting for ecosystems in the catchment.	All	All	All
1.2.1	Provide routine training (forestry handbook) to CMCs, forest management, land care and agricultural managers: one training in each district every two years	N/A	N/A	N/A
1.2.2	Establish nurseries for provision of seedlings and establish distribution, training and management systems in all districts - pilot projects	37	42	45
1.2.3	Support the implementation of a reforestation programme aimed at restoring lost woodland and at establishing woodlots to reduce the pressure on natural forest. Link to agroforestry and sustainable land management	55	71	113
1.2.4	Planting trees in degraded areas	42	60	106
<b>1.2.6</b>	Promote woodlots and agro-forestry	4	6	10
<b>1.2.7</b>	Build capacity and promote use of practices for managed regeneration of wetland and indigenous trees to increase tree cover in degraded catchment and sub-sub-catchment areas.	3	10	14
1.3.1	Regular updating of district wetland inventories by districts	46	96	119
1.3.2	Updating of demarcated protection zones and acceptable utilisation of wetlands, producing GIS maps of wetlands at various levels	43	80	108
1.3.3	Study for economic valuation of wetland resources and disseminate the results	N/A	N/A	N/A
1.3.4	Review and update the wetland management/action plans	44	80	105
1.3.5	Restoration of vital (unique) critical (subject to on - going degradation) wetlands	31	54	67
1.4.1	Mapping, demarcation of riparian and roadside protection zones and identify and implement source protection measures	46	69	80
2.1.1	Improve sanitation technology and building material support and implement them	47	59	100

Ref. No.	Options	Numbers Covered in the whole catchment		
		Sub-counties	Parishes	Villages
2.1.2	Improve faecal sludge management (collection, transportation, treatment and re-use) through clustering of small towns (Kumi Sironko, Kapchorwa, Nakapiripirit)	6	6	6
2.2.2	Refurbish valley dams and tanks	25	31	37
2.3.1	Design and construct River Agu scheme to supply Kumi and surroundings - water and wastewater works	2	2	2
2.3.2	Soroti treatment and distribution - expand in stages (NWSC)	1	1	1
2.6.1	Feasibility studies and design of prioritised sand dams. Construction, with cooperation and input from local communities	7	8	10
2.7.1	Needs identification for location and type of dams and associated abstraction facilities	15	20	21
2.7.2	Feasibility & design of prioritised dams for stock watering and humans needs. Construction, with cooperation and input from local communities	20	27	29
2.8.2	Enhancement of rain fed agriculture	48	54	75
2.8.3	New irrigation schemes: Undertake feasibility studies of identifies areas	38	63	86
2.8.4	Construction of new irrigation schemes: Improved (seasonal) Wetlands Schemes	19	32	42
2.8.5	Construction of new irrigation schemes: Low - power pumped schemes that utilise water from nearby rivers, swamps and lakes	16	27	29
2.8.6	Construction of new irrigation schemes: Simple gravity - fed schemes	16	27	31
2.8.7	Construction of new irrigation schemes: Type A Formal Irrigation	3	3	3
2.8.8	Construction of new irrigation schemes: Type B Formal Irrigation	N/A	N/A	N/A
2.9.1	Water efficiency evaluation and recommendations	N/A	N/A	N/A
2.10.1	Investment and implementation in hydropower installations and grid distribution	17	20	22
2.11.1	Promote additional and alternative sources of energy including low cost solar panels to be used for LED lighting, radios and cell phones	52	66	105
2.11.2	Promote use of energy efficient woodstoves by making the technology readily available	57	66	93
2.12.1	Develop a manual on aquaculture techniques (building on available material)	N/A	N/A	N/A
2.12.2	Assist farmers with rehabilitation of viable aquaculture ponds and in the construction of new ponds - allowance made for a pilot	44	48	51
2.12.3	Train and assist farmers on the appropriate fishing techniques and equipment as well as the protection of breeding grounds	15	20	25
2.13.1	Create an ecological tourism organisation, train it and provide the necessary starting equipment e.g. a boat	24	28	35
2.13.2	Promote horticulture	38	47	55
2.13.3	Promote bee keeping	42	55	77
3.1.1	Demarcate areas considered unsafe for habitation or other use and warn inhabitants	42	69	109
3.1.2	Develop an early flood warning system	43	74	144
3.1.3	Development/compilation of hazard/risk map for landslides/ sedimentation/floods	N/A	N/A	N/A

Ref. No.	Options	Numbers Covered in the whole catchment		
		Sub-counties	Parishes	Villages
3.3.1	Determine current stocking rates and assess carrying capacity of all districts. Develop a plan to keep the numbers of animals within the theoretical limits of carrying capacity	N/A	N/A	N/A
3.3.2	Livestock improvement programme	50	86	206
3.3.3	Promote dairy farming	46	65	99
4.1.1	Monitoring stations must be maintained and regularly calibrated. Gauge readers need to be trained and check mechanisms introduced to ensure stability and consistency in data	N/A	N/A	N/A
4.1.2	Expand, rehabilitate, and improve the water quality, evaporation, rainfall, ground water and stream flow monitoring network systems and lake and wetland water level monitoring gauges. Implement sedimentation monitoring	N/A	N/A	N/A
4.1.3	Monitor surface and ground water use and levels to prevent over-exploitation	N/A	N/A	N/A
4.2.1	Train a committed cadre of extension service providers to render inter-disciplinary, integrated extension service to include CMCs, CDOs etc.	1	3	0
4.2.2	Develop support materials for use by extension officers (building on currently available materials)	N/A	N/A	N/A
4.3.1	Develop training guidelines and awareness raising materials (building on currently available materials)	N/A	N/A	N/A
4.3.2	Introduction of a community radio programme dedicated to environmental matters	4	6	6
4.3.3	Sanitation project. Demonstration of ecosan and other sanitation systems. Provision of appropriate designs and training in construction. Support with provision of materials	40	59	105
4.3.4	Implement demonstration projects - schools, model farms etc. (capital costed elsewhere)	51	62	85
4.3.5	Introduction of awareness raising programmes in schools	59	79	107
4.4.1	Train experts (import expertise) in the development of technology guidelines, training and other approaches	N/A	N/A	N/A
4.4.2	Enhance and strengthen the capacity of BMUs	12	19	23
4.4.3	Enhance and strengthen the capacity of rice grower associations	22	37	39
4.5.1	Strengthen enforcement bodies with capacity	1	1	1

## 6.2 Implementation Plan

From the district intervention site lists a detailed implementation plan has been developed. However, the villages have been summarised following the sub-counties and the number and type of structures put together to create more of an overview. Therefore, one has to go back to the intervention site list of the specific district for detailed information.

The options are grouped under the developed objectives for the Awoja catchment and therein according to the respective topics under which they fall (see also tables *Table 5-5* and *Table 5-6*). Within the topics the options follow the order of the results of the screening/ranking (from high to low scores) to reflect their importance. This gives a detailed picture of which structures should be implemented in which area of each district if applicable under the respective option and at the same time illustrates the most concerned areas for that option.



The option 2.3.1 “Design and construct River Agu scheme to supply Kumi and surrounds it water and waste water works” has not been included in the detailed implementation plan as plans are under way to construct the water supply scheme according to officials from Kumi district. Option 2.8.8 “Construction of new irrigation schemes: Type B formal irrigation” has not been considered further as no district considered it as a possible option in their area. Although they were still separate options in the intervention site lists, option 2.7.1 (Needs identification for location and type of dams and associated abstraction facilities) has been incorporated into option 2.7.2 (Feasibility and design of prioritised dams for stock watering and human needs. Construction with cooperation and input from local communities) as they are closely linked and the concerned districts have already suggested sites and the types of structures. The last option 4.5.2 (Develop bylaws and ordinances on water and environmental management and protection) has been newly added to the detailed implementation plan as there was a great demand for this theme from the districts during the field visits. The detailed Awoja Implementation Plan is set out in Annex 3.

Since the information on each option is very detailed, it was necessary to compile it further into a summarised implementation plan. The districts under one option have been put together and the type and number of structures for each district summarised as shown in *Table 6-2* below.

The indicators meant to measure performance associated with implementation of the specific options are presented in Table 6-3.

Table 6 -2: Summary Implementation Plan

Ref. No.	Options	Districts concerned	Type and No. of structure	Responsibility	Period of Intervention				
					1	2	3	4	5
	<b>Catchment Protection and Conservation</b>								
	<b>Sustainable Land and Environmental Management</b>								
1.1.8.1	Introduce improved farming practices	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Construct 40 cylvos, 60 underground water tanks, 2 irrigation layouts, provide 80 ox-ploughs, 2 tractors, 50 fresian cattle, 26 treadle pumps, tree seedlings, seeds, woodlots: 10ha, agroforestry: 53ha, contour bunds: 400km, trenches: 50km, cattle tracks: 5grass planting, train and equip 1,227 farmers	Kyoga WMZ, CMC, DNRO, DEO, DAO	x	x			
1.1.3	Identification and regular (annually) eradication of floating islands / invasive alien plants	Soroti, Serere, Ngora, Kumi, Katakwi	3 tractors, 9 motor boats, 18 wheelbarrows, hoes and other harvesting equipment, construction of 6 barriers before Awoja bridge, eradication of plants twice yearly on Awoja River and Lake Bisina	Kyoga WMZ, CMC, DNRO, DEO	x	x			
1.1.8	Ecological water requirements: Revisiting legislation and catchment assessment	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Ecological water requirements: legislation and catchment assessment	Kyoga WMZ, CMC, Consultant		x			
1.1.1	The preparation and dissemination of comprehensive and sustainable land and environmental management manual providing the technological approaches tailored for the Awoja catchment and Kyoga WMZ	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Develop a comprehensive and sustainable land and environmental management manual and disseminate it	Kyoga WMZ, CMC, Consultant	x				

1.1.2	Design and pilot of individual farms according to sustainable land and environmental management principles. Layout to include contouring, drain and waterway layout and improvements, road design, runoff management, woodlot and agroforestry planning	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Establish 8 runoff management structures, 14ha of agroforestry, 344ha of woodlots/agroforestry, 190km of contour bunds, 128km of road design, 3 bridges, 7 small - drip irrigations, 14 nurseries, carry out 14 sensitisations	Kyoga WMZ, CMC, DNRO, DEO, DAO	x	x	x	x	x
1.1.4	Development of a fire risk, fire control and fire protection plan, with controlled burning where required for grazing and biodiversity management and implement it	Amudat, Napak, Nakapiripirit, Bukwo, Katakwi, Kween	6 x fire fighting equipment, training of fire fighters (24), training of fire fighting committees (58), development of 6 fire management plans, quarterly public awareness raising (113 communities), 41 community trainings, establish fire lines of 40km, ordinance and by-laws <sup>1</sup>	Kyoga WMZ, CMC, DNRO, DEO, DAO, DFO, CDO	x	x	x	x	x
1.1.5	River bank protection and stabilisation - gabions, management of cattle access points, protection of riparian vegetation	Bulambuli, Sironko, Amudat, Napak, Kapchorwa, Nakapiripirit, Soroti, Serere, Ngora, Bukwo, Katakwi, Bukedea, Kween	Gabions: 276km, demarcations on rivers: 230km, recourse of river: 10km, river pegging: 260km, weirs: 15, bridges: 15, stone pitching of cattle access points: 7km <sup>2</sup> , cattle access points: 218, woodlots: 15ha, riparian vegetation (trees, grass): 323km, seedlings: 50,000+, de-silting	Kyoga WMZ, CMC, DNRO, DEO, DFO	x	x	x	x	x
1.1.9	Build the capacity on conservation methods, especially for wetlands	Bulambuli, Amudat, Napak, Kapchorwa, Nakapiripirit, Soroti, Serere, Ngora, Kumi, Katakwi, Bukedea, Kween	Form and train 56 environmental committees, form and train 15 wetland user committees, train community members in 10 villages, carry out sensitisations in 68 villages, develop training manuals (160 copies)	Kyoga WMZ, CMC, DNRO, DEO	x	x	x	x	x
1.1.10	Monitoring the impacts of sustainable land and environmental management in terms of improved farming practices (individual benefits) and downstream water management	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Develop monitoring programmes for all 14 districts	Kyoga WMZ, CMC, DNRO, DEO, DAO, DCO					x
1.1.11	Develop and implement climate change awareness creation strategy addressing sustainable land and environment management	Sironko, Bulambuli, Ngora, Katakwi and Soroti districts with all the sub-counties, parishes and villages	- Conduct a holistic climate change capacity needs assessment - Develop a climate change capacity building and training plan and program	All communities, state and non-state climate change actors.	x	x	x	x	x
1.1.12	Promote climate change planning at sector, catchment and sub-catchment levels	Sironko, Bulambuli, Ngora, Katakwi and Soroti districts with all the sub-counties, parishes and villages	- Carry out a robust economic needs assessment in the most impacted sectors by climate change (agriculture, water, energy, infrastructure-roads, bridges, settlements)	Kyoga WMZ, DNRO, DWO, Roads, Housing)	x	x	x	x	x

1.1.13	<p>Promote climate-smart-integrated landscape management approaches.</p>	<p><b>Sironko district</b>  <b>Bukise Subcounty,</b>  Mayempe village and Lusate parish  Kijua village and Lusate Parish  <b>Bumamba Sub-county</b>  Kisenyi village, Nandele parish  <b>Bumalimba Sub-county</b>  Miwu village, Bumalimba parish  River Sironko  Sironko bridge-  River separatesMiwu and Budadiri  Town council  <b>Busulani Sub-county</b>  River Sironko Bumasifa Bridge  Separates Bumasifa/Nazu village  Bugijmunya parish  Makuyu Trading center  Makuyu village, Busulani parish  <b>Bumasifwa sub-county</b>  River Mahapa  Bulwala Parish, Nanseke village  Mahapa bridge  Jewa village, Bunamande parish  <b>Bugitimwa Sub-county</b>  Nabuso village, Bugitimwa parish  <b>Masaba sub-county</b>  Namagoye village, Bufupa parish  <b>Buyobo sub-county</b>  Sonooli bridge</p>	<ul style="list-style-type: none"> <li>- Plant flood resistant crop varieties</li> <li>- Apply climate smart land use and building codes for private and public buildings.</li> <li>- Invest in making existing and new buildings more resilient.</li> <li>- Review and update to apply the climate smart transport codes</li> <li>- Promote climate smart aquaculture practices</li> <li>- Demarcate, gazette and restore wetland areas.</li> <li>- Promote climate smart agro-forestry practices</li> <li>- Climate proof investments of drainage plans and systems.</li> <li>- Construct early warning and climate information systems</li> <li>- Develop emergency response measures and recovery centres in the most vulnerable areas</li> <li>- Construct valley dams and tanks</li> <li>- Construct rain water harvesting infrastructure.</li> <li>- Plant flood resistant pastures for livestock.</li> <li>- Promote climate smart livestock breeds.</li> <li>- Promote community forest and national park groups.</li> <li>- Design and implement Ramsar site wetland research, eco-tourism and education centres</li> <li>- Establish a climate change fund to manage disasters and minimize risks</li> </ul>	MWE, DLG, MAA-IF,	x	x	x	x	x
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1.1.14	Uptake of climate change and disaster risk reduction tools for joint planning and implementation of sustainable land and environmental technologies and practices at catchment and sub-catchment levels	<p><b>Magoro sub-county</b> Kareu village, Magoro parish Oriau village, Oriau parish Amusia village, Amusia parish Floodplain in Omongo swamp</p> <p><b>Toroma sub-county</b> Morunyang village, Toroma parish</p> <p><b>Soroti district</b></p> <p><b>Arapai sub-county</b> Alabaka valley, Alabaka parish Turus/Arusi village, Dakabela parish Amotot village, Dakabela parish</p> <p><b>Gweri sub-county</b> Takamariam village, Awaliwale parish Amusia swamp Amusia. Village, Mugenya parish, Abelet and Awoja villages, Dokolo parish Ongiseba village, Awoja parish</p> <p><b>Asureti Sub-county</b> Okungur and Aukot villages, Aukot-Mukula parishes Otatai and Mukula villages, Mukula parish</p> <p>Same as above</p>	- Develop capacity building plan for the state and non-state climate change actors in climate change and disaster risk reduction tools	MWE	
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Ref. No.	Options	Districts concerned	Type and No. of structure	Responsibility	1	2	3	4	5
1.1.15	Build capacity of communities, land and environment users by supporting them in land suitability mapping, land use and farm planning, soil health improvement, soil and water conservation activities in micro and macro watersheds.	Same as above	- Develop GIS tools	MWE					
1.1.16	Develop green management plans for business models	All districts in Kyoga Management zone	- Conduct management and performance of green businesses - Identify and apply circular economy principles to critical components of the business models - Conceptualization of the framework of the circular business models	Kyoga WMZ, CMC, DNRO, DEO, DWO					
1.1.17	Undertake carbon stock assessment	All districts in Kyoga Management zone	- Assess and measure the carbon stores and their stock changes in the land use patterns of forests, wetlands, crop lands and grasslands to gain carbon credits. - Compute and analyse greenhouse gas accounting - Take stock of natural and private capital assets of natural resources in the catchment.	Kyoga WMZ, CMC, DNRO, DEO, DWO					
1.1.18	Conduct natural resource accounting for ecosystems in the catchment.	All districts in Kyoga Management zone	- Conduct a water balance - Carry out green resource accounting of natural assets in the biota, land and water ecosystems - Encourage natural resource planning (inherent value of resources for GHG emissions, carbon-stores, degradation and economic losses).	Kyoga WMZ, CMC, DNRO, DEO, DWO					
<b>Reforestation</b>									
1.2.2	Establish nurseries for provision of seedling and establish distribution, training and management systems in all districts - pilot projects	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	36 nurseries; 9 tree nurseries, 1 greenhouse, 1 training of farmers, 5 trainings for nursery managers <sup>2</sup>	Kyoga WMZ, CMC, DNRO, DEO, DAO	x	x			



1.2.3	Support the implementation of a reforestation programme aimed at restoring lost woodland and at establishing woodlots to reduce the pressure on natural forest. Link to agroforestry and sustainable land management	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngoga	Agroforestry for 157ha plus trees for 12 km boundary, woodlots for 239ha, seedlings 650,000 plus for 20ha, 18 tree nurseries, 12 nurseries, 18 sensitisations, training of 40 farmers, training of 10 management committees, development of a reforestation programme	Kyoga WMZ, CMC, DNRO, DEO, DFO, CDO	x	x	x	x	x
1.2.4	Planting of trees in degraded areas	Bukwo, Kween, Bukambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Amudat, Kumi, Ngoga	Planting trees: 1,155ha, seedlings: 630,500, tree nurseries: 6	Kyoga WMZ, CMC, DNRO, DEO, DFO, CDO		x	x	x	x
1.2.5	Provide routine training (forestry handbook) to CMCs, forest management, land care and agricultural managers: 1 training in each district every two years	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngoga	Train CMCs, forest management, land care and agricultural managers	Kyoga WMZ, CMC, DNRO, DEO, DAO, DFO, consultant	x		x		x
1.2.6	Promote woodlots and agro-forestry	<b>Bulambuli district</b> Border between Lusha and Buginyanya Sub-counties Sisiyi village and Jewa parish <b>Bulaago sub-county</b> Gibeyi village, Bugatisa parish Rwanda Town Council village, Busiya parish <b>Sisiyi/Bulaago Sub-county</b> Kagele River and Kagele bridge Kagele village, Tunyi village	- Encourage planting trees on private and public land - Establish agro-forestry systems in the catchment	MWE, DNRO, DFO, DWO, District Engineer					
1.2.7	Build capacity and promote use of practices for managed regeneration of wetland and indigenous trees to increase tree cover in degraded catchment and sub-sub-catchment areas.	<b>Katakwi district</b> <b>Ngariam sub-county</b> Ngariam village corner, Ngariam parish Kaikamosing village, Kaikamosing parish Health centres and homesteads, borehole water source	- Encourage tree planting and regeneration on public and private land - Establish community wetland and forestry groups - Strengthen the capacity and training of institutions dealing in wetland and forest management and development in the catchment	MWE, DNRO, DFO, DWO, District Engineer					

Ref. No.	Options	Districts concerned	Type and No. of structure	Responsibility	1	2	3	4	5
1.2.7		Acanga village, Acanga parish Apeleum village, Kelim parish <b>Soroti district</b> <b>Arapai sub-county</b> Alabaka valley, Alabaka parish Turus/Arusi village, Dakabela parish Amotot village, Dakabela parish <b>Gweri sub-county</b> Takamariam village, Awaliwale parish Amusia swamp Amusia. Village, Mugenya parish, Abelet and Awoja villages, Dokolo parish Ongiseba village, Awoja parish							
	<b>Lakes and Wetlands Management</b>								
1.3.1	Regular updating of district wetland inventories by districts	Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Develop 8 wetland inventories, update 13 wetland inventories regularly, GIS equipment	Kyoga WMZ, CMC, DNRO, DEO	x	x	x	x	x
1.3.3	Study for economic valuation of wetland resources and disseminate the results	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Economic valuation of wetland resources and its dissemination	Kyoga WMZ, CMC, DNRO, DEO, consultant		x			
1.3.2	Updating of demarcated protection zones and acceptable utilization of wetlands, producing GIS maps of wetlands at various levels	Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Demarcation of 134 protection zones, update of 49 protection zones, produce GIS maps for all wetlands, establish 1 protection zone with suitable vegetation, GPS and GIS equipment	Kyoga WMZ, CMC, DNRO, DEO	x				
1.3.4	Develop or review and update the wetland management / action plans	Kween, Bukambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Develop 94 wetland management action plans, review and update 126 wetland management action plans	Kyoga WMZ, CMC, DNRO, DEO	x	x	x	x	x

1.3.5	Restoration of vital (unique) critical (subject to on – going degradation) wetlands	Kween, Bulambuli, Kapchorwa, Sironko, Bukegea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Desilt 3 rivers, restoration / tree planting in 63 wetlands, develop woodlots of 5ha, fence 1 acre with live hedges, peg off 12 open access areas for animals, restore the fish population in 16 areas, awareness creation in 40 villages, train 2 wetland management committees, law enforcement and bylaws	Kyoga WMZ, CMC, DNRO, DEO	x	x	x
1.3.6	Enhance wetlands and lake systems through integrated watershed management	<p><b>Katakwi district</b></p> <p><b>Ngariam sub-county</b></p> <p>Ngariam village corner, Ngariam parish</p> <p>Kaikamosing village, Kaikamosing parish</p> <p>Health centres and homesteads, borehole water source</p> <p>Acanga village, Acanga parish</p> <p>Apeleum village, Kelim parish</p> <p><b>Soroti district</b></p> <p><b>Arapai sub-county</b></p> <p>Alabaka valley, Alabaka parish</p> <p>Turus/Arusi village, Dakabela parish</p> <p>Amotot village, Dakabela parish</p> <p><b>Gweri sub-county</b></p> <p>Takamariam village, Awaliwale parish</p> <p>Amusia swamp</p> <p>Amusia. Village, Mugenya parish, Abelet and Awoja villages, Dokolo parish</p> <p>Ongiseba village, Awoja parish</p>	<p>-Strengthen wetland and lake management institutions respond for wetland and lake management and conservation</p> <p>-Promote wetland and lake law enforcement and governance</p> <p>-Demarcation and gazettement of critical and vital wetland systems and their maintenance in the catchment as carbon sinks</p> <p>-Design and implementation of RAMSAR sites and framework wetland and lake management plans</p> <p>-Design and implementation of the district wetland action plans in the catchment with carbon sink potential</p> <p>-Design and implementation of RAMSAR site wetland research, ecotourism and education centres</p> <p>-Creation of catchment information database through re-inventory and assessment of all wetlands in the catchment</p>	MWE DNRO, DFO, DWO, District Engineer, District Wetland Officer			

Ref. No.	Options	Districts concerned	Type and No. of structure	Responsibility	1	2	3	4	5
1.3.7	Promote payment for ecosystem services for enhanced ecosystem management and benefits	<p><b>Sironko district</b>  <b>Bukise Subcounty,</b>  Mayempe village and Lusate parish  Kijua village and Lusate Parish</p> <p><b>Bumamba Sub-county</b>  Kisenyi village, Nandele parish</p> <p><b>Bumalimba Sub-county</b>  Miwu village, Bumalimba parish  River Sironko  Sironko bridge-</p> <p>River separatesMiwu and Budadiri Town council</p> <p><b>Busulani Sub-county</b>  River Sironko Bumasifa Bridge  Separates Bumasifa/Nazu village Bugimunya parish  Makuyu Trading center</p> <p>Makuyu village, Busulani parish</p> <p><b>Bumasifwa sub-county</b>  River Mahapa  Bulwala Parish, Nanseke village  Mahapa bridge  Jewa village, Bunamande parish</p> <p><b>Bugitimwa Sub-county</b>  Nabuso village, Bugitimwa parish</p> <p><b>Masaba sub-county</b>  Namagoye village, Bufupa parish</p> <p><b>Buyobo sub-county</b>  Sonooli bridge</p>	<p>-Strengthen wetland and lake management institutions respond for wetland and lake management and conservation</p> <p>-Promote wetland and lake law enforcement and governance</p> <p>-Demarcation and gazettement of critical and vital wetland systems and their maintenance in the catchment as carbon sinks</p> <p>-Design and implementation of RAMSAR sites and framework wetland and lake management plans</p> <p>-Design and implementation of the district wetland action plans in the catchment with carbon sink potential</p> <p>-Design and implementation of RAMSAR site wetland restarich, ecotourism and education centres</p> <p>-Creation of catchment information database through re-inventory and assessment of all wetlands in the catchment</p>	MWE, DNRO, DFO, DWO, District Engineer, District Wetland Officer					



				<p>...grass planting for 36ha, woodlots: 15ha, seedlings: 50,000, road side tree planting for 453km, 16 cattle rams, construction of 15 bridges, gabions, mapping of rivers and road sides, 15 sensitisations, GPS, GIS systems, train an interdistrict committee between Ngora and Serere</p>		<p>Amusia. Village, Mugenya parish, Abelet and Awoja villages, Dokolo parish  Ongiseba village, Awoja parish  <b>Asureti Sub-county</b>  Okungur and Aukot villages, Aukot-Mukula parishes  Otatai and Mukula villages, Mukula parish  <b>Ngora District</b>  <b>Odwarata sub-county</b>  Agule village, Kopege parish  Agule village, Kopege parish  River Agu, Agu dridge village, Agu parish  <b>Kobwin sub-county</b>  Tilling village, Tilling parish  Gawa village, Tillage parish  <b>Kapir sub-county</b>  Ajesa village, Orisai parish  Akisim village, Akisim parish  Kakor village, Omiito parish  <b>Mukula Sub-county</b>  Akei bridge, Akei village, Akei Parish  Kajamaka village, Kajeluku parish  Adul village, Mukula parish</p>	<p>Identify and protect fragile ecosystems including steep slopes, river banks, sih breeding areas and wetlands</p>	<p>1.4.2</p>	



Ref. No.	Options	Districts concerned	Type and No. of structure	Responsibility	1	2	3	4	5
		Amotot village, Dakabela parish <b>Gweri sub-county</b> Takamariam village, Awaliwale parish Amusia swamp							
	<b>Development for socio-economic growth</b>								
	<b>Sanitations Systems</b>								
2.1.1	Improve sanitation technology and building material support and implement them	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	4 water-borne toilets 10 stance, 35 lined pit latrines 3 stance, 24 lined pit latrines 4 stance, 40 VIP latrines 5 stance, 10 VIP latrines 2 stance, 57 ecosan toilets, awareness creation in 45 villages, 3 incinerators. All toilets shall be equipped with aurinary and hand washing facilities.	Kyoga WMZ, CMC, DNRO, DEO, DWO	x				
2.1.2	Improve faecal sludge management (collection, transportation, treatment and re-use) through clustering of small towns (Kumi, Sironko, Kapchorwa, Nakapiripirit)	Sironko, Napak, Kapchorwa, Nakapiripirit, Kumi	1 central faecal sludge treatment site for public institutions, 1 treatment facility for waste for Ongino hospital, 3 cesspools, 4 cesspool emp-tiers, 2 sewage systems, establish and protect 2 lagoons, promote use of effective microorganism (EMO) for sludge reduction	Kyoga WMZ, CMC, DNRO, DEO, DWO		x			
	<b>Refurbishment of infrastructure</b>								
2.2.2	Refurbish valley dams and tanks	Sironko, Amudat, Napak, Nakapiripirit, Soroti, Serere, Ngora, Kumi, Katakwi, Bukedea	19 valley dams, 20 valley tanks	Kyoga WMZ, CMC, DNRO, DEO, DAO	x				
	<b>Piped Water Schemes (Surface Water)</b>								
2.3.2	Soroti treatment and distribution - expand in stages (NWSC)	Soroti	2 reservoirs of 200 cubic metres and approx. 500km of pipeline extension	Kyoga WMZ, NWSC, CMC, DWO		x			x
	<b>Sand Dams</b>								
2.6.1	Feasibility studies and design of prioritised sand dams. Construction, with cooperation and input from local communities	Amudat, Napak, Nakapiripirit	10 sand dams, train 10 sand dam management committees	Kyoga WMZ, CMC, DWO, DNRO, DEO	x				



<b>Dams</b>										
2.7.2	Feasibility & design of prioritized dams for livestock watering and humans needs. Construction, with cooperation and input from local communities	Amudat, Napak, Nakapiripirit, Soroti, Serere, Ngora, Kumi, Bukwo, Katakwi, Bukedea, Kween	19 dams, 14 valley dams, 4 abstraction facilities for livestock watering and 4 for irrigation with treadle pumps	Kyoga WMZ, CMC, DNRO, DEO, DAO, DWO	x	x	x	x		
<b>Enhancement of Irrigation</b>										
2.8.2	Enhancement of rain fed agriculture	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Establish 288 rain water harvesting technologies for irrigation, provide 150 treadle pumps, 80 sprinkler irrigations, establish 2 valley tanks with irrigation equipment, 90 underground tanks with pipes and pumps, 2 rock and runoff harvesting facilities into underground tanks with pumps and pipes, 2 GFS with equipment, provide short-term and drought resistant crops for 18 villages, mulching for 5 villages, 6 demonstrations, 6 sensitisations, train 550 farmers on irrigation and soil/water conservation	Kyoga WMZ, CMC, DNRO, DEO, DAO, DWO	x	x	x	x		x
2.8.5	Construction of new irrigation schemes: Low - power pumped schemes that utilize water from nearby rivers, swamps and lakes	Bulambuli, Amudat, Kapchorwa, Nakapiripirit, Soroti, Serere, Ngora, Kumi, Katakwi, Bukedea	29 schemes	Kyoga WMZ, CMC, DNRO, DEO, DAO, DWO	x					
2.8.6	Construction of new irrigation schemes: Simple gravity - fed schemes	Bulambuli, Sironko, Napak, Kapchorwa, Nakapiripirit, Bukwo, Katakwi, Bukedea, Kween	24 GFS, 2 sprinkler irrigation schemes, 2 rock catchment based schemes	Kyoga WMZ, CMC, DNRO, DEO, DAO, DWO	x	x				
2.8.3	New irrigation schemes: Undertake feasibility studies of identifies areas	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Feasibility studies for 82 irrigation schemes	Kyoga WMZ, CMC, DNRO, DEO, DAO, DWO	x					
2.8.7	Construction of new irrigation schemes: Type A Formal Irrigation	Serere, Bukwo	3 irrigation schemes	Kyoga WMZ, CMC, DNRO, DEO, DAO, DWO					x	
2.8.4	Construction of new irrigation schemes: Improved (seasonal) wetlands schemes	Bulambuli, Amudat, Kapchorwa, Nakapiripirit, Soroti, Serere, Ngora, Kumi, Katakwi, Bukedea, Kween	36 irrigation schemes, 1 GFS, 4 valley dams, irrigation channels for 6km	Kyoga WMZ, CMC, DNRO, DEO, DAO, DWO		x				

Ref. No.	Options	Districts concerned	Type and No. of structure	Responsibility	1	2	3	4	5
	<b>Water Use Efficiency</b>								
2.9.1	Water efficiency evaluation and recommendations	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Water efficiency evaluation and recommendations	Kyoga WMZ, CMC, consultant				x	
	<b>Small Hydropower</b>								
2.10.1	Investment and implementation in hydropower installations and grid distribution	Bulambuli, Sironko, Kapchorwa, Nakapiripirit, Ngora, Kumi, Katakwi, Kween	8 dams, extensions of electricity lines for 149km	Kyoga WMZ, CMC				x	x
	<b>Alternative Energy Supply</b>								
2.11.2	Promote use of energy efficient woodstoves by making the technology readily available	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Train 1,430 persons on woodstove making and equip them, construct 21 woodstoves, carry out 29 sensitisations and 17 village demonstrations	Kyoga WMZ, CMC, DNRO, DEO, DFO	x		x		
2.11.1	Promote additional and alternative sources of energy including low cost solar panels to be used for LED lighting, radios and cell phones	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	392 solar panels, 26 windturbines, 40 radios, 40 cell phones, construction of 42 biogas units, train 42 persons in biogas digester making, 4 sensitisations	Kyoga WMZ, CMC, DNRO, DEO, DFO	x		x		
	<b>Aquaculture</b>								
2.12.1	Develop a manual on aquaculture techniques (building on available material)	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Develop a manual on aquaculture techniques	Kyoga WMZ, CMC, Consultant	x				
2.12.2	Assist farmers with rehabilitation of viable aquaculture ponds and in the construction of new ponds - allowance made for a pilot	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Construct 39 new fish ponds, rehabilitate 27 fish ponds, establish 1 fish breeding centre, pilot 1 fish cage farming, train 66 farmers on the management of fish ponds <sup>4</sup>	Kyoga WMZ, CMC, DNRO, DEO, DAO	x		x		
2.12.3	Train and assist farmers on the appropriate fishing techniques and equipment as well as the protection of breeding grounds	Bulambuli, Napak, Soroti, Serere, Ngora, Kumi, Bukedea, Kween	Train 370 fishermen on appropriate fishing techniques and equip them	Kyoga WMZ, CMC, DNRO, DEO, DAO	x				



Ref. No.	Options	Districts concerned	Type and No. of structure	Responsibility	1	2	3	4	5
	<b>Cattle Keeping Practices</b>								
3.3.1	Determine current stocking rates and assess carrying capacity of all districts. Develop a plan to keep the numbers of animals within the theoretical limits of carrying capacity	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Determine current stocking rates and assess carrying capacity. Develop a plan to keep the numbers of animals within the theoretical limits of carrying capacity	Kyoga WMZ, CMC, consultant	x				
3.3.2	Livestock improvement programme	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Establish 42 artificial insemination services, 47 cattle dips and crushes, 62 zero grazing units, 2 demo sites for tsetse and tick control, 7 fodder banks, 46 watering points, 6 animal drug stores, 6 demonstration ranches, provide 730 high cross breed cattle, 124 goats, 124 sheep, improved veterinary services in 45 locations including vaccinations, tsetse fly and tick control and spraying, carry out 25 awareness raising campaigns on good livestock practices, build capacity for veterinary staff and health workers, train 668 farmers on improved modern management of livestock	Kyoga WMZ, CMC, DNRO, DEO, Dvet	x		x	x	x
3.3.3	Promote dairy farming	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Provide 505 high breed dairy cattle, establish 4 milk cooling plants, establish 34 zero grazing units, establish 9 fodder banks, provide 60 milk coolers, 6 milking machines, mini-coolers, transportation cans, form and train 34 dairy farmers associations, train and equip 512 farmers, train and equip 20 practitioners in artificial insemination, train 16 people on management of zero grazing, pasture, production and management, train 16 people on making yoghurt, ghee etc., plant 2 ha of fodder grass, improve veterinary services, carry out 2 vaccination campaigns, carry out tick, tsetse and worm controls, tagging of animals	Kyoga WMZ, CMC, DNRO, DEO, Dvet			x	x	x
	<b>Social and Institutional Development</b>								
	<b>Monitoring</b>								

4.1.1	Monitoring stations must be maintained and regularly calibrated. Gauge readers need to be trained and check mechanisms introduced to ensure stability and consistency in data	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Assessment of the monitoring stations, rehabilitation of the stations if necessary, training of gauge readers, regular data collection/monitoring, data analysis and appropriate data storage	Kyoga WMZ, DWRM, CMC	x	x	x	x	x
4.1.2	Expand, rehabilitate, and improve the water quality, evaporation, rainfall, ground water and stream flow monitoring network systems and lake and wetland water level monitoring gauges. Implement sedimentation monitoring	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Assessment of the water quality, evaporation, rainfall, groundwater and stream flow monitoring network and water level monitoring gauges, rehabilitation or expansion of stations if necessary, regular data collection/monitoring, data analysis and appropriate data storage, set up a sedimentation monitoring network	Kyoga WMZ, DWRM, CMC	x	x	x	x	x
4.1.3	Monitor surface and ground water use and levels to prevent over - exploitation	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Regular surface and groundwater monitoring, inventory of water users, monitoring and follow up of water abstraction permits	Kyoga WMZ, DWRM, CMC	x	x	x	x	x
	<b>Extension Services</b>								
4.2.1	Train a committed cadre of extension service providers to render inter - disciplinary, integrated extension service to include CMCs, CDOs etc.	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Train extension service providers to render inter - disciplinary, integrated services	Kyoga WMZ, CMC, consultant		x			
4.2.2	Develop support materials for use by extension officers (building on currently available materials)	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Develop support materials for the extension officers	Kyoga WMZ, CMC, consultant			x		
	<b>Awareness Raising</b>								
4.3.5	Introduction of awareness raising programmes in schools	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Establish 121 environmental clubs, establish 50 drama clubs, establish 4 demo schools, carry out 58 awareness raising campaigns, train teachers in 75 schools, provide IEC material for 38 schools	Kyoga WMZ, CMC, DNRO, DEO, DEo			x		x
4.3.1	Develop training guidelines and awareness raising materials (building on currently available materials)	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Develop training guidelines and awareness raising materials	Kyoga WMZ, CMC, consultant				x	

Ref. No.	Options	Districts concerned	Type and No. of structure	Responsibility	1	2	3	4	5
4.3.2	Introduction of a community radio programme dedicated to environmental matters	Bukwo, Kween, Bulambuli, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Establish 4 radio stations, establish environmental programmes: 5 x general, 1 x per month: 2 x, 2 x per month: 1 x, 1 x per week: 2 x, 3 x per week: 2 x, radio talk shows and spot messages: quarterly: 2 x, weekly: 1 x, establish 3 radio listening clubs, provision of IEC material for dissemination	Kyoga WMZ, CMC, DNRO, DEO, DCO	x	x	x	x	x
4.3.4	Implement demonstration projects - schools, model farms etc. (capital costed elsewhere)	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Establish 84 model farms; woodlots in 16 schools; agroforestry, woodlots and nurseries in 22 schools, rehabilitate a poultry and piggyery in 1 school, form and train 43 young farmers associations	Kyoga WMZ, CMC, DNRO, DEO, DAO, DEdO			x	x	x
4.3.3	Sanitation project. Demonstration of ecosan and other sanitation systems. Provision of appropriate designs and training in construction. Support with provision of materials	Bukwo, Kween, Bulambuli, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Construct 61 5stance VIP latrines, 34 ecosan toilets, 16 rubbish skips, carry out 44 awareness raising campaigns, train households on waste management and disposal in 8 villages, form and train 16 sanitation groups, form and train 24 committees on ecosan toilets, form and train 23 committees on management, operation and maintenance of latrines, carry out 1 study on collapsable soil to find the most appropriate toilet systems	Kyoga WMZ, CMC, DNRO, DEO, DWO			x	x	x
<b>Institutional Capacity Building</b>									
4.4.1	Train experts (import expertise) in the development of technology guidelines, training and other approaches	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Train experts in the development of technology guidelines, training and other approaches	Kyoga WMZ, CMC, consultant				x	
4.4.2	Enhance and strengthen the capacity of BMUs	Serere, Soroti, Ngora, Kumi, Katakwi, Bukedea	Form or reactivate 23 BMUs, train 227 BMU members, sensitise 23 communities, establish 4 BMU shelters	Kyoga WMZ, CMC, DNRO, DEO, DAO	x				
4.4.3	Enhance and strengthen the capacity of rice grower associations	Bulambuli, Nakapiripirit, Soroti, Serere, Ngora, Kumi, Katakwi, Bukedea, Kween	Form 39 rice grower associations, train 500 rice grower association members, carry out 12 awareness raising campaigns and 2 exchange visits to established associations, construct 14 rice mills, 5 storage facilities and 1 rice store, rice haulers, provide seeds, develop training material	Kyoga WMZ, CMC, DNRO, DEO, DAO	x		x	x	



Table 6-3: Indicators for the Options

Ref. No.	Options	Indicator
	<b>Catchment Protection and Conservation</b>	
	<b>Sustainable Land and Environmental Management</b>	
1.1.8.1	Introduce improved farming practices	The income of farmers has increased by 20%
1.1.3	Identification and regular (annually) eradication of floating islands/invasive alien plants	The area invaded by invasive plants has been reduced to 0
1.1.8	Ecological water requirements: Revisiting legislation and catchment assessment	Legislation providing for ecological water requirements is in place. Requirements assessed for 8 streams
1.1.1	The preparation and dissemination of comprehensive and sustainable land and environmental management manual providing the technological approaches tailored for the Awoja Catchment and Kyoga WMZ	All districts are in the possession of a comprehensive and sustainable land and environmental management manual
1.1.2	Design and pilot of individual farms according to sustainable land and environmental management principles. Layout to include contouring, drain and waterway layout and improvements, road design, runoff management, woodlot and agroforestry planning	Each farm is equipped with x conservation structures. Baseline: 0. The productivity of each farm has increased by 20 %
1.1.4	Development of a fire risk, fire control and fire protection plan, with controlled burning where required for grazing and biodiversity management and implement it	Availability of fire management plans in each district, number of sensitised communities, number of committees and members trained, number of ha of uncontrolled burning is reduced by 60%
1.1.5	River bank protection and stabilisation - gabions, management of cattle access points, protection of riparian vegetation	Number of hectares of areas demarcated and restored, number of cattle access points
1.1.9	Build the capacity on conservation methods, especially for wetlands	Number and type of activities carried out by the trained committees
1.1.10	Monitoring the impacts of sustainable land and environmental management in terms of improved farming practices (individual benefits) and downstream water management	Monitoring programme implemented
	<b>Reforestation</b>	
1.2.2	Establish nurseries for provision of seedling and establish distribution, training and management systems in all districts - pilot projects	Existence of x newly established nurseries, number of seedlings produced, number of seedlings sold Baseline: 0
1.2.3	Support the implementation of a reforestation programme aimed at restoring lost woodland and at establishing woodlots to reduce the pressure on natural forest. Link to agroforestry and sustainable land management	Number of hectares under agroforestry, number of ha of newly planted woodlots, number of seedlings produced and sold in x nurseries Baseline: 0
1.2.4	Planting of trees in degraded areas	Number of ha with newly planted trees that survived, number of seedlings planted, number of seedlings produced and sold in x nurseries Baseline: 0
1.2.1	Provide routine training (forestry handbook) to CMCs, forest management, land care and agricultural managers: 1 training in each district every two years	Number and type of activities carried out by the persons trained



Ref. No.	Options	Indicator
	<b>Lakes and Wetlands Management</b>	
1.3.1	Regular updating of district wetland inventories by districts	Availability of wetland inventories in each district, yearly update of wetland inventories
1.3.3	Study for economic valuation of wetland resources and disseminate the results	Each district is in the possession of the study reports
1.3.2	Updating of demarcated protection zones and acceptable utilization of wetlands, producing GIS maps of wetlands at various levels	Availability of GIS maps for x wetlands, number and ha of demarcated protection zones
1.3.4	Develop or review and update the wetland management/action plans	Availability of wetland management action plans (new and updated) in all districts
1.3.5	Restoration of vital (unique) critical (subject to on-going degradation) wetlands	Number of hectares of wetlands restored, number of open access areas for animals, activities undertaken by x wetlands management committees
	<b>Buffer Zone Set - asides</b>	
1.4.1	Mapping, demarcation of riparian and roadside protection zones and identify and implement source protection measures	Number of kilometres and size of riparian and roadside protection zones established, number of ha restored, availability of maps of riparian and roadside protection zones
	<b>Sanitations Systems</b>	
2.1.1	Improve sanitation technology and building material support and implement them	Number of toilets according to the type of improved technology constructed and used
2.1.2	Improve faecal sludge management (collection, transportation, treatment and re-use) through clustering of small towns (Kumi, Sironko, Kapchorwa, Nakapiripirit)	Availability and usage of sludge treatment facilities
	<b>Refurbishment of infrastructure</b>	
2.2.2	Refurbish valley dams and tanks	Number of times valley dams and times valley tanks refurbished and used
	<b>Piped Water Schemes (Surface Water)</b>	
2.3.2	Soroti treatment and distribution - expand in stages (NWSC)	Availability of 2 reservoirs and x new pipelines, number of people served with clean safe water from the extensions
	<b>Sand Dams</b>	
2.6.1	Feasibility studies and design of prioritised sand dams. Construction, with cooperation and input from local communities	Availability of 10 sand dams, number and type of activities carried out by the trained committees, number of people served from the new sand dams
	<b>Dams</b>	
2.7.2	Feasibility & design of prioritized dams for stock watering and humans needs. Construction, with cooperation and input from local communities	Availability of times valley dams and times dams, number of people and animals served
	<b>Enhancement of Irrigation</b>	
2.8.2	Enhancement of rain fed agriculture	Availability of x new irrigation schemes, number of hectares additionally irrigated, number of farmers who carry out soil/water conservation methods
2.8.5	Construction of new irrigation schemes: Low - power pumped schemes that utilize water from nearby rivers, swamps and lakes	Availability of 29 new irrigation schemes, number of farmers profiting from the new schemes, number of hectares irrigated

Ref. No.	Options	Indicator
2.8.6	Construction of new irrigation schemes: Simple gravity - fed schemes	Availability of 24 GFS irrigation schemes, number of farmers profiting from the new schemes, number of ha irrigated
2.8.3	New irrigation schemes: Undertake feasibility studies of identifies areas	Number and type of schemes proposed in the feasibility studies
2.8.7	Construction of new irrigation schemes: Type A Formal Irrigation	Availability of 3 Type A irrigation schemes, number of farmers profiting from the new schemes, number of ha irrigated
2.8.4	Construction of new irrigation schemes: Improved (seasonal) wetlands schemes	Availability of x irrigation schemes, number of farmers profiting from the new schemes, number of ha irrigated
<b>Water Use Efficiency</b>		
2.9.1	Water efficiency evaluation and recommendations	Evaluation report
<b>Small Hydropower</b>		
2.10.1	Investment and implementation in hydropower installations and grid distribution	Availability of x new power supply lines, number of people connected to the new grid lines
<b>Alternative Energy Supply</b>		
2.11.2	Promote use of energy efficient woodstoves by making the technology readily available	Number of people using the new woodstoves
2.11.1	Promote additional and alternative sources of energy including low cost solar panels to be used for LED lighting, radios and cell phones	Number of people using the new energy sources according to type
<b>Aquaculture</b>		
2.12.1	Develop a manual on aquaculture techniques (building on available material)	Availability and use of manual in each district
2.12.2	Assist farmers with rehabilitation of viable aquaculture ponds and in the construction of new ponds - allowance made for a pilot	Availability of x numbers of fish ponds, number of beneficiaries from the fish ponds
2.12.3	Train and assist farmers on the appropriate fishing techniques and equipment as well as the protection of breeding grounds	Number of fishermen trained, number of fishing grounds protected
<b>Socio-economic Strengthening</b>		
2.13.1	Create an ecological tourism organisation, train it and provide the necessary starting equipment e.g. a boat	Number of ecological tourism organisations trained, number of tourists visiting the sites Baseline: 0
2.13.2	Promote horticulture	Number of acres under horticulture Baseline 0, number and type of products harvested
2.13.3	Promote bee keeping	Number of farmers trained in bee keeping, amount of income from bee keeping per farmer Baseline: 0
<b>Mitigation and Adaptation</b>		
<b>Flood and Landslide Management and Preparedness for Floods and Landslides</b>		
3.1.1	Demarcate areas considered unsafe for habitation or other use and warn inhabitants	Number of ha demarcated unsafe for habitation
3.1.3	Development/Compilation of hazard/risk map for landslides/sedimentation/floods	Availability of risk maps for landslides, floods and sedimentation
3.1.2	Develop an early flood warning system	Availability of x early warning systems

Ref. No.	Options	Indicator
	<b>Cattle Keeping Practices</b>	
3.3.1	Determine current stocking rates and assess carrying capacity of all districts. Develop a plan to keep the numbers of animals within the theoretical limits of carrying capacity	Numbers of the current stocking rates, assessment of the carrying capacity with a plan to keep the number of animals in the limit
3.3.2	Livestock improvement programme	Number of vaccinations and spraying in the districts compared to the previous year, availability of x animal drug stores, number of people frequenting the drug stores, number of artificial inseminations carried out in comparison to the previous year
3.3.3	Promote dairy farming	Number of farmers engaging in dairy farming Baseline: 0, amount of income from dairy farming Baseline: 0
	<b>Social and Institutional Development</b>	
	<b>Monitoring</b>	
4.1.1	Monitoring stations must be maintained and regularly calibrated. Gauge readers need to be trained and check mechanisms introduced to ensure stability and consistency in data	Number of monitoring stations regularly rehabilitated and calibrated, data bases regularly updated
4.1.2	Expand, rehabilitate, and improve the water quality, evaporation, rainfall, ground water and streamflow monitoring network systems and lake and wetland water level monitoring gauges. Implement sedimentation monitoring	Reviewed and expanded monitoring network is in place
4.1.3	Monitor surface and ground water use and levels to prevent over - exploitation	Number and type of water resources investments using data from the monitoring networks
	<b>Extension Services</b>	
4.2.1	Train a committed cadre of extension service providers to render inter - disciplinary, integrated extension service to include CMCs, CDOs etc.	Number of persons trained, number and type of activities carried out by the persons trained
4.2.2	Develop support materials for use by extension officers (building on currently available materials)	Number and kind of support materials readily developed and disseminated to each district
	<b>Awareness Raising</b>	
4.3.5	Introduction of awareness raising programmes in schools	Number and type of activities carried out in x schools
4.3.1	Develop training guidelines and awareness raising materials (building on currently available materials)	Number and type of training guidelines and awareness raising materials available in all districts
4.3.2	Introduction of a community radio programme dedicated to environmental matters	Availability of x radio stations, number and type of environmental radio programmes aired out
4.3.4	Implement demonstration projects - schools, model farms etc. (capital costed elsewhere)	Availability of x model farms, ratio of number of products planted to harvested
4.3.3	Sanitation project. Demonstration of ecosan and other sanitation systems. Provision of appropriate designs and training in construction. Support with provision of materials	Number and type of demonstration toilets constructed, number of well maintained clean toilets
	<b>Institutional Capacity Building</b>	
4.4.1	Train experts (import expertise) in the development of technology guidelines, training and other approaches	Availability of technology guidelines in each district

Ref. No.	Options	Indicator
4.4.2	Enhance and strengthen the capacity of BMUs	Number of BMU members trained, number and type of activities carried out by the BMUs
4.4.3	Enhance and strengthen the capacity of rice grower associations	Number of persons trained, number and type of activities carried out by the rice grower associations
	<b>Legislation and Enforcement</b>	
4.5.1	Strengthen enforcement bodies with capacity	Number of persons trained, number of law enforcement activities carried out
4.5.2	Develop bylaws and ordinances on water and environmental management and protection	Availability of bylaws, ordinances on water and environmental management and protection, 20% reduction of environmental related offences

### 6.3 Investment Plan/Funding Requirements

In the investment plan, costs have been allocated to each option with all their necessary inputs as shown in the plan. The time frame for the implementation is laid out for 5-6 years, but can be extended especially in regard to the high number of options. However, in case of later implementation, the adequacy of the options has to be checked and if necessary adapted. A summary of the investment plan, which mainly shows the options, investments, and the costs distributed in the 5-6 year is presented in *Table 6-4*. A detailed investment plan is attached in annex 4, which should be read together with the intervention list to get the actual villages in which the interventions are.

Table 6-4: Summary Investment Plan

Ref. No.	Options	Description of Intervention	Yearly Cost Allocation [Thousand USD]				
			2015/16	2017	2018	2019	2020
1.1.8.1	Introduce improved farming practices	Construct 40 silos (UGX754,000/1.8ton)					
		Construct 60 underground water tanks (6000L)					
		Design and construct 2 irrigation systems (10 ha per layout)					
		Provide 40 ox-ploughs					
		Procure 2 tractors					
		Procure 50 fresian cattle					
		Procure 26 treadle pumps	804.3	402.2	402.2		
		Provide for 10 ha of woodlots					
		Put 53ha under agroforestry					
		Construct 400km contour bunds					
		Excavate 50km trenches					
Construct 5 cattle tracks							
Train and equip 1227 farmers							
1.1.8	Identification and regular (annually) eradication of floating islands / invasive alien plants	Procure 3 tractors					
		Procure 9 motor boats					
		Procure 18 wheelbarrows, hoes and other harvesting equipment	320.3	256.2	64.1		
		Construction of 6 barriers before Awoja bridge					
1.1.8	Ecological water requirements: Revisiting legislation and catchment assessment	Put in place legislation					
		Improve catchment assessment		117.9			
1.1.1	The preparation and dissemination of comprehensive and sustainable land and environmental management manual providing the technological approaches tailored for the Awoja Catchment and Kyoga WMZ	Develop a comprehensive and sustainable land and environmental management manual and disseminate it	98.6				

Ref. No.	Options	Description of Intervention	Yearly Cost Allocation [Thousand USD]				
			2015/16	2017	2018	2019	2020
1.1.2	Design and pilot of individual farms according to sustainable land and environmental management principles. Layout to include contouring, drain and waterway layout and improvements, road design, runoff management, woodlot and agroforestry planning	Practice agroforestry on 40ha, half woodlots					
		Put in place woodlots / agroforestry of 344 ha					
		Construct contour bunds of 190km					
		Road design / construction for 128km	1,478.9	1,478.9	985.9	739.4	246.5
		Construct 3 bridges					
		Install 7 small - drip irrigations (5ha each)					
		Put in place 14ha Nurseries					
		Carry out 14 sensitisations (50 people per sensitisation)					
		Procure 6 fire fighting equipment					
		Training of fire fighters (24)					
1.1.4	Development of a fire risk, fire control and fire protection plan, with controlled burning where required for grazing and biodiversity management and implement it	Carry out training of fire fighting 58 committees (10 people per committee)					
		Development of fire management plans					
		Carry out quarterly public awareness raising (113 communities, 50 people each)	658.3	493.8	493.8		
		Carry out community 41 trainings (50 people per training)					
		Establish fire lines					
		Put in place ordinance and by-laws					
		Construct gabions					
		Demarcations on rivers					
		Recourse of river					
		River pegging					
1.1.5	River bank protection and stabilisation - gabions, management of cattle access points, protection of riparian vegetation	Construct weirs					
		Construct bridges					
		Stone pitching of cattle access points	4,119.2	4,119.2	2,353.8	1,176.9	
		Construct cattle access points					
		Put in place woodlots					

		Plant riparian vegetation, 323km (4m wide)						
		Procure seedlings						
		De-silting (activity)						
1.1.9	Build the capacity on conservation methods, especially for wetlands	Form and train 15 environmental committees (10 people per committee)	328.1	328.1	164.1	66.8		
		Form and train 15 wetland user committees (10 people per committee)						
		Train community members in 10 villages (50 people per village)						
		Carry out sensitisations in 68 villages (50 people per village)						
		Develop training manuals (160 copies)						
1.1.10	Monitoring the impacts of sustainable land and environmental management in terms of improved farming practices (individual benefits) and downstream water management	Develop monitoring programmes for all 14 districts			66.8	66.8		
1.2.2	Establish nurseries for provision of seedling and establish distribution, training and management systems in all districts - pilot projects	Plant 36 nurseries (0.2 ha per nursery)	87.6	87.6				
1.2.3	Support the implementation of a reforestation programme aimed at restoring lost woodland and at establishing woodlots to reduce the pressure on natural forest. Link to agroforestry and sustainable land management	Plant tree 9 nurseries (0.2 ha per nursery)	886.9	886.9	221.7	221.7		
		Construct a greenhouse						
		One training of farmers						
		5 trainings for nursery managers						
		Agroforestry for 157ha						

Ref. No.	Options	Description of Intervention	Yearly Cost Allocation [Thousand USD]				
			2015/16	2017	2018	2019	2020
1.2.4	Planting of trees in degraded areas	Plant trees for 12km boundary (1m wide stretch)					
		Plant woodlots for 239ha					
		Procure seedlings 650,000 for 20ha					
		Plant 18 tree nurseries (0.2ha each)					
		Plant 12 nurseries (0.2ha each)					
		Carry out 18 sensitisations (50 people per sensitisation)	82.0	49.2	16.4	16.4	
		Carry out training of 40 farmers					
		Carry out training of 10 management committees (10 people per committee)					
		Development of a reforestation programme					
		Planting 1,155ha of trees					
1.2.1	Provide routine training (forestry handbook) to CMCs, forest management, land care and agricultural managers: 1 training in each district every two years	Procure 630,500 seedlings					
		Plant 6 tree nurseries (0.2ha each)					
		Train CMCs, forest management, land care and agricultural managers	22.5	22.5		22.5	
1.3.1	Regular updating of district wetland inventories by districts	Develop 8 wetland inventories	83.5	33.4	16.7	16.7	16.7
		Update 13 wetland inventories regularly					
1.3.3	Study for economic valuation of wetland resources and disseminate the results	Procure GIS equipment					
		Economic valuation of wetland resources and its dissemination			62.9		
1.3.2	Updating of demarcated protection zones and acceptable utilisation of wetlands, producing GIS maps of wetlands at various levels	Demarcation of 134 protection zones		1,402.3			



1.3.4	Develop or review and update the wetland management/action plans	<p>Update of 49 protection zones</p> <p>Produce GIS maps for all wetlands</p> <p>Establish 1 protection zone with suitable vegetation (plant riparian vegetation, 5ha)</p> <p>Procure GPS and GIS equipment</p> <p>Develop 94 wetland management action plans</p>	94.3	31.4	15.7	15.7
1.3.5	Restoration of vital (unique) critical (subject to on - going degradation) wetlands	<p>Review and update 126 wetland management action plans</p> <p>De-silt 3 rivers</p>		368.1	276.1	276.1
1.4.1	Mapping, demarcation of riparian and roadside protection zones and identify and implement source protection measures	<p>Restoration/tree planting in 63 wetlands (0.5ha each)</p> <p>Develop woodlots of 5ha</p> <p>Fence 1 acre with live hedges (0.254km by 1m wide)</p> <p>Peg off 12 open access areas for animals (each 0.5km)</p> <p>Restore the fish population in 16 areas</p> <p>Awareness creation in 40 villages (50 people per village)</p> <p>Train 2 wetland management committees (10 people per committee)</p> <p>Law enforcement and bylaws</p> <p>De-silt 15 rivers</p>		1,717.5	1,717.5	
2.1.1	Improve sanitation technology and building material support and implement them	<p>Establish a riparian buffer zone of 200ha</p> <p>30 m buffer zone along River Sironko and its tributaries (30km)</p> <p>Demarcation zones along Rivers Siit, Nyalit, Chepkwir, Kapteret, River Sipi and its tributaries (100km)</p> <p>Protection zones along 16 rivers (100km)</p> <p>Demarcation pillars in 6 areas</p> <p>15km river pegging of River Sironko</p> <p>Tree planting on 114ha</p> <p>Fodder grass planting for 36ha</p> <p>Woodlots: 15ha</p>	633.4	633.4		

Ref. No.	Options	Description of Intervention	Yearly Cost Allocation [Thousand USD]				
			2015/16	2017	2018	2019	2020
2.1.1		Seedlings: 50,000					
		Road side tree planting for 453km (1m wide)					
		16 cattle rams					
		Construction of 15 bridges					
		Construction of gabions					
		Mapping of rivers and road sides					
		15 sensitisations (50 people per sensitisation)					
		GPS, GIS systems					
		Train an inter-district committee between Ngora and Serere (20 people)					
		Construct 4 water-borne toilets (10stance)					
		2.1.2	Improve faecal sludge management (collection, transportation, treatment and re-use) through clustering of small towns (Kumi, Sironko, Kapchorwa, Nakapiripirit)	Construct 35 lined pit latrines (3stance including hand washing facility)			
Construct 24 lined pit latrines (4 stance including hand washing facility)							
Construct 40 VIP latrines (5stance including hand washing facility)							
Construct 10 VIP latrines (2stance including handwashing facility)							
Construct 57 ecosan toilets (4stance including hand washing facility)					745.0		
Carry out awareness creation in 45 villages							
Construct 3 incinerators							
Put in place 1 central faecal sludge treatment site for public institutions							

2.2.2	Refurbish valley dams and tanks	1 treatment facility for waste for Ongino hospital	1,786.7	1,461.9		
		Put in place 3 cesspools				
		Procure 4 cesspool emptiers				
		Construct 2 sewage systems				
		Establish and protect 2 lagoons				
		Promote use of effective microorganism (EMO) for sludge reduction				
		Refurbish 19 valley dams				
2.3.2	Soroti treatment and distribution - expand in stages (NWSC)	Refurbish 20 valley tanks				
		Construct 2 reservoirs of 200 cubic metres		141.1		141.1
		Lay 500km of pipeline extension				
2.6.1	Feasibility studies and design of prioritised sand dams. Construction, with cooperation and input from local communities	Construct 10 sand dams	890.4	890.4		
		Train 10 sand dam management committees (10 people per committee)				
2.7.2	Feasibility & design of prioritized dams for stock watering and humans needs. Construction, with cooperation and input from local communities	Construct 19 dams	1,300.0	2,166.7	866.7	
		Construct 14 valley dams				
2.8.2	Enhancement of rain fed agriculture	Install 4 abstraction facilities for livestock watering				
		Install 4 irrigation facilities with treadle pumps				
		Establish 288 rain water harvesting technologies for irrigation	1,282.0	1,098.9	549.4	366.3
		Provide 150 treadle pumps				
		80 sprinkler irrigations				
2.8.5	Construction of new irrigation schemes: Low - power pumped schemes that utilize water from nearby rivers, swamps and lakes	Establish 2 valley tanks with irrigation equipment				
		90 underground tanks with pipes and pumps,				
		2 rock and runoff harvesting facilities into underground tanks with pumps and pipes				
		2 GFS with equipment (20ha per system)		163.2	163.2	
		Provide short-term and drought resistant crops for 18 villages				

Ref. No.	Options	Description of Intervention	Yearly Cost Allocation [Thousand USD]				
			2015/16	2017	2018	2019	2020
		Mulching for 5 villages 6 demonstrations 6 sensitisations (100 people per sensitisation) Train 550 farmers on irrigation and soil/water conservation Construct 29 schemes (1ha per scheme)					
2.8.6	Construction of new irrigation schemes: Simple gravity - fed schemes	Construct 24 GFS (5ha per scheme)		548.1	548.1		
2.8.3	New irrigation schemes: Undertake feasibility studies of identifies areas	Construct 2 sprinkler irrigation schemes (10ha per scheme) Construct 2 rock catchment based schemes (5ha per scheme) Carry out feasibility studies for 82 irrigation schemes	98.6				
2.8.7	Construction of new irrigation schemes: Type A Formal Irrigation	Construct 3 irrigation schemes				251.6	167.7
2.8.4	Construction of new irrigation schemes: Improved (seasonal ) wetlands schemes	Construct 36 irrigation schemes			2,782.3	1,854.9	
2.9.1	Water efficiency evaluation and recommendations	Construct 1 GFS Construct 4 valley dams Construct irrigation channels for 6km Water efficiency evaluation and recommendations					62.9
2.10.1	Investment and implementation in hydropower installations and grid distribution	Construction of 8 dams				16,857.9	16,857.9

2.11.2	Promote use of energy efficient woodstoves by making the technology readily available	Extensions of electricity lines for 149km Train 1,430 persons on woodstove making and equip them	502.2	167.4	167.4	167.4	
2.11.1	Promote additional and alternative sources of energy including low cost solar panels to be used for LED lighting, radios and cell phones	Construct 21 woodstoves Carry out 29 sensitisations / demonstrations (100 people per sensitisation) 392 solar panels, including distribution		165.1	55.0	55.0	
2.12.1	Develop a manual on aquaculture techniques (building on available material)	26 wind turbines 40 radios 40 cell phones Train 42 persons in biogas digester making Construction of 42 biogas units 4 sensitisations, 100people sensitisation Develop a manual on aquaculture techniques	21.4				
2.12.2	Assist farmers with rehabilitation of viable aquaculture ponds and in the construction of new ponds - allowance made for a pilot	Construct 39 new fish ponds (5 x 5 x 2 m)		104.1	62.5	41.6	
2.12.3	Train and assist farmers on the appropriate fishing techniques and equipment as well as the protection of breeding grounds	Rehabilitate 27 fish ponds Establish 1 fish breeding centre Pilot 1 fish cage farming Train 66 farmers on the management of fish ponds Train 370 fishermen on appropriate fishing techniques and equip them	54.5	54.5			
2.13.1	Create an ecological tourism organisation, train it and provide the necessary starting equipment e.g. a boat	Form and train 23 ecological tourism organisations (10 people per organisation)		614.4	614.4	153.6	153.6

Ref. No.	Options	Description of Intervention	Yearly Cost Allocation [Thousand USD]				
			2015/16	2017	2018	2019	2020
2.13.2	Promote horticulture	Establish an office / information centre for each organization					
		Train 39 guides					
		Construct 9 bandas					
		Establish 17 campsites with the necessary equipment					
		Establish 7 restaurants with equipment					
		Establish 3 art and craft centres					
		Provide 31 binoculars					
		Procure 53 life jackets	139.6	104.7	69.8	34.9	
		Procure 7 cameras					
		Procure 4 guide books					
Procure 15 boats							
Procure 1 abseiling equipment							
Train 778 farmers and equip them with the necessary tools incl. seeds							
2.13.3	Promote bee keeping	Establish 10 demonstration plots, 12 greenhouses, irrigation pumps, treadle pumps, pipes, fencing					
		Train 1,054 farmers on modern bee keeping			449.5	337.1	337.1
3.1.1	Demarcate areas considered unsafe for habitation or other use and warn inhabitants	Procure 6,490 beehives					
		Procure 864 harvesting gear					
		Provide processing, packaging and marketing equipment for all					
		Set up 2 honey collection centres and 33 honey processing plants	63.8	63.8			
		Demarcate 104 areas unsafe for habitation and 5 settlements in game reserves					

3.1.3	Development/ Compilation of hazard/ risk map for landslides/sedimentation/floods	Develop/compile hazard/risk maps for landslides/sedimentation/floods	48.6				
3.1.2	Develop an early flood warning system	Establish 144 early warning systems for floods and landslides			103.0	103.0	
3.3.1	Determine current stocking rates and assess carrying capacity of all districts. Develop a plan to keep the numbers of animals within the theoretical limits of carrying capacity	Install 40 traditional early warning systems Form and train 34 early warning committees (10 people per committee) Determine current stocking rates and assess carrying capacity. Develop a plan to keep the numbers of animals within the theoretical limits of carrying capacity	65.0				
3.3.2	Livestock improvement programme	Establish 42 artificial insemination services		1,171.4	1,004.1	836.7	334.7
3.3.3	Promote dairy farming	47 cattle dips and crushes 62 zero grazing units 2 demo sites for tsetse and tick control 7 fodder banks 46 watering points 6 animal drug stores 6 demonstration ranches Provide 730 high cross breed cattle 124 goats 124 sheep Improved veterinary services in 45 locations including vaccinations, tsetse fly and tick control and spraying Train 668 farmers on improved modern management of livestock Carry out 25 awareness raising campaigns on good livestock practices, build capacity for veterinary staff and health workers (50 people per campaign) Provide 505 high breed dairy cattle					
					602.5	602.5	301.2

Ref. No.	Options	Description of Intervention	Yearly Cost Allocation [Thousand USD]				
			2015/16	2017	2018	2019	2020
4.1.1	Monitoring stations must be maintained and regularly calibrated. Gauge readers need to be trained and check mechanisms introduced to ensure stability and consistency in data	Establish 4 milk cooling plants					
		Establish 34 zero grazing units					
		Establish 9 fodder banks					
		Provide 60 milk coolers, 6 milking machines, minicoolers, transportation cans					
		Form and train 34 dairy farmers associations (50 people per association)					
		Train and equip 512 farmers					
		Train 20 practitioners in artificial insemination					
		Train 16 people on management of zero grazing, pasture, production and management	25.9	19.4	6.5	6.5	6.5
		Train 16 people on making yoghurt, ghee etc.					
		Plant 2 ha of fodder grass					
		Improve veterinary services, carry out 2 vaccination campaigns, carry out tick, tsetse and worm controls, tagging of animals					
Assessment of the monitoring stations, rehabilitation of the stations if necessary, training of gauge readers, regular data collection/monitoring, data analysis and appropriate data storage							
4.1.2	Expand, rehabilitate, and improve the water quality, evaporation, rainfall, ground water and stream flow monitoring network systems and lake and wetland water level monitoring gauges. Implement sedimentation monitoring	Assessment of the water quality, evaporation, rainfall, groundwater and stream flow monitoring network and water level monitoring gauges, rehabilitation or expansion of stations if necessary, regular data collection/monitoring, data analysis and appropriate data storage, set up a sedimentation monitoring network	25.9	19.4	6.5	6.5	6.5
4.1.3	Monitor surface and ground water use and levels to prevent overexploitation	Regular surface and groundwater monitoring, inventory of water users, monitoring and follow up of water abstraction permits	12.9	12.9	12.9	12.9	12.9



4.2.1	Train a committed cadre of extension service providers to render inter - disciplinary, integrated extension service to include CMCs, CDOs etc.	Train extension service providers to render inter - disciplinary, integrated services			27.2	27.2	
4.2.2	Develop support materials for use by extension officers (building on currently available materials)	Develop support materials for the extension officers		30.1			
4.3.5	Introduction of awareness raising programmes in schools	Establish 121 environmental clubs (15 people per club)		339.6	169.8	169.8	
4.3.1	Develop training guidelines and awareness raising materials (building on currently available materials)	Establish 50 drama clubs (15 people per club)	80.7				
		Establish 4 demo schools					
		Carry out 58 awareness raising campaigns (50 people per campaign)					
		Train teachers in 75 schools (10 people per school)					
		Provide Information Educational and Communication (IEC) material for 38 schools					
4.3.2	Introduction of a community radio programme dedicated to environmental matters	Establish 4 radio stations		95.1	47.5	47.5	
4.3.4	Implement demonstration projects - schools, model farms etc.	Establish environmental programmes: 5 x general, 1 x per month: 2 x, 2 x per month: 1 x, 1 x per week: 2 x, 3 x per week: 2 x, radio talk shows and spot messages: quarterly: 2 x, weekly:	237.7				
		Establish 3 radio listening clubs					
		Provision of IEC material for dissemination			501.4	300.9	200.6
		Establish 84 model farms					
4.3.3	Sanitation project. Demonstration of ecosan and other sanitation systems. Provision of appropriate designs and training in construction. Support with provision of materials	Establish woodlots in 16 schools (2ha per woodlot)					
		Nurseries in 22 schools (0.2ha per nursery)					
		Rehabilitate a poultry and piggery in 1 school					
		Form and train 43 young farmers associations (20 people per association)					
	Construct 61 with 5 stance VIP latrines			565.0	565.0	282.5	

Ref. No.	Options	Description of Intervention	Yearly Cost Allocation [Thousand USD]				
			2015/16	2017	2018	2019	2020
4.4.1	Train experts (import expertise) in the development of technology guidelines, training and other approaches	Construct 34 ecosan toilets					
		Construct 16 rubbish skips					
		Carry out 44 awareness raising campaigns (50 people per campaign)					
		Train households on waste management and disposal in 8 villages (100 people per village)					
		Form and train 16 sanitation groups (20 people per group)					
		Form and train 24 committees on ecosan toilets (10 people per committee)				28.6	
		Form and train 23 committees on management, operation and maintenance of latrines (10 people per committee)					
		Carry out 1 study on collapsable soil to find the most appropriate toilet systems					
		Train experts in the development of technology guidelines, training and other approaches					
4.4.2	Enhance and strengthen the capacity of BMUs	Form or reactivate 23 BMUs (20 people per BMU)	197.2	197.2			
4.4.3	Enhance and strengthen the capacity of rice grower associations	Train 227 BMU members					
		Sensitise 23 communities (50 people per community)					
		Establish 4 BMU shelters					
		Form 39 rice grower associations (15 people per association)		440.2	440.2	220.1	

4.5.1	Strengthen enforcement bodies with capacity	<p>Train 500 rice grower association members</p> <p>Carry out 12 awareness raising campaigns (50 people per campaign)</p> <p>2 exchange visits to established associations (25 people per visit)</p> <p>Construct processing centres with rice mills, storage facilities, rice haulers</p> <p>Provide seeds</p> <p>Develop training material</p> <p>Train and enforce environmental committees (3), law enforcement bodies (3) (police, UWA, LDUs) and community LCs on environmental law enforcement,</p>	27.9	18.6			
4.5.2	Develop by - laws and ordinances on water and environmental management and protection	<p>Train police in environmental affairs, increase of number of environmental police in Napak</p> <p>Develop bylaws and ordinances on water and environmental management and protection</p>	39.3				
<b>Total</b>			<b>15,257</b>	<b>20,397.8</b>	<b>18,550.9</b>	<b>27,389.1</b>	<b>20,081.5</b>

Table 65B: Summary Investment Plan for climate change Interventions

Ref. No.	Options	Description of Intervention	Yearly Cost Allocation (USD)				
			2020/2021	2022	2023	2024	2025
1.1.11	Develop and implement climate change awareness creation strategy addressing sustainable land and environment management	-Conduct a holistic climate change capacity needs assessment	200,000				
		-Develop a climate change capacity building and training plan and program		20,000			
1.1.12	Promote climate change planning at sector, catchment and sub-catchment levels	-Carry out a robust economic needs assessment in the most impacted sectors by climate change (agriculture, water, energy, infrastructure-roads, bridges, settlements)			200,000		
1.1.13	Promote climate -smart -integrated landscape management approaches.						
		-Plant flood resistant crop varieties	300,000				
		-Apply climate smart land use and building codes for private and public buildings.	20,000				
		-Invest in making existing and new buildings more resilient.	50,000,000				
		-Review and update to apply the climate smart transport codes		20,000			
		-Promote climate smart aquaculture practices		2,000,000			
		-Demarcate, gazette and restore wetland areas.		500,000			
		-Promote climate smart agro-forestry practices		300,000			
		-Climate proof investments of drainage plans and systems.			500,000		



Ref. No.	Options	Description of Intervention	Yearly Cost Allocation (USD)					
			2020/2021	2022	2023	2024	2025	
1.1.17	Undertake carbon stock assessment	-Conceptualization of the framework of the circular business models -Assess and measure the carbon stores and their stock changes in the land use patterns of forests, wetlands, crop lands and grasslands to gain carbon credits. -Compute and analyse greenhouse gas accounting -Take stock of natural and private capital assets of natural resources in the catchment.		50,000 200,000				
1.1.18	Conduct natural resource accounting for ecosystems in the catchment.	-Conduct a water balance -Carry out green resource accounting of natural assets in the biota, land and water ecosystems -Encourage natural resource planning ( inherent value of resources for GHG emissions, carbon stores, degradation and economic losses). -Encourage planting trees on private and public land -Establish agro-forestry systems in the catchment			200,000 200,000	200,000 200,000		
1.2.6	Promote woodlots and agro-forestry	-Encourage tree planting and regeneration on public and private land		3,000,000				
1.2.7	Build capacity and promote use of practices for managed regeneration of wetland and indigenous trees to increase tree cover in degraded catchment and sub-sub-catchment areas.		1,500,000					

					500,000				
								100,000	
1.3.6	Promote water catchment, wetlands and lake systems through integrated watershed management					100,000			
						100,000			
						100,000			
						100,000			
						200,000			
						200,000			
								200,000	
								200,000	
1.3.7	Promote payment for ecosystem services for enhanced ecosystem management and benefits								
						100,000			
						100,000			

Ref. No.	Options	Description of Intervention	Yearly Cost Allocation (USD)					
			2020/2021	2022	2023	2024	2025	
		-Demarcation and gazettement of critical and vital wetland systems and their maintenance in the catchment as carbon sinks		100,000				
		-Design and implementation of RAMSAR site wetland resarch, ecotourism and education centres				200,000		
		-Creation of catchment information database through re-inventory and assessment of all wetlands in the catchment				200,000		
	Buffer Zone Set – asides	-Strengthen wetland and lake management institutions respond for wetland and lake management and conservation			100,000			
		-Promote wetland and lake law enforcement and governance			100,000			
		-Demarcation and gazettement of critical and vital wetland systems and their maintenance in the catchment as carbon sinks			100,000			
		-Design and implementation of RAMSAR sites and framework wetland and lake management plans				100,000		
		-Design and implementation of the district wetland action plans in the catchment with carbon sink potential					200,000	
		-Design and implementation of RAMSAR site wetland resarch, ecotourism and education centres						200,000
		-Creation of catchment information database through re-inventory and assessment of all wetlands in the catchment						200,000



1.4.2	Identify and protect fragile ecosystems including steep slopes, river banks, sih breeding areas and wet-lands			500000				
<b>Total</b>			<b>53,090,000</b>	<b>7,690,000</b>	<b>46,320,000</b>	<b>2,240,000</b>	<b>4,400,000</b>	

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# ANNEX 1 – Screening of Options

## SCREENING CRITERIA

OFF-LINE SCREENING OF OPTIONS		Screened Totals for Sub-options											
No	Option / Sub-option	Sustainability	Consequences of failure to implement	Capacity to implement	Cost	Ease of implementation (physical feasibility)	Opportunity costs (if any)	Environmental benefit (+ve)	Environmental cost (-ve)	Economic benefit	Social Benefit	Importance of issue(s) addressed	Overall impact of option
		Definite long-term sustainability (5) Sustainable (3) Uncertain-it depends (0) Short-term only (-3) Most unlikely (-5)	None. Issue(s) will resolve naturally over time (-3) Issue(s) increase but remain at same relative scale (0) Escalation of issue(s) (3)	None/inadequate (-3) Weak (-2) Capacity to be built/recruited (-1) Limited capacity (1) Good - available (3)	Prohibitive (-5) Very expensive (-3) Expensive (-1) Reasonably affordable (3) Very affordable (5)	Very difficult (-3) Difficult (-2) Feasible/possible (2) Very feasible (3)	Very high (-3) High (-2) (Limited (-1) None (0)	No impact (0) Minimal positive impact (3) High impact positive (5)	High Negative Impact (-5) Minimal negative impact (-3) No impact (0)	Low (1) Medium (3) High (5)	Low (1) Medium (3) High (5)	Low (1) Medium (3) High (5)	Addresses one issue (1) 2-3 issue (3) more than 3 issues (5)
<b>1. Source Protection</b>													
1.1	<b>Sustainable land &amp; environmental management</b>												
1.1.1	The preparation and dissemination of a comprehensive Sustainable Land and Environmental Management manual providing the technological approaches tailored for the Awoja Catchment and Kyoga WMZ.	5	3	1	2	0	0	0	0	1	1	5	5
1.1.2	Design and pilot of individual farms according to sustainable land and environmental management principles. Layout to include contouring, drain and waterway layout and improvements, road design, runoff management, woodlot and agroforestry planning	5	3	-1	-2	-1	0	5	0	5	5	5	5
1.1.3	Identification and regular (annually) eradication of floating islands / invasive alien plants	3	3	3	3	2	0	3	0	3	3	5	3
1.1.4	Development of a fire risk, fire control and fire protection plan, with controlled burning where required for grazing and biodiversity management and implement it	3	3	1	2	2	-2	5	0	1	1	5	3
1.1.5	Riverbank protection and stabilisation - gabions, management of cattle access points, protection of riparian vegetation	5	3	-1	-1	-2	-2	5	0	3	3	5	5
1.1.6	Rehabilitation of degraded landscapes through construction of check dams, demi-lunes, swales, brush packs and stone packs, fanya juu etc.	3	3	-1	-2	2	0	5	0	3	5	5	3

**OFF-LINE SCREENING OF OPTIONS**

		Screened Totals for Sub-options																			
OFF-LINE SCREENING OF OPTIONS	No Option / Sub-option		35	26	37	26	8														
	1.1.7	On-farm rainwater harvesting - channelling of overland flow and excess runoff into underground storage tanks for irrigation and household water excluding drinking	3	5	3	0	2	-1	3	3	3	3	3	3	3	3	3	3	3	3	
	1.1.8	Ecological water requirements: revisiting legislation and catchment assessment	3	5	5	0	2	3	3	3	3	3	3	3	3	3	3	3	3	3	
	1.1.8.1	Introduce improved farming practices	5	5	5	0	3	3	3	3	3	3	3	3	3	3	3	3	3	3	
	1.1.9	Build the capacity on conservation methods, especially for wetlands	5	5	5	-1	3	5	3	3	3	3	3	3	3	3	3	3	3	3	
	1.1.10	Monitoring the impacts of sustainable land and environmental management in terms of improved farming practices (individual benefit), and downstream water management	1	5	1	0	2	-1	0	0	0	0	0	0	0	0	0	0	0	0	0
	<b>1.2</b>	<b>Reforestation</b>																			
	1.2.1	Provide routine training (forestry handbook) to CMCs, forest management, landcare and agricultural managers: 1 training in each district @2yrs	3	5	1	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.2.2	Establish nurseries for provision of seedlings and establish distribution, training and management systems in all districts - pilot projects	5	5	5	0	2	-1	3	3	3	3	3	3	3	3	3	3	3	3	3
	1.2.3	Support the implementation of a reforestation programme aimed at restoring lost woodland and at establishing woodlots to reduce the pressure on natural forest. Link to agroforestry and sustainable land management	5	5	5	0	-2	5	5	5	5	5	5	5	5	5	5	5	5	5	5

1.2.4	Plant trees in degraded areas	5	5	1	3	0	0	5	0	2	3	1	3	3	31
<b>1.3</b>	<b>Lakes and wetlands management</b>														
1.3.1	Regular updating of district wetland inventories by districts	1	3	1	1	0	3	0	3	3	1	3	3	3	22
1.3.2	Updating of demarcated protection zones and acceptable utilisation of wetlands, producing GIS maps of wetlands at various levels	1	3	1	1	0	3	0	3	2	3	-1	3	3	19
1.3.3	Study for the economic valuation of wetland resources and disseminate the results	3	5	1	1	0	3	0	3	-2	4	-1	3	3	20
1.3.4	Review and update the wetland management / action plans	5	5	3	3	0	5	-2	-2	-2	-1	-2	3	0	17
1.3.5	Restoration of vital (unique) critical (subject to on-going degradation) wetlands	5	5	3	3	0	5	-2	-3	-3	-2	-2	3	0	15
<b>1.4</b>	<b>Buffer zone set-asides</b>														
1.4.1	Mapping, demarcation of riparian and roadside protection zones, and identify & implement source protection measures	3	3	1	1	0	0	0	3	3	2	-1	0	-3	9
<b>2. Development for Socio-economic Growth</b>															
<b>2.1</b>	<b>Sanitation systems</b>														
2.1.1	Improve sanitation technology, and building material support and implement them	3	5	5	3	0	5	0	2	2	3	-1	3	3	31
2.1.2	Improve faecal sludge management (collection, transportation, treatment and re-use) through clustering of small towns (Kumi Sironko, Kapchorwa, Nakapiripirit)	3	1	1	3	-3	3	0	-3	-3	-3	-3	0	0	-1
<b>2.2</b>	<b>Refurbishment of infrastructure</b>														
2.2.2	Refurbish valley dams and tanks	5	5	5	5	-3	3	-1	2	2	-1	3	0	0	23
2.2.3	Refurbish springs, boreholes, pumps, hand pumps and piped systems	3	5	5	3	0	0	0	2	2	2	-1	3	3	25
2.2.4	Rehabilitate those irrigation schemes where economically and socially justifiable. Bunamono and Labori schemes identified	3	5	5	5	-3	3	-1	2	2	-1	-1	0	0	17
<b>2.3</b>	<b>Piped water schemes (Surface water)</b>														
2.3.1	Design and construct River Agu scheme to supply Kumi and surrounds - water and wastewater works	1	5	5	1	-3	0	-1	-2	-2	2	1	0	3	12
2.3.2	Soroti treatment and distribution - expand in stages (NWSC)	1	5	5	1	-3	0	-1	-2	-2	2	1	0	3	12

**OFF-LINE SCREENING OF OPTIONS**

		Screened Totals for Sub-options	12
<b>OFF-LINE SCREENING OF OPTIONS</b>	<b>Sustainability</b>	Definite long-term sustainability (5) Sustainable (3) Uncertain-it depends (0) Short-term only (-3) Most unlikely (-5)	3
	<b>Consequences of failure to implement</b>	None. Issue(s) will resolve naturally over time (-3) Issue(s) increase but remain at same relative scale (0) Escalation of issue(s) (3)	0
	<b>Capacity to implement</b>	None/inadequate (-3) Weak (-2) Capacity to be built/recruited (-1) Limited capacity (1) Good - available (3)	1
	<b>Cost</b>	Prohibitive (-5) Very expensive (-3) Expensive (-1) Reasonably affordable (3) Very affordable (5)	2
	<b>Ease of implementation (physical feasibility)</b>	Very difficult (-3) Difficult (-2) Feasible/possible (2) Very feasible (3)	-2
	<b>Opportunity costs (if any)</b>	Very high (-3) High (-2) (Limited (-1) None (0)	-1
	<b>Environmental benefit (+ve)</b>	No impact (0) Minimal positive impact (3) High impact positive (5)	0
	<b>Environmental cost (-ve)</b>	High Negative Impact (-5) Minimal negative impact (-3) No impact (0)	-3
	<b>Economic benefit</b>	Low (1) Medium (3) High (5)	1
	<b>Social Benefit</b>	Low (1) Medium (3) High (5)	5
	<b>Importance of issue(s) addressed</b>	Low (1) Medium (3) High (5)	5
	<b>Overall impact of option</b>	Addresses one issue (1) 2-3 issue (3) more than 3 issues (5)	1
	<b>No</b>	<b>Option / Sub-option</b>	
2.3.3	Identify, design and construction of further piped water schemes for growing towns and villages at regional growth centres, including supply to larger industries		
<b>2.4</b>	<b>Groundwater development</b>		
2.4.1	Feasibility studies of availability and supply for prioritised towns and settlements		25
2.4.2	Design and construction of groundwater schemes for towns/settlements		24
2.4.3	Groundwater schemes / boreholes for domestic and livestock supply - evaluation, design, construction (focus on Districts 1,2 and 14)		25
<b>2.5</b>	<b>Rainwater harvesting (roof water tanks and roof catchments)</b>		
2.5.1	Provision of subsidised rainwater tanks to willing buyers. Implementation should be based on a cost-sharing mechanism		32
<b>2.6</b>	<b>Sand dams</b>		
2.6.1	Feasibility studies and design of prioritised sand dams. Construction, with cooperation and input from local communities		26
<b>2.7</b>	<b>Dams (small stock watering dams, valley dams and tanks, large dams)</b>		
2.7.1	Needs identification for location and type of dams and associated abstraction facilities		30



2.7.2	Feasibility & design of prioritised dams for stock watering and human needs. Construction, with cooperation and input from local communities	4	4	4	4	4	4	4	-1	2	0	2	-1	-1	3	1	21
<b>2.8</b>	<b>Enhancement of irrigation</b>																
2.8.1	Provide farmers with appropriate technologies for the abstraction of water from rivers and shallow boreholes. This would include facilitating access to treadle pumps and small motorised pumps and the construction of small diversion weirs. Prioritise the drier areas of Kapchorwa and Kween on the leeward side of Mt. Elgon, Karamoja and Teso	4	5	5	5	5	5	5	-2	0	-1	2	1	-1	0	-1	17
2.8.2	Enhancement of rainfed agriculture	5	5	5	5	5	5	5	-1	0	0	3	3	1	2	3	31
2.8.3	New irrigation schemes: undertake feasibility studies of identified areas	3	3	2	2	2	2	2	-4	1	-2	2	3	-2	0	2	10
2.8.4	Construction of new irrigation schemes: Improved (seasonal) Wetland Schemes	2	3	3	3	3	3	3	-5	0	-1	2	3	1	-3	-1	7
2.8.5	Construction of new irrigation schemes: low-power pumped schemes that utilize water from nearby rivers, swamps and lakes	4	5	4	5	4	5	4	-4	0	-2	2	2	1	2	1	20
2.8.6	Construction of new irrigation schemes: simple gravity-fed schemes	4	5	4	5	4	5	4	-4	0	-2	2	2	1	2	1	20
2.8.7	Construction of new irrigation schemes: Type A formal Irrigation	4	5	3	4	3	4	3	-3	0	-2	-2	-2	-2	3	0	8
2.8.8	Construction of new irrigation schemes: Type B formal Irrigation	4	5	3	3	3	3	3	-3	0	-1	-3	-4	-2	3	0	5
<b>2.9</b>	<b>Water use efficiency</b>																
2.9.1	Water efficiency evaluation and recommendations	2	2	2	3	0	5	0	0	2	0	2	3	0	2	3	24
<b>2.10</b>	<b>Small hydropower</b>																
2.10.1	Investment and implementation in hydropower installations and grid distribution	1	5	3	5	-1	1	-1	-1	2	3	2	3	3	0	3	24
<b>2.11</b>	<b>Alternative energy supply</b>																
2.11.1	Promote additional and alternative sources of energy including low cost solar panels to be used for LED lighting, radios and cell phones	3	3	5	3	0	0	0	0	-2	0	3	3	-1	0	0	14
2.11.2	Promote use of energy efficient woodstoves by making the technology readily available	5	5	5	3	0	5	0	0	-2	0	3	3	-1	3	3	29
<b>2.12</b>	<b>Aquaculture</b>																
2.12.1	Develop a manual on aquaculture techniques (building on available material)	3	3	1	1	0	0	0	0	2	0	2	4	-1	0	5	18
2.12.2	Assist farmers with the rehabilitation of viable aquaculture ponds and in the construction of new ponds - allowance made for a pilot	3	3	3	3	-3	3	-1	-1	2	-1	2	1	-1	0	3	16

**OFF-LINE SCREENING OF OPTIONS**

Screened Totals for Sub-options		28
Sustainability	Definite long-term sustainability (5) Sustainable (3) Uncertain-it depends (0) Short-term only (-3) Most unlikely (-5)	0
Consequences of failure to implement	None. Issue(s) will resolve naturally over time (-3) Issue(s) increase but remain at same relative scale (0) Escalation of issue(s) (3)	3
Capacity to implement	None/inadequate (-3) Weak (-2) Capacity to be built/recruited (-1) Limited capacity (1) Good - available (3)	-1
Cost	Prohibitive (-5) Very expensive (-3) Expensive (-1) Reasonably affordable (3) Very affordable (5)	3
Ease of implementation (physical feasibility)	Very difficult (-3) Difficult (-2) Feasible/possible (2) Very feasible (3)	2
Opportunity costs (if any)	Very high (-3) High (-2) (Limited (-1) None (0)	0
Environmental benefit (+ve)	No impact (0) Minimal positive impact (3) High impact positive (5)	5
Environmental cost (-ve)	High Negative Impact (-5) Minimal negative impact (-3) No impact (0)	0
Economic benefit	Low (1) Medium (3) High (5)	5
Social Benefit	Low (1) Medium (3) High (5)	3
Importance of issue(s) addressed	Low (1) Medium (3) High (5)	5
Overall impact of option	Addresses one issue (1) 2-3 issue (3) more than 3 issues (5)	3
No	Option / Sub-option	
2.12.3	Train and assist farmers on the appropriate fishing techniques and equipment as well as the protection of breeding grounds	
<b>2.13</b>	<b>Socio-economic strengthening</b>	
2.13.1	Create an ecological tourism organisation, train it and provide the necessary starting equipment e.g. a boat	22
2.13.2	Promote horticulture	15
2.13.3	Promote bee keeping	17
<b>3. Floods and Droughts Mitigation</b>		
<b>3.1</b>	<b>Flood management and preparedness for floods</b>	
3.1.1	Demarcate areas considered unsafe for habitation or other use and warn inhabitants	36
3.1.2	Develop an early flood warning system	13
3.1.3	Development / compilation of a hazard / risk map for landslides / sedimentation / floods	22
<b>3.2</b>	<b>Construction of infrastructure for flood control</b>	
3.2.1	Plan and implement flood retention structures, with cooperation and input from local communities	30

3.2.2	Plan and construct levees in areas where this can have optimal benefit with minimal disadvantage to users further downstream, with cooperation and input from local communities	1	3	3	3	3	-3	0	-1	2	-2	3	0	0	9
3.2.3	Assess structures within flood prone areas (roads, bridges, culverts) and their resistance to flooding. Then strengthen roads, bridges and culverts for better flood resistance and ensure that escape routes are not cut off	1	5	5	5	5	-3	3	0	2	3	3	3	3	30
<b>3.3</b>	<b>Cattle keeping practices</b>														
3.3.1	Determine current stocking rates and assess carrying capacity of all districts. Develop a plan to keep the numbers of animals within the theoretical limits of carrying capacity	3	3	3	3	1	0	5	-1	2	2	3	3	3	27
3.3.2	Livestock improvement programme	1	1	5	5	5	0	0	0	2	2	3	0	3	22
3.3.3	Promote dairy farming	3	5	3	5	5	-3	3	-2	-2	-3	-2	-3	0	4
<b>4. Social and Institutional Development</b>															
<b>4.1</b>	<b>Monitoring</b>														
4.1.1	Monitoring stations must be maintained and regularly calibrated. Gauge readers need to be trained and check mechanisms introduced to ensure stability and consistency in data.	5	5	3	3	3	0	3	0	3	3	3	3	3	34
4.1.2	Expand, rehabilitate, and improve the water quality, evaporation, rainfall, groundwater and streamflow monitoring network systems and lake and wetland water-level monitoring gauges. Implement sedimentation monitoring.	5	5	3	3	3	0	3	0	3	-1	3	3	3	30
4.1.3	Monitor surface and groundwater use and levels to prevent over-exploitation	5	3	3	3	3	0	5	0	2	2	3	3	3	32
<b>4.2</b>	<b>Extension services (information and training)</b>														
4.2.1	Train a committed cadre of extension service providers to render inter-disciplinary, integrated extension service to include CMCs, CDOs, etc.	5	5	5	5	5	0	5	0	2	3	3	3	3	39
4.2.2	Develop support materials for use by extension officers (building on currently available material)	5	5	5	3	5	0	5	0	2	2	3	3	3	36
<b>4.3</b>	<b>Awareness raising</b>														
4.3.1	Develop training guidelines and awareness raising materials (building on currently available materials)	5	5	5	3	5	0	5	0	3	-1	3	3	3	34
4.3.2	Introduction of a community radio programme dedicated to environmental matters	5	5	5	3	5	0	5	0	2	-1	3	3	3	33

**OFF-LINE SCREENING OF OPTIONS**

		Screened Totals for Sub-options						
OFF-LINE SCREENING OF OPTIONS	No	Option / Sub-option		22	27	35		
	4.3.3	Sanitation project. Demonstration of ecosan and other sanitation systems. Provision of appropriate designs, and training in construction. Support with provision of materials		0	0	3		
	4.3.4	Implement demonstration projects - schools, model farms etc. (capital costed elsewhere)		3	0	3		
	4.3.5	Introduction of awareness raising programmes in schools		0	-1	-1		
	<b>4.4</b>	<b>Institutional capacity building</b>		3	2	2		
	4.4.1	Train experts (import expertise) in the development of technology guidelines, training, and other approaches		0	0	0	28	
	4.4.2	Enhance and strengthen the capacity of BMUs		0	-1	3	27	
	4.4.3	Enhance and strengthen the capacity of rice grower associations		0	-1	3	14	
	<b>4.5</b>	<b>Legislation and enforcement</b>		3	2	2		
	4.5.1	Strengthen enforcement bodies with capacity		0	0	3	34	
				<b>Average score for options</b>			<b>22.6</b>	<b>No of options</b>
							<b>77</b>	

## ANNEX 2 – Intervention Lists

### INTERVENTION SITES FOR THE OPTIONS District: AMUDAT

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
1.1.1	The preparation and dissemination of comprehensive and sustainable land and environmental management manual providing the technological approaches tailored for the Awoja catchment and Kyoga WMZ	Amudat	N/A	N/A	N/A	N/A	N/A			
1.1.2	Design and pilot of individual farms according to sustainable land and environmental management principles. Layout to include contouring, drain and waterway layout and improvements, road design, runoff management, woodlot and agroforestry planning	Amudat	Karita	Karita	Naporokocho Lokoma Lomamcheche Chepkararat Lwakai Lokales Karengboche Kararon	Road design, woodlots and agro forestry, bridges for access	120 km from the main road, 10 hectares in each village, 3 bridges	1	3	8
1.1.3	Identification and regular (annually) eradication of floating islands / invasive alien plants	Amudat	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a
1.1.4	Development of a fire risk, fire control and fire protection plan, with controlled burning where required for grazing and biodiversity management and implement it	Amudat	Karita	Lokales	Kokwachaiya Amuna Kanyerus Lwakai Lokales Naporokocho Lohoma Kaidom	Fire fighting equipment (fire extinguishers etc.), recruit and train fire fighters, develop a fire management plan, raise public awareness	24 fire fighters (3 per village in 2 quarters)	1	3	8

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
1.1.5	River bank protection and stabilisation - gabions, management of cattle access points, protection of riparian vegetation	Amudat	Karita	Lokales	Lokales Lomamcheche Moru-arengan Agula Napokocho Karita Center Losidok	Construction of gabions, tree planting along the riverbanks and Chepkararat seasonal rivers, stone pitching of cattle access points	20 sq.km tree planting, gabions (45 km), seasonal rivers 15 km, stone pitching of cattle access points (7 sq.km), 1 by-law	1	3	7
1.1.8	Ecological water requirements: Revisiting legislation and catchment assessment	Amudat	N / A	N / A	N / A	N / A	N / A	n/a	n/a	n/a
1.1.8.1	Introduce improved farming practices	Amudat	Karita	Lokales	Lwakai Karita Lokales Lomamcheche Amuna Kaichom Karita Naporokocho Kanyerus	Use of fertilisers, build stores (cylos), use of ox ploughs, tractors, improved seeds	5 irrigation schemes per village, 50 fresian cattle introduced, stores/granaries (fire proof stores) (5 par village), improved seeds, tractors for an association to rent it out to farmers, 10 ox ploughs per village	1	2	9
1.1.9	Build the capacity on conservation methods, especially for wetlands	Amudat	Karita	Lokales	Lokales Karita	Build capacity in SCs and parishes of environmental committees, assist communities to develop environmental actions plans	40 people, 10 par parish: training of community members (30 par parish)	1	2	
1.1.10	Monitoring the impacts of sustainable land and environmental management in terms of improved farming practices (individual benefits) and downstream water management	Amudat	Karita	Lokales	All targeted villages	Monitoring visits, community monitoring meetings		1	2	
1.2.1	Provide routine training (forestry handbook) to CMCs, forest management, land care and agricultural managers: 1 training in each district @ 2 yrs	Amudat	N / A	N / A	N / A	N / A	N / A	n/a	n/a	n/a

1.2.2	Establish nurseries for provision of seedling and establish distribution, training and management systems in all districts - pilot projects	Amudat	Karita	Lokales Karita Losidole	Lomamcheche Karita TC Cheptapoyo	3 nurseries	1 nursery per village	1	3	3
1.2.3	Support the implementation of a reforestation programme aimed at restoring lost woodland and at establishing woodlots to reduce the pressure on natural forest. Link to agroforestry and sustainable land management	Amudat	Karita	Lokales Karita	Lomamcheche Naporokocha Karita Kanyerus Lwakai Cheptapoyo	Reforestation, woodlots	3 areas of reforestation and 5 places of woodlots	1	3	6
1.2.4	Planting trees in degraded areas			Losidok	Cheptapoyo	Trees: Neem, gurvira, acacia, teak, dryland eucalyptus etc.	2 ha per village			7
1.3.1	Regular updating of district wetland inventories by districts	Amudat	Karita	Lokales	Kaichum Naporochoch Agule Lomamcheche Lwakai Alalam Chepkararat	Establish inventory	1 quarterly update	1	2	3
1.3.2	Updating of demarcated protection zones and acceptable utilization of wetlands, producing GIS maps of wetlands at various levels	Amudat	Karita	Lokales Losidok	Greek Lokales Lokoma	GPS handsets, laptop, computers, updating of zones	3 handsets, 3 laptops	1	3	15
1.3.3	Study for economic valuation of wetland resources and disseminate the results	Amudat	N / A	N / A	All All All N / A	N / A	N / A	n/a	n/a	n/a
1.3.4	Review and update the wetland management / action plans	Amudat	Karita	Lokales Losidok	Greek Lokoma	Conduct quarterly review meetings, review draft action plan for Greek, develop plan for Lokoma	4 in a year	1	2	2

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
1.3.5	Restoration of vital (unique) critical (subject to on-going degradation) wetlands	Amudat	Karita	Lokales Karita	Lomamcheche Naporokocho	Create community awareness, plant trees, law enforcement and by-laws	2 villages for awareness creation, 2 wetlands restored	1	2	2
1.4.1	Mapping, demarcation of riparian and roadside protection zones and identify and implement source protection measures	Amudat	Karita	Lokales Karita Losidok	Greek River Karita River Lokoma Wetland Chepkararat River	GPS, GIS system, maps, signposts, laptops, pillars	3 handsets, 1 GIS, 2 signposts, 3 laptops	1	3	4
2.1.1	Improve sanitation technology and building material support and implement them	Amudat	Karita	Lokales Karita Losidok	Lwakai Naporokocho Lokales Lomamcheche Karita Kaichom Kanyerus Amuna Lokoma	Pit latrines, hand washing facilities, awareness creation	8 pit latrines (4stance plus urinar) per village and 8 hand washing facilities per village	1	3	9
2.1.2	Improve faecal sludge management (collection, transportation, treatment and re-use) through clustering of small towns (Kumi, Sironko, Kapchorwa, Nakapiririt)	Amudat	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a
2.2.2	Refurbish valley dams and tanks	Amudat	Karita	Karita	Kaicho (valley dam)	Valley dam	1	1	1	1
2.3.1	Design and construct river Agu scheme to supply Kumi and surroundings - water and wastewater works	Amudat	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a
2.3.2	Soroti treatment and distribution - expand in stages (NWSC)	Amudat	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a
2.6.1	Feasibility studies and design of prioritised sand dams. Construction, with cooperation and input from local communities	Amudat	Karita	Lokales Karita	Chepkararat Karita Karengbocho	Construction of sand dams	3 sand dams	1	1	3



2.7.1	Needs identification for location and type of dams and associated abstraction facilities	Amudat	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	n/a	n/a
2.7.2	Feasibility & design of prioritized dams for stock watering and humans needs. Construction, with cooperation and input from local communities	Amudat	Karita	Karita	Lokom Karita	This area receives moderate rainfall	2 dams	1	1	1	2	2
2.8.2	Enhancement of rain fed agriculture	Amudat	Karita	Lokales	Kakoron Narukanes Lokales Ward A Lokales Ward B Agule Moruakuruk	Treadle pumps, sprinkler irrigation, introduce short term and drought resistant crops, training of farmers	20 farmers per village	1	1	1	6	6
2.8.3	New irrigation schemes: Undertake feasibility studies of identifies areas	Amudat	Karita	Lokales Karita	Lomamcheche Naporokocho Lokales Karita Kaichom	Feasibility studies	5 schemes	1	2	1	5	5
2.8.4	Construction of new irrigation schemes: Improved (seasonal) Wetlands Schemes	Amudat	Karita	Lokales Karita	Lomancheche Naporokocho Lokales Karita Kaichom		5 schemes	1	2	1	5	5
2.8.5	Construction of new irrigation schemes: Low - power pumped schemes that utilize water from nearby rivers, swamps and lakes	Amudat	Karita	Lokales	Lokales (Greek River)	Construction of new irrigation scheme	1 scheme	1	1	1	1	1
2.8.6	Construction of new irrigation schemes: Simple gravity-fed schemes.	Amudat	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a	n/a	n/a
2.8.7	Construction of new irrigation schemes: Type A Formal Irrigation.	Amudat	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a	n/a	n/a
2.8.8	Construction of new irrigation schemes: Type B formal irrigation Formal Irrigation		N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a	n/a	n/a
2.9.1	Water efficiency evaluation and recommendations	Amudat	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a	n/a	n/a

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
2.10.1	Investment and implementation in hydropower installations and grid distribution	Amudat	N/A	N / A	N/A	N / A	N / A	n/a	n/a	n/a
2.11.1	Promote additional and alternative sources of energy including low cost solar panels to be used for LED lighting, radios and cell phones	Amudat	Karita	Lokales	Lwakai Naporokocho Lokales Lomamcheche Amuna Karita Kaichom Kanyerus	Solar panels, biogas for trading centres ie Karita T/C, Lokales T/C, Cheptapoyo T/C, Cheptakoratic T/C	4 primary schools, 4 trading centres, 3 health units	1	2	8
2.11.2	Promote use of energy efficient woodstoves by making the technology readily available	Amudat	Karita	Karita	Kaichom Karita Amuna Naporokocho Kanyerus Lwakai Lokales	Training of women to make energy saving stoves, provision of tool kits, awareness raising	5 groups of women per parish, 14 tool kits per parish	1	2	7
2.12.1	Develop a manual on aquaculture techniques (building on available material)	Amudat	N/A	N / A	N/A	N / A	N / A	n/a	n/a	n/a
2.12.2	Assist farmers with rehabilitation of viable aquaculture ponds and in the construction of new ponds - allowance made for a pilot	Amudat	Karita	Lokales	Lomamcheche	Construction of new ponds	1 new pond	1	1	1
2.12.3	Train and assist farmers on the appropriate fishing techniques and equipment as well as the protection of breeding grounds	Amudat	N/A	N / A	N/A	N / A	N / A	n/a	n/a	n/a

2.13.1	Create an ecological tourism organisation, train it and provide the necessary starting equipment e.g a boat	Amudat	Karita	Lokales	Lomamcheche Arukanes Lokales Agule Naaporokocho Kaichom	Create and build capacity of CBOs, build camps, train guides	4 well equipped camps, 4 cameras, 4 binoculars, 2 capacity buildings of CBOs and guides, 4 guide books	1	2	6
2.13.2	Promote horticulture	Amudat	Karita	Lokales	Lokales Agule Kakoron Kaichom	Vegetable gardens, introduction of good seeds	20 farmers per village	1	2	4
2.13.3	Promote bee keeping	Amudat	Karita	Lokales	Kaichom Karita Amuna Lwakai Lomamcheche Kanyerus	Beehives, value addition, harvesting, processing and packaging equipment, train farmer groups	600 beehives, 60 pcs of harvesting gear, training of 12 farmer groups	1	2	6
3.1.1	Demarcate areas considered unsafe for habitation or other use and warn inhabitants	Amudat	Karita	Lokales	Naporokocho Lokoma Arukanes Agule Lomamcheche	Discussion with people of settlement in game reserve		1	1	5
3.1.2	Develop an early flood warning system	Amudat	Karita	Lokales	Lokales Agule Arukanes Kakoron Moruakuruk Lomamcheche	Early warning systems	6	1	1	6
3.1.3	Development / Compilation of hazard / risk map for landslides / sedimentation / floods	Amudat	N / A	N / A	N / A	N / A	N / A	n/a	n/a	n/a

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
3.3.1	Determine current stocking rates and assess carrying capacity of all districts. Develop a plan to keep the numbers of animals within the theoretical limits of carrying capacity	Amudat	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a
3.3.2	Livestock improvement programme	Amudat	Karita	Lokales	Lomamcheche Lokales Karita Kaichom Lokoma	Cattle crutches, veterinary services, vaccination equipment, artificial insemination, cross breeding, demosite for teak control and awareness raising, tsetse fly control: traps and chemicals (2 demosites and awareness raising)	5 cattle crutches, 2 demo sites for tsetse fly and teak control each, training of 1 person / SC on artificial insemination, train and equip community and animal health workers	1	2	5
3.3.3	Promote dairy farming	Amudat	Karita	Karita	Kaichom Karita Amuna Naporokocho Lwakai Lokales Lomamcheche Kanyerus	Improve on breeds, teak control, tsetse and worm control, training of communities on management of zero grazing, pasture and ranching (16 people), training on making yoghurt, ghee etc. (16 people)	Trainings: 2 x 16 people, mini coolers, 50 cross bred cattle	1	2	8
4.1.1	Monitoring stations must be maintained and regularly calibrated. Gauge readers need to be trained and check mechanisms introduced to ensure stability and consistency in data	Amudat	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a

4.1.2	Expand, rehabilitate, and improve the water quality, evaporation, rainfall, ground water and streamflow monitoring network systems and lake and wetland water level monitoring gauges. Implement sedimentation monitoring	Amudat	N/A	N/A	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a
4.1.3	Monitor surface and ground water use and levels to prevent over - exploitation	Amudat	N/A	N/A	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a
4.2.1	Train a committed cadre of extension service providers to render inter - disciplinary, integrated extension service to include CMCs, CDOs etc.	Amudat	Karita	Lokales Karita Losidok	N/A	N/A	N/A	Train committed cadres	3 (1 per parish)	1	3	
4.2.2	Develop support materials for use by extension officers (building on currently available materials)	Amudat	N/A	N/A	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a
4.3.1	Develop training guidelines and awareness raising materials (building on currently available materials)	Amudat	N/A	N/A	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a
4.3.2	Introduction of a community radio programme dedicated to environmental matters	Amudat	Karita	Lokales Karita Losidok	N/A	N/A	N/A	Develop a radio station for Amudat, community radio programmes, radio listening clubs	1 radio station, 3 (1 per parish)	1	3	3
4.3.3	Sanitation project. Demonstration of ecosan and other sanitation systems. Provision of appropriate designs and training in construction. Support with provision of materials	Amudat	Karita	Karita	Kaichom Karita Amuna Naporokocha Lwakai Lomamcheche Lokales Kanyerus	N/A	Train on waste management of disposal at household level on human waste, awareness raising	8 villages		1	2	8
4.3.4	Implement demonstration projects - schools, model farms etc. (capital costed elsewhere)	Amudat	Karita	Lokales Kaita	Lokales P/S Karita P/S	N/A	Model schools farms	2		1	2	2
4.3.5	Introduction of awareness raising programmes in schools.	Amudat	Karita	Lokales Karita Losidok	Lokales P/S Karita P/S Chetapoyo P/S	N/A	Awareness raising	3		1	3	3

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
4.4.1	Train experts (import expertise) in the development of technology guidelines, training and other approaches	Amudat	N/A	N/A	N/A	N/A	N/A			
4.4.2	Enhance and strengthen the capacity of BMUs	Amudat	N/A	N/A	N/A	N/A	N/A	n/a		
4.4.3	Enhance and strengthen the capacity of rice grower associations	Amudat	N/A	N/A	N/A	N/A	N/A	n/a		
4.5.1	Strengthen enforcement bodies with capacity			Karita		Strengthen environmental committees, strengthen law enforcement bodies (police, UWA, LDUs)	2 x 3 per parish			
		Amudat	Karita	Lokales						
				Losidok						
								<b>39</b>	<b>77</b>	<b>178</b>

### INTERVENTION SITES FOR THE OPTIONS **District: BUKEDEA**

Options	District	Sub-county	Parish	Village	Type of structure	No. of structures
The preparation and dissemination of comprehensive and sustainable land and environmental management manual providing the technological approaches tailored for the Awoja catchment and Kyoga WMZ	Bukedea	N/A	N/A	N/A	N/A	N/A
Design and pilot of individual farms according to sustainable land and environmental management principles. Layout to include contouring, drain and waterway layout and improvements, road design, runoff management, woodlot and agroforestry planning	Bukedea	Kachumbala	Aligoi	Aligoi	Soil and water conservation structures, woodlots and agroforestry	10 ha of soil & water conservation structures, 7 ha of woodlots and 10 ha of agroforestry
Identification and regular (annual) eradication of floating islands/ invasive alien plants	Bukedea	N/A	N/A	N/A	N/A	N/A
Development of a fire risk, fire control and fire protection plan, with controlled burning where required for grazing and biodiversity management and implement it	Bukedea	N/A	N/A	N/A	N/A	N/A

River bank protection and stabilisation - gabions, management of cattle access points, protection of riparian vegetation	Bukedea	Kolir	Komongomeri	Akou Etom	Gabions, protection of riparian vegetation, cattle access points (River Sironko)	Gabions for 100 m in each village, 2 cattle access points per village
			Akuoro	Akuoro		
Ecological water requirements: revisiting legislation and catchment assessment	Bukedea	N/A	Suula	Aloet	N/A	N/A
			N/A	N/A		
Introduce improved farming practices	Bukedea	Kachumbala	Kotia	Kotia	Organic farming (compost & slurry), field ditches, hedgerows, strip ban	20 households
			Akwariikwar	Akwariikwar	Agroforestry & zero grazing	20 households
			Kajamaka	Kalupo	Hedgerows, strip bans	20 households
			Katekwan	Katekwan	Cattle tracks	5
			Koena	Koena	Agroforestry & woodlots	10 ha respectively
Build the capacity on conservation methods, especially for wetlands	Bukedea	Kachumbala HQ Bukedea TC Kolir HQ Malera HQ Bukedea HQ			Training of environmental committees in wetlands on wetland management	60 people per S/C (1 committee per SC)
Monitoring the impacts of sustainable land and environmental management in terms of improved farming practices (individual benefits) and downstream water management	Bukedea	N/A	N/A	N/A	N/A	N/A
			N/A	N/A	N/A	N/A
Provide routine training (forestry handbook) to CMCs, forest management, land care and agricultural managers: 1 training in each district @ 2 yrs	Bukedea	N/A	N/A	N/A	N/A	N/A
			N/A	N/A	N/A	N/A
Establish nurseries for provision of seedling and establish distribution, training and management systems in all districts - pilot projects	Bukedea	Bukedea HQ Kolir Bukedea TC Kachumbala Kidongole Malera	Kamon	Kamon	Nurseries	1 nursery per village
			Kolir	Kolir		
			Emokori	Emokori		
			Kachumbala	Kachumbala		
			Kidongole	Kidongole		
Kabarwa	Kabarwa					

Options	District	Sub-county	Parish	Village	Type of structure	No. of structures
Support the implementation of a reforestation programme aimed at restoring lost woodland and at establishing woodlots to reduce the pressure on natural forest. Link to agroforestry and sustainable land management	Bukedea	Bukedea HQ	Kamon	Kamon	Capacity building, woodlots, tree planting	30 ha per village, 6 community sensitisations
				Kolir		
				Emokori		
				Kachumbala		
				Kidongole		
				Kabarwa		
				Kachumbala		
				Kachumbala		
				Kachumbala		
				Kachumbala		
Planting trees in degraded areas	Bukedea	Bukedea HQ	Kamon	Kamon wetland	Tree seedlings	30 ha
				Kolir		
				Emokori B		
				Oswapai		
				Okunguro		
				Emokori		
				Kachumbala		
				Kachumbala		
				Kobori		
				Katekwan		
Regular updating of district wetland inventories by districts	Bukedea	Bukedea TC	Emokori B	Anyebo wetland	GIS Software, GPS, procurement of computers, water proof ware	Wetland inventory exists, but requires updating
				Oswapai		
				Okunguro		
				Emokori		
				Kachumbala		
				Kobori		
				Katekwan		
				Kidongole		
				Kotiokot		
				Kabarwa		
Updating of demarcated protection zones and acceptable utilization of wetlands, producing GIS maps of wetlands at various levels	Bukedea	Bukedea TC	Oswapai	Anyebo wetland	Provide GIS Software, GPS, computers for updating of the demarcated zones	Update demarcations
				Okunguro		
				Kobori		
				Katekwan		
				Kotiokot		
				Kachumbala		
				Kidongole		
				Malera		
				N/A		
				Study for economic valuation of wetland resources and disseminate the results		
N/A						
N/A						
N/A						
N/A						
N/A						
N/A						
N/A						
N/A						
N/A						



Review and update the wetland management / action plans	Bukedea	Bukedea HQ	Kamon	Kamon wetland	Need for review of the action plans	1 per SIC
		Kolir	Kolir	Kolir wetland		
		Bukedea TC	Emokori	Emokori wetland		
		Kachumbala	Kachumbala	Kachumbala wetland		
		Kidongole	Kidongole	Kidongole wetland		
		Malera	Kabarwa	Kabarwa wetland		
Restoration of vital (unique) critical (subject to on - going degradation) wetlands	Bukedea	Bukedea TC	Emokori B	Anyebo wetland	Creating awareness on wetland use, grass and tree planting	6 wetlands
			Oswapai	Oswapai wetland		
			Okunguro	Obiro wetland		
		Kidongole	Kobori	Kobori wetland		
			Katekwan	Katekwan wetland		
		Malera	Kotiokot	Aakol wetland		
Mapping, demarcation of riparian and roadside protection zones and identify and implement source protection measures	Bukedea	Kolir	Kolir	Kocus Tajir	River bank pegging of River Sironko	15 km
Improve sanitation technology and building material support and implement them	Bukedea	Kolir	Aminit	Busano P/S	Ecosan toilets, lined pit latrines, sensitise people on benefits of using such technologies	Schools get 1 ecosan toilet each and health centres and the market 1 lined pit latrine each (5stance per institution)
			Tajar	Busano HC111		
				Tajar P/S		
				Tajar HC11		
		Malera	Kangole	Kangole P/S		
				Kangole HC11		
			Kangole TC			
Improve faecal sludge management (collection, transportation, treatment and reuse) through clustering of small towns	Bukedea	Bukedea TC	Emokori A	Emokori-Cattle market	N/A	N/A
		N/A	N/A	N/A		
Refurbish valley dams and tanks	Bukedea	Malera	Kacoc	Kodukul dam	Desilting equipment (back hoe)	2 desilting equipments
		Bukedea HQ	Kakere	Kakere valley tank		
			Akuoro	Otank (Akeru) valley tank		
		Kolir	Angangam	Angangam dam		

Options	District	Sub-county	Parish	Village	Type of structure	No. of structures
Design and construct river Agu scheme to supply Kumi and surroundings - water and wastewater works	Bukedea	N/A	N/A	N/A	N/A	N/A
Soroti treatment and distribution - expand in stages (NWSC)	Bukedea	N/A	N/A	N/A	N/A	N/A
Feasibility studies and design of prioritised sand dams. Construction, with cooperation and input from local communities	Bukedea	N/A	N/A	N/A	N/A	N/A
Needs identification for location and type of dams and associated abstraction facilities	Bukedea	Kolir	Aminit	Aminit	Valley dams	5
			Kamaturo	Kamaturo		
			Kangole	Kangole		
			Kaleu	Kaleu		
			Kodike	Kodike		
			Aminit	Aminit		
Feasibility & design of prioritized dams for stock watering and humans needs. Construction, with cooperation and input from local communities	Bukedea	Kolir	Kamaturo	Kamaturo	5	
			Kangole	Kangole		
			Kaleu	Kaleu		
			Kodike	Kodike		
			Kokwech	Kokwech		
			Kotiokot	Kamuno		
			Komongmeri	Sagam		Underground pumps, delivery pumps for irrigation, best farming practices (mulching, contours)
				Komongmeri		
				Akou Etom		
			Bukedea HQ	Kocheka		15 farmers per village
Omonyono						
Apopo						
New irrigation schemes: Undertake feasibility studies of identifies areas	Bukedea	Kolir	Kacabul	Undertake feasibility studies	8 schemes	
			Kamaturo			
			Tajar			
			Kokus			
			Aminit			

		Malera	Kangole Kaleu Kodike Koreng	Kaleu Kaleu Kodike Koreng					
Construction of new irrigation schemes: Improved (seasonal ) Wetlands Schemes	Bukedea	Kolibir	Kamutur	Kamutur	Valley dams	8 schemes			
			Tajar	Tajar					
			Kocus	Kocus					
			Aminit	Aminit					
	Bukedea	Malera	Kangole	Kangole	8 schemes				
			Kaleu	Kaleu					
			Kodike	Kodike					
			Koreng	Koreng					
Construction of new irrigation schemes: Low - power pumped schemes that utilize water from nearby rivers, swamps and lakes	Bukedea	Kolibir	Kamutur	Kamutur	8 schemes				
			Tajar	Tajar					
			Kocus	Kocus					
			Aminit	Aminit					
	Bukedea	Malera	Kangole	Kangole	8 schemes				
			Kaleu	Kaleu					
			Kodike	Kodike					
			Koreng	Koreng					
Construction of new irrigation schemes: Simple gravity - fed schemes	Bukedea	Kolibir	Kamutur	Kamutur	8 schemes				
			Tajar	Tajar					
			Kocus	Kocus					
			Aminit	Aminit					
	Bukedea	Malera	Kangole	Kangole	8 schemes				
			Kaleu	Kaleu					
			Kodike	Kodike					
			Koreng	Koreng					
Construction of <b>new</b> irrigation schemes: Type A Formal Irrigation	Bukedea	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Construction of new irrigation schemes: Type B Formal Irrigation	Bukedea	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Options	District	Sub-county	Parish	Village	Type of structure	No. of structures		
Water efficiency evaluation and recommendations	Bukedea	N/A	N/A	N/A	N/A	N/A		
Investment and implementation in hydropower installations and grid distribution	Bukedea	N/A	N/A	N/A	N/A	N/A		
Promote additional and alternative sources of energy including low cost solar panels to be used for LED lighting, radios and cell phones	Bukedea	Bukedea HQ	Suula	Suula P/S	Solar panels and biogas technology for each school	Solar panels and biogas technology for each school		
		Kolir	Okum	Kalengo P/S				
		Bukedea TC	Emokori A	Bukeda P/S				
		Kachumbala	Komuge	Komuge P/S				
		Kidongole	Kidongole	Kidongole P/S				
Promote use of energy efficient woodstoves by making the technology readily available	Bukedea	Bukedea HQ	Kakere	Gagama	Training of households	30 households per village		
				Atirir				
				Okobwa				
			Suula	Aloet				
		Kachumbala	Kwarikwari	Kwanikar				
				Nyakoi				
		Kidongole	Kanyamutamu	Koena			Aligoi	Aligoi
								Kachinga
								Kanyamutamu A
								Kanyamutamu B
	Koena A							
		Koena B						
Develop a manual on aquaculture techniques (building on available material)	Bukedea	N/A		N/A	N/A	N/A		
Assist farmers with rehabilitation of viable aquaculture ponds and in the construction of new ponds - allowance made for a pilot	Bukedea	Malera	Kangole	Matata	Construct new ponds, fish fingerlings, fish feeds, training on management of the ponds	1 pond per village, 1 farmer per village		
			Kotiokot	Kotiokot				
		Bukedea HQ	Bukedea	Suula				
			Kidongole	Kidongole				
Train and assist farmers on the appropriate fishing techniques and equipment as well as the protection of breeding grounds	Bukedea	Malera	Kangole	Kangole (L. Matata)	Proper size nets, training on better methods	50 fishermen per village		
			Kotiokot	Kotiokot (L. Aakol)				

Create an ecological tourism organisation, train it and provide the necessary starting equipment e.g a boat	Bukedea	Malera	Kangole	Kangole (Migratory birds)	Improve on road network to sites, 2 binoculars, set up an information centre, create and train a tourism organisation, training of guides	2 guides per village
		Kachumbala	Komuge	Komuge (Rocksites painting)		
Promote horticulture	Bukedea	Malera	Kachede	Kachede	Green houses, irrigation pumps, pipes, training farmer groups on value addition, acquire processing equipment e.g. pulp extractors, storage tanks	1 green house demonstration per village, 3 groups of 30 members per SC
			Kodikie	Kodikie		
			Kaleu	Kaleu		
		Bukedea TC	Kachabu	Apopo		
		Kolir	Tajar	Tajar		
			Kamutur	Kamutur		
Promote bee keeping	Bukedea	Kidongole	Chodong	Chodong A	Train farmers, beehives, harvesting gear, processing equipments, storage tanks, packaging material	5 farmers per village
				Chodong B		
			Kajamaka	Kosiye		
		Bukedea HQ	Kasoka	Kawuje		
				Kasoka		
				Ajamaka		
		Bukedea TC	Okunguro Parents	Okunguro Parents		
				Sagam		
				Ogaalam		
		Kolir	Apopong	Popong		
			Agangam	Agangam		
	Komongmeri	AkouEtom				
	Aligoi	Aligoi				
		Kachinga				
	Malera	Malera	Kangole			

Options	District	Sub-county	Parish	Village	Type of structure	No. of structures					
Demarcate areas considered unsafe for habitation or other use and warn inhabitants	Bukedea	Kolir	Kamutur	Kamutur		8 villages					
			Tajar	Tajar							
			Kocus	Kocus							
			Aminit	Aminit							
		Malera	Kangole	Kangole							
			Kaleu	Kaleu							
			Kodike	Kodike							
			Koreng	Koreng							
			Develop an early flood warning system	Bukedea			Kolir	Kamutur	Kamutur	Early warning systems	8 villages
								Tajar	Tajar		
Kocus	Kocus										
Aminit	Aminit										
Malera	Kangole	Kangole									
	Kaleu	Kaleu									
	Kodike	Kodike									
	Koreng	Koreng									
	Bukedea	N/A			N/A	N/A	N/A	N/A			
									Bukedea		
Livestock Improvement Programme	Bukedea	Malera	Kangole	Kangole	Construction of cattle cruches / troughs, improved fodder, exotic bulls, artificial insemination, vetinary services, training farmers	2 water troughs per village, 20 farmers per village trained on improved livestock practices and 2 farmers per village receive 1 exotic bull each					
			Kodike	Kodike							
			Kobaale	Kobaale							
			Koreng	Koreng							
			Kamailuk	Kamailuk							
							Kamailuk				
								Kamailuk			
									Kamailuk		
										Kamailuk	
											Kamailuk



Options	District	Sub-county	Parish	Village	Type of structure	No. of structures
Expand, rehabilitate, and improve the water quality, evaporation, rainfall, ground water and streamflow monitoring network systems and lake and wetland water level monitoring gauges. Implement sedimentation monitoring	Bukedea	N/A	N/A	N/A	N/A	N/A
Monitor surface and ground water use and levels to prevent over-exploitation.	Bukedea	N/A	N/A	N/A	N/A	N/A
Train a committed cadre of extension service providers to render interdisciplinary, integrated extension service to include CMCs, CDOs etc.	Bukedea	N/A	N/A	N/A	N/A	N/A
Develop support materials for use by extension officers (building on currently available materials)	Bukedea	N/A	N/A	N/A	N/A	N/A
Develop training guidelines and awareness raising materials (building on currently available materials)	Bukedea	N/A	N/A	N/A	N/A	N/A
Introduction of a community radio programme dedicated to environmental matters	Bukedea				Environmental programme using the radio station in Kumi	2 emissions per month
Sanitation project. Demonstration of ecosan and other sanitation systems. Provision of appropriate designs and training in construction. Support with provision of materials	Bukedea	Kolir	Kolir	Kolir P/S	Ecosan toilets plus handwashing facilities, sensitise people on the benefits of using such technologies	5 stance ecosan toilets per school plus handwashing facilities
			Komonmeri	Komongmeri P/S		
			Kachumbala	Kachumbala P/S		
		Kidongole	Kotia P/S			
			Kidongole H/Q	Kidongole P/S		
		Bukedea TC	Kosiro	Kosiro P/S		
			Emokori A	Bukedea SS		
Suula	Suuna P/S					



Implement demonstration projects - schools, model farms etc. (capital costed elsewhere)	Bukedea	Bukedea TC	Emokori A	Bukedea P/S	Woodlots, seedlings, wheel barrows, garden forks, hoes, pangas	Woodlots - 1 acre per school
				Bukedea SS		
				Bukedea Township		
				Suuna P/S		
				Akworo P/S		
				Kamon P/S		
				Kidongole H/Q		
				Kosiro P/S		
				Kachumbala P/S		
				Kotia P/S		
Kolir P/S						
Komongmeri P/S						
Introduction of awareness raising programmes in schools	Bukedea	Bukedea TC	Emokori A	Bukedea P/S	Establish environmental clubs, ICT materials, drama clubs	12 schools
				Bukedea SS		
				Bukedea Township		
				Suuna P/S		
				Akworo P/S		
				Kamon P/S		
				Kidongole H/Q		
				Kosiro P/S		
				Kachumbala P/S		
				Kotia P/S		
Kolir P/S						
Komongmeri P/S						
Import experts (import expertise) in the development of technology guidelines, training and other approaches	Bukedea	N/A	N/A	N/A	N/A	N/A
				N/A		
Enhance and strengthen the capacity of BMUs	Bukedea	Malera	Kangole	Kangole ( L.Matata)	Establish BMUs and train members	2
			Kotiokot	Kotiokot (L.Aakol)		

Options	District	Sub-county	Parish	Village	Type of structure	No. of structures
Enhance and strengthen the capacity of rice grower associations	Bukedea	Kidongole	Kobori	Kobori wetland	Form and train rice grower associations, awareness raising campaigns in all wetlands	1 association of 10 people per wetland, 2 awareness raising campaigns per wetland
			Katekwan	Katekwan wetland		
			Emokori	Anyebo wetland		
		Oswapai wetland	Oswapai wetland			
		Okunguro	Obiro wetland			
Strengthen enforcement bodies with capacity	Bukedea	Malera	Kotiokot	Aakol wetland	N/A	N/A
		N/A	N/A	N/A		

### INTERVENTION SITES FOR THE OPTIONS **District: BUKWO**

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
1.1.1	The preparation and dissemination of comprehensive and sustainable land and environmental management manual providing the technological approaches tailored for the Awoja catchment and Kyoga WMZ	Bukwo	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a
1.1.2	Design and pilot of individual farms according to sustainable land and environmental management principles. Layout to include contouring, drain and waterway layout and improvements, road design, runoff management, woodlot and agroforestry planning	Bukwo	Kabei	Mutushet	Lungwa	Contour bunds, woodlots, trenches	1 farm in each village	3	6	10
			Kapsenton	Kapkorosoi						
			Kabei	Kitau						
		Chesower	Nyalit	Bisho						
				Cheptandan						
				Chesower						
				Chemuron						
				Chepkwasta						
		Tulei	Kabukwo	Roroo						
			Chekwir	Turlwo						
1.1.3	Identification and regular (annually) eradication of floating islands / invasive alien plants	Bukwo	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a

<b>1.1.4</b>	Development of a fire risk, fire control and fire protection plan, with controlled burning where required for grazing and biodiversity management and implement it	Bukwo	Riwo Lower Tulel Kamet	Aralam Chepkwir Mokoyon	Aralam Ngeny Turo Tuwobei Mokoyon Chebinyiny	Develop a fire control and protection plan for grazing and biodiversity, form and train committees for fire fighting and management	1 committee per village	3	3	6
<b>1.1.5</b>	River bank protection and stabilisation - gabions, management of cattle access points, protection of riparian vegetation	Bukwo	Chesower	Siit (R. Siit) Nyalit (R. Nyalit)	Kamunjan Molol Kapsiywo Rorok Nyalit	4 cattle access points, gabions, tree planting: 4 km 3 cattle access points, tree planting: 4 km 6 cattle access points, tree planting: 8 km 8 cattle access points, tree planting: 7 km		3	4	9
<b>1.1.8</b>	Ecological water requirements: Revisiting legislation and catchment assessment	Bukwo	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a
<b>1.1.8.1</b>	Introduce improved farming practices (as learning centres)	Bukwo	Kamet Riwo Kortek Chesower Kabei Tulel	Yemitek Brim Kobobei Siit Kapsemeton Tulel	Brown Brim Kobobei Chepkwasta Kapsemeton Korot	Zero grazing, naper grass, contour bunds, agroforestry, mulching, fencing, fruit trees, vegetables, coffee, bananas	Train 10 farmers per village	6	6	6
<b>1.1.9</b>	Build the capacity on conservation methods especially for wetlands	Bukwo	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a
<b>1.1.10</b>	Monitoring the impacts of sustainable land and environmental management in terms of improved farming practices (individual benefits) and downstream water management	Bukwo	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
1.2.1	Provide routine training (forestry handbook) to CMCs, forest management, land care and agricultural managers: 1 training in each district @ 2 yrs	Bukwo	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a
1.2.2	Establish nurseries for provision of seedlings and establish distribution, training and management systems in all districts - pilot projects	Bukwo	Chesower Kamet Kabei	Nyalit Yemitek Kapsemeton	Nyalit Chematow Kapsemeton	Create and train a nursery management team, soil materials, seeds incl. moringa, fodder and napier grass, coffee, vegetables, avocado, jackfruit; gardening equipment	3 nurseries	3	3	3
1.2.3	Support the implementation of a reforestation programme aimed at restoring lost woodland and at establishing woodlots to reduce the pressure on natural forest. Link to agroforestry and sustainable land management	Bukwo	Kabei Riwo Kamet Tulel Chesower	Kapteret Brim Aralam Mokoyon Kabukwo Bisho	Kona Shambabel Aralam Kongta Rorok Bisho	Tree planting: local and agroforestry species, woodlots: indigenous and multipurpose trees e.g suspana	2 ha per parish	5	6	6
1.2.4	Planting trees in degraded areas	Bukwo	Kortek	Chesimat	Sindet Chesimat Sosur Rwandoi Kokonwo Kapsikwa Chebinying Chebuyonon	Indigenous and multipurpose trees	1 ha per village	1	1	8
1.3.1	Regular updating of district wetland inventories by districts	Bukwo	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a
1.3.2	Updating of demarcated protection zones and acceptable utilization of wetlands, producing GIS maps of wetlands at various levels	Bukwo	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a

1.3.3	Study for economic valuation of wetland resources and disseminate the results	Bukwo	N/A	N/A	N/A	N/A	N/A	N/A	N/A	n/a	n/a			
1.3.4	Review and update the wetland management / action plans	Bukwo	N/A	N/A	N/A	N/A	N/A	N/A	N/A	n/a	n/a			
1.3.5	Restoration of vital ( unique) critical (subject to on going degradation) wetlands	Bukwo	N/A	N/A	N/A	N/A	N/A	N/A	N/A	n/a	n/a			
1.4.1	Mapping, demarcation of riparian and roadside protection zones and identify and implement source protection measures	Bukwo	Chesower	Siit (R. Siit)	Kamunjan	Mapping and demarcation of whole rivers, protect sources and springs with trees and grasses, road protection: mapping and demarcation of major and feeder roads, tree planting along roads for 100 km	3	4	9	N/A	n/a			
												Molol		
												Kapsiywo		
												Rorok		
												Nyalit		
												Kapkumolon		
Tulel/Kamet	Kapkumolon (R. Chepkwir)	Chekwir												
			Kabei	Kapteret (R. Kapteret)	Kapteret									
						Korosh								
2.1.1	Improve sanitation technology, and building materials, support and implement them	Bukwo	Chesower	Kabei	Kamet	Ecosan toilets, train households on usage of ecosan toilets incl. composting, management of waste	6	6	20 ecosan toilets per S/C on household level (following criteria to be developed)	N/A	n/a			
												Tulel		
												Riwo		
												Kartek		
												N/A	N/A	N/A
2.1.2	Improve faecal sludge management (collection, transportation, treatment and re-use) through clustering of small towns (Kumi, Sironko, Kapchorwa, Nakapiripit)	Bukwo	N/A	N/A	N/A	N/A	N/A	N/A	N/A	n/a	n/a			
2.2.2	Refurbish valley dams and tanks	Bukwo	N/A	N/A	N/A	N/A	N/A	N/A	N/A	n/a	n/a			
2.3.1	Design and construct River Agu scheme to supply Kumi and surrounds water and waste water works	Bukwo	N/A	N/A	N/A	N/A	N/A	N/A	N/A	n/a	n/a			
2.3.2	Soroti treatment and distribution - expand in stages (NWSC)	Bukwo	N/A	N/A	N/A	N/A	N/A	N/A	N/A	n/a	n/a			

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
2.6.1	Feasibility studies and design of prioritised sand dams. Construction with co operation and input from local communities	Bukwo	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a
2.7.1	Needs identification for location and type of dams and associated abstraction facilities	Bukwo	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a
2.7.2	Feasibility and design of prioritised dams for stock watering and human needs. Construction with cooperation and input from local communities	Bukwo	Kamet	Lwongon	Ndilai	Construction of new valley dams	3 dams	3	3	3
			Riwo	Aralam	Kapkwon					
			Tulel	Chekwir	Tulwo					
2.8.2	Enhancement of rain fed agriculture	Bukwo	Kamet	Mukoyon	Loch	Introduce short term and drought resistant crops (sweet potatoes, cassava, millet, g-nuts etc.), sensitisation of farmers, demonstrations in some gardens	6 villages	3	6	6
			Riwo	Lwongon	Tarack					
				Kapchemogen	Kapchemogen					
			Tulel	Aralam	Kewarwang					
				Chekwir	Chemuron					
				Kapswama	Kaptobori					
2.8.3	New irrigation schemes: Undertake feasibility studies of identified areas	Bukwo	Chesower	R. Siit		from GFS		2	2	2
2.8.4	Construction of new irrigation schemes: Improved (seasonal) wetland schemes	Bukwo	Kamet/Tulel	R. Nyalit		N/A	N/A	n/a	n/a	n/a
			N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a
2.8.5	Construction of new irrigation schemes: Low power pumped schemes that utilise water from nearby rivers, swamps and lakes	Bukwo	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a
2.8.6	Construction of new irrigation schemes: Simple gravity-fed schemes	Bukwo	Chesower	R. Siit			3 schemes	3	3	3
			Kamet/Tulel	R. Nyalit						
			Kabei	R. Kamayiso						
2.8.7	Construction of new irrigation schemes: Type A formal irrigation	Bukwo	Chesower	R. Siit			2 schemes	2	2	2
			Kamet/Tulel	R. Nyalit						
2.8.8	Construction of new irrigation schemes: Type B formal irrigation	Bukwo	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a

<b>2.9.1</b>	Water efficiency evaluation and recommendations	Bukwo	N/A	N/A	N/A	N/A	N/A	N/A	n/a	n/a
<b>2.10.1</b>	Investment and implementation in hydropower installations and grid distribution	Bukwo								
<b>2.11.1</b>	Promote additional and alternative sources of energy including low cost solar panels to be used for led lighting, radios and cell phones	Bukwo	Chesower						6	
			Kabei							
			Kamet							
			Tulel							
			Riwo							
			Kortek							
<b>2.11.2</b>	Promote use of energy efficient woodstoves by making the technology readily available	Bukwo	Kamet	Kamet		Moson			6	12
			Riwo	Kapkware		Chemenen				
			Kortek	Kapkokoyo		Sheptuimat				
			Tulel	Mayak		Tuyet				
			Chesower	Chesower		Munda				
			Kabei	Lwongon		Siron				
						Kosori				
						Koikoi				
						Torokyo				
						Kween				
						Tarak				
						Kolagei				
<b>2.12.1</b>	Develop a manual on aquaculture techniques (building on available materials)	Bukwo	N/A	N/A	N/A	N/A	N/A	N/A	n/a	n/a

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
2.12.2	Assist farmers with the rehabilitation of viable aquaculture ponds and construction of new ponds - allowance made for a pilot	Bukwo	Kamet	Kamet	Chebony	Construct 6 new ponds	1 farmer per village	6	6	6
			Chesower	Chesower	Chesower					
			Kortek	Kabobei	Tulwo					
			Riwo	Chepsoikey	Chepsoikey					
			Kabei	Kapsemeton	Kapsemeton					
			Tulel	Tulel	Masasha					
2.12.3	Train and assist farmers on the appropriate fishing techniques and equipment as well as the protection of breeding grounds	Bukwo	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a
2.13.1	Create an ecological tourism organisation, train it and provide the necessary starting equipment e.g. a boat	Bukwo	Chesower	Nyalit	Nyalit	Form and train an eco tourism organisation, train and equip 4 guides, 2 binoculars, advertisement material: maps, brochures, internet; develop 2 campsites		1	2	2
				Bisho	Bisho					
2.13.2	Promote horticulture	Bukwo	Riwo	Aralam	Aralam	Seeds (fruits and vegetables), train and equip farmers, pesticides, insecticides, spray pumps	2 farmers per village	6	7	11
			Kamet	Mokoyon	Mokoyon					
			Kabei	Kabei	Lungwa					
			Kortek	Kubobei	Makunga					
					Kween					
					Kapkoras					
			Chesower	Chesower	Bumatoy					
					Torokyo					
			Tulel	Burkeywo	Leketetwo					
					Kakworosoy					
		Chepkwir	Tuyobei							



<b>2.13.3</b>	Promote bee keeping	Bukwo	Chesower	Siit	Siit	Molol Chesmat Kongta Sumotwit Kapngaran Kwanwa Cherangany Longit Mosowo Chekwatytit Kapngotiny	Bee hives, train and equip farmers, establish processing and packaging sites, promote beekeepers association and train them	2 farmers per village, promote beekeeping associations and train them	1	6	12																																								
												3.1.1	Demarcate areas considered unsafe for habitation or other use and warn inhabitants	Bukwo	Kabei Kamet	Kapteret Yemitek	Kapteret Yemitek Borowon	Landslide areas: demarcation	2	2	3																														
																						3.1.2	Develop an early flood warning system	Bukwo	Kabei Kamet	Kapteret Yemitek Borowon	Landslide areas	3 early warning systems	2	2	3																				
																																3.1.3	Development/compilation of a hazard/risk map for landslides/sedimentation/ floods	Bukwo	N/A	N/A	N/A	N/A	n/a	n/a	n/a										
																																										3.3.1	Determine current stocking rates and assess carrying capacity of all districts. Develop a plan to keep the numbers of animals within the theoretic limits of carrying capacity	Bukwo	N/A	N/A	N/A	N/A	n/a	n/a	n/a

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
3.3.2	Livestock improvement programme	Bukwo	Riwo Kamet Kabei Kortek Chesower Tulel	Aralam Mokoyon Kabei Kubobei Chesower Burkeywo Chepkwir	Aralam Mokoyon Lungwa Makunga Kween Kapkoras Bumatoy Torokyo Leketetwo Kakworosoy Tuyobei	Improved breeds (cross breeds) incl. bulls, cattle dips and crushes, artificial insemination, improved fodder, good breeds of goat and sheep, zero grazing units, veterinary services improved: vaccination, tick control	11 villages	6	7	11
3.3.3	Promote dairy farming	Bukwo	Riwo Kamet Kabei Kortek Chesower Tulel	Aralam Mokoyon Kabei Kubobei Chesower Burkeywo Chepkwir	Aralam Mokoyon Lungwa Makunga Kween Kapkoras Bumatoy Torokyo Leketetwo Kakworosoy Tuyobei	Dairy animals, milk coolers, zero grazing units, training of farmers and provision of materials, vaccination and cattle spraying, tagging of the animals	2 farmers per village	6	7	11
4.1.1	Monitoring stations must be maintained and regularly calibrated. Gauge readers need to be trained and check mechanisms introduced to ensure stability and consistency in data	Bukwo	N/A	N/A	N/A	N/A	N/A	N/A	n/a	n/a

4.1.2	Expand, rehabilitate and improve the water quality, evaporation, rainfall, ground water and streamflow monitoring network systems and lake and wetland water level monitoring gauges. Implement sedimentation monitoring	Bukwo	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a
4.1.3	Monitor surface and ground water use and levels to prevent over - exploitation	Bukwo	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a
4.2.1	Train a committed cadre of extension service providers to render inter - disciplinary, integrated extension service to include CMCs, CDOs etc.	Bukwo	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a
4.2.2	Develop support materials for use by extension officers (building on currently available materials)	Bukwo	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a
4.3.1	Develop training guidelines and awareness raising materials (building on currently available materials)	Bukwo	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a
4.3.2	Introduction of a community radio programme dedicated to environmental matters (community radio Bukwo FM exists)	Bukwo											
4.3.3	Sanitation project. Demonstration of ecosan and other sanitation systems. Provision of appropriate designs and training in construction. Support with provision of materials	Bukwo	Chesower	Chesower	Chesower	Chesower P/S	VIP lined latrines for schools with hand washing facilities, form and training management committees (6 people per committee)	16 schools	6	8	17		
			Tulel	Tulel	Tulel P/S	Kamunjan P/S							
					Kapsiwo P/S								
					Kabokwa P/S								
					Koikoi P/S								
					Chemrot P/S								
			Kamet	Kamet	Kamet P/S								
				Yemitek	Chekwer P/S								
			Kabei	Kabei	Mutichet P/S								
					Kapseneton P/S								
		Kabei P/S											
		Kortek	Kortek	Kortek P/S									
				Chesimat P/S									
	Riwo	Brim	Brim P/S										
		Aralam	Aralam P/S										



<b>4.3.5</b>	Introduction of awareness raising programmes in schools	Bukwo	Chesower	Chesower	Chesower P/S	16 P/S, 4 SS, establish environmental clubs, awareness raising campaigns, train teachers	6	6	20
			Tulei	Tulei	Chesower SS				
					Kamunjan P/S				
					Tulei P/S				
					Tulei SS				
					Kapsiwo P/S				
					Kabokwa P/S				
					Koikoi P/S				
					Chemrot P/S				
			Kamet	Kamet	Kamet P/S				
				Yemitek	Chekwir P/S				
			Kabei	Kabei	Mutichet P/S				
					Kapseneton P/S				
					Kabei P/S				
		Kabei SS							
Kortek	Kortek	Kortek P/S							
		Kortek Girls SS							
		Chesimat P/S							
Riwo	Brim	Brim P/S							
	Aralam	Aralam P/S							
N/A	N/A	N/A							
N/A	N/A	N/A							
N/A	N/A	N/A							
N/A	N/A	N/A							
N/A	N/A	N/A							
N/A	N/A	N/A							
<b>4.4.1</b>	Train experts (import expertise) in the development of technology guidelines, training and other approaches	Bukwo			N/A	N/A	n/a	n/a	n/a
<b>4.4.2</b>	Enhance and strengthen the capacity of BMUs	Bukwo			N/A	N/A	n/a	n/a	n/a
<b>4.4.3</b>	Enhance and strengthen the capacity of rice grower associations	Bukwo			N/A	N/A	n/a	n/a	n/a
<b>4.5.1</b>	Strengthen enforcement bodies with capacity	Bukwo			N/A	N/A	n/a	n/a	n/a
							<b>107</b>	<b>118</b>	<b>209</b>

**INTERVENTION SITES FOR THE OPTIONS**
**District: BULAMBULI**

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
1.1.1	The preparation and dissemination of comprehensive and sustainable land and environmental management manual providing the technological approaches tailored for the Awoja catchment and Kyoga WMZ	Bulambuli	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a
1.1.2	Design and pilot of individual farms according to sustainable land and environmental management principles. Layout to include contouring, drain and waterway layout and improvements, road design, runoff management, woodlot and agroforestry planning	Bulambuli	Bumugibole	Logoli	Gaboisi Lusoz Upper Sooti Kikolo	Runoff management and agroforestry in each village	4 runoffs and 4 agroforestry	2	2	4
1.1.3	Identification and regular (annually) eradication of floating islands / invasive alien plants	Bulambuli	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a
1.1.4	Development of a fire risk, fire control and fire protection plan, with controlled burning where required for grazing and biodiversity management and implement it	Bulambuli	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a
1.1.5	River bank protection and stabilisation - gabions, management of cattle access points, protection of riparian vegetation	Bulambuli	Bulegeni	Samazi	Sisiyi A Sisiyi B Bunamono Bumukoye Sipi B	Stabilization - gabions on Rivers Sisiyi, Simu and Sipi	10 kms on each river in the areas where they have been heavily eroded	2	2	5
1.1.8	Ecological water requirements: Revisiting legislation and catchment assessment	Bulambuli	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a
1.1.8.1	Introduce improved farming practices	Bulambuli	Bumasobo	Bowakadola Lusaso	Buwokadola Makutano Tobongoni Gibuzale	Agro forestry trees, training of 15 farmers in each village	200,000 seedlings of trees friendly to crops	1	2	4
1.1.9	Build the capacity on conservation methods, especially for wetlands	Bulambuli	Bunambutye Bwikhonge Nabongo	Bumufuni Bunalwere Bunankakha	Buwebele Sipi A Bunamono	Sensitization of the local communities and empowering local environment committees	3 committees (1 in each village)	3	3	3



Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
1.3.2	Updating of demarcated protection zones and acceptable utilization of wetlands, producing GIS maps of wetlands at various levels	Bulambuli	Nabbongo	Bunagaka		Demarcation of the wetlands	Wetland maps indicating boundaries of each wetland, GPS, cameras, gumboots, raincoats	6	21	
			Bukhalu	Bufumbura						
				Bufukhula						
				Simu						
				Busabulo						
				Busiu						
				Bunalwere						
				Bukhalu						
				Atari	Bunambutye					
				Tabakonyi						
				Kaptokoyi						
				Bulukuyu						
				Bumfuni						
				Buwabala	Bwikhonge					
				Cheputui						
				Bumukoya	Muyembe					
				Bungwanyai						
				Buwagogo						
				Simu	Bulegeni					
				Mbigi						
				Samazi						
	Bunagaka	Nabbongo								
	Bufumbura									
	Bufukhula	Bukhalu								
	Simu									
	Busabulo									
	Busiu									
	Bunalwere									
	Bukhalu									





Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
2.1.1	Improve sanitation technology and building material support and implement them	Bulambuli	Buyaga T/C	Buyaga Cell A	Buyaga T/B	Water - borne toilets	1 toilet with 10 stances in each village	4	4	4
			Bulambuli T/C	Administration	Muyembe Market					
			Buluganya	Buluganya	Zema T/C					
			Sisiyi	Kibanda	Kibanda A					
2.1.2	Improve faecal sludge management (collection, transportation, treatment and re-use) through clustering of small towns (Kumi Sironko, Kapchorwa, Nakapiripirit)	Bulambuli	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a
2.2.2	Refurbish valley dams and tanks	Bulambuli	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a
2.3.1	Design and construct river Agu scheme to supply Kumi and surroundings - water and wastewater works	Bulambuli	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a
2.3.2	Soroti treatment and distribution - expand in stages (NWSC)	Bulambuli	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a
2.6.1	Feasibility studies and design of prioritised sand dams. Construction, with cooperation and input from local communities	Bulambuli	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a
2.7.1	Needs identification for location and type of dams and associated abstraction facilities	Bulambuli	Bunambutye	Bushanji	Buliweta	Construction of valley dams	3 valley dams, 1 in each village	3	3	3
			Nabongo	Bumasokho	Bumasokho					
			Bukhalu	Bunawere	Bunawere B					
2.7.2	Feasibility & design of prioritized dams for stock watering and humans needs. Construction, with cooperation and input from local communities	Bulambuli	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a
2.8.2	Enhancement of rain fed agriculture	Bulambuli	Nabongo	Buwakooli	Bunambutye	Roof water tanks (30 in each village)	90 roof water tanks in the 3 villages	2	2	3
			Bulegeni	Samazi	Nakitwe					
					Nakifumboko					

2.8.3	New irrigation schemes: Undertake feasibility studies of identifies areas	Bulambuli	Bunambutye	Bunaganda	Bukitanga	River Tabakonyi	6 irrigation schemes	6	6	6
			Bwikhonge	Buwekanda	Bumayana	River Cheptuyi				
			Nabbongo	Bufumbula	Butta	River Sipi				
			Muyembe	Buyaka	Yembe	River Muyembe				
			Bukhalu	Busiu	Buwakhanyunyi	River Simu				
			Bulengeni	Samazi	Suguta	River Simu				
2.8.4	Construction of new irrigation schemes: Improved (seasonal ) Wetlands Schemes	Bulambuli	Bwikhonge	Bunalwere	Bushiende	Irrigation channels	A total of 6 kms	2	2	3
2.8.5	Construction of new irrigation schemes: Low - power pumped schemes that utilize water from nearby rivers, swamps and lakes	Bulambuli	Bukhalu	Busiu	Buwakhanyunyi A	River Simu: Treadle pumps	3 treadle pumps in each village	1	1	2
					Buwakhanyunyi B					
2.8.6	Construction of new irrigation schemes: Simple gravity - fed schemes	Bulambuli	Bunambutye	Buluguya	Buwebele	Gravity flow schemes	2 GFS	1	1	2
2.8.7	Construction of new irrigation schemes: Type A Formal Irrigation	Bulambuli	N / A	N / A	N / A	N / A		n/a	n/a	n/a
2.8.8	Construction of new irrigation schemes: Type B Formal Irrigation	Bulambuli	N / A	N / A	N / A	N / A		n/a	n/a	n/a
2.9.1	Water efficiency evaluation and recommendations	Bulambuli	N / A	N / A	N / A	N / A		n/a	n/a	n/a
2.10.1	Investment and implementation in hydropower installations and grid distribution	Bulambuli	Simu	Bukibologoto	Sisiyi Falls	Dams	2	2	2	2
2.11.1	Promote additional and alternative sources of energy including low cost solar panels to be used for LED lighting, radiois and cell phones	Bulambuli	Simu	Bukibologoto	Bukibologoto	Bukibologoto P/S	2 solar panels (1 in each institution)	1	1	2
					Nakizungu	Simu HC				
2.11.2	Promote use of energy efficient woodstoves by making the technology readily available	Bulambuli	Bulegeni	Mbigi	Samazi TC	Train and equip the community with the materials and the appropriate technology	20 households per village	7	7	7
			Bukhalu	Bushienda	Bushienda					
			Muyembe	Bumugoya	Simu Corner TC					
			Nabbongo	Buwakholi	Buwakholi					
			Bwikhonge	Bulumara	Bumatsopa					
			Bunambutye	Buwebele	Busangai					
			Bulambuli TC	Bulambuli TC	Administration Cell					

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
2.12.1	Develop a manual on aquaculture techniques (building on available material)	Bulambuli	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a
2.12.2	Assist farmers with rehabilitation of viable aquaculture ponds and in the construction of new ponds - allowance made for a pilot	Bulambuli	Lusha Muyembe	Bumwambu Buyeke	Kidega Bushitimo	New fish ponds	1 per village	2	2	2
2.12.3	Train and assist farmers on the appropriate fishing techniques and equipment as well as the protection of breeding grounds	Bulambuli	Muyembe Bwikhonge	Bungwanyai Bwikhonge	Bukywaka A Bukywaka B Bunabiiri Bulako	Train fishermen on the appropriate technology and equip them	5 fishermen per village	2	2	4
2.13.1	Create an ecological tourism organisation, train it and provide the necessary starting equipment e.g a boat	Bulambuli	Bulago Bumasobo Buginyanya	Tunyi Bwokhadala Logoli	Dooba Buwakhadala TC Lusozi Upper	Form ecological tourism organisations and equip them with the necessary tools like binoculars and life jackets; construction of 9 bandas	One organisation formed in each village plus the necessary tools, 3 bandas in each village	3	3	3
2.13.2	Promote horticulture	Bulambuli	Lusha Namisuni	Bumwambu Namudongo	Bumwambu Mabono	Train 20 homesteads in each village and equip them with seeds, fertilizers, watering cans, hoes, pangas and pesticides	40 homesteads	2	2	2
2.13.3	Promote bee keeping	Bulambuli	Bumugibole Masira	Mayiyi Ganzo	Mayiyi Matunda Masesequra A Masesequra B	Train and provide bee hives and honey harvesting gear to 10 homesteads per village and provide a honey collection centre in each parish	1 honey processing centres in each parish, 10 beehives for each homestead and an organised training on honey production in each parish	2	2	4

3.1.1	Demarcate areas considered unsafe for habitation or other use and warn inhabitants	Bulambuli	Landslides: Namisumi	Gamatimbei	Kalitusi	Demarcations	7 areas to be demarcated	7	7	7
			Sisiyi	Luzzi	Tabari					
			Bumasobo	Bugimwela	Lugula					
			Bulugaya	Sooti	Sooti					
			<b>Flooding:</b> Bukhalu	Bunamuye	Bududa					
			Bunambutye	Buluguya	Buzema					
			Nabbongo	Bufumbula	Bufumbula					
3.1.2	Develop an early flood warning system	Bulambuli	Landslides: Namisumi	Gamatimbei	Kalitusi	Develop an early warning system in the demarcated areas in each village	Install early warning equipment in each demarcated area e.g. automatic weather stations	7	7	7
			Sisiyi	Luzzi	Tabari					
			Bumasobo	Bugimwela	Lugula					
			Bulugaya	Sooti	Sooti					
			<b>Flooding:</b> Bukhalu	Bunamuye	Bududa					
			Bunambutye	Buluguya	Buzema					
			Nabbongo	Bufumbula	Bufumbula					
3.1.3	Development / Compilation of hazard / risk map for landslides / sedimentation / floods	Bulambuli	N / A	N / A	N / A	N / A	N / A	n/a	n/a	n/a
			N / A	N / A	N / A	N / A	N / A	N / A	n/a	n/a
3.3.1	Determine current stocking rates and assess carrying capacity of all districts. Develop a plan to keep the numbers of animals within the theoretical limits of carrying capacity	Bulambuli	Muyembe	Bungwanyani	Bukywaka A	Sensitization to farmers on good livestock practices, artificial insemination, improved pasture management, high cross breed cattle (female & male) and pesticides	3 pairs of cross breeds per village, artificial insemination services at the 2 SCs, sensitization meetings in each of the 4 villages	2	2	4
			Bwikhonge	Bwikhonge	Bukywaka B					
3.3.2	Livestock improvement programme	Bulambuli	Bwikhonge	Bwikhonge	Bunabiuro					
					Bulako					

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
3.3.3	Promote dairy farming	Bulambuli	Muyembe	Bungwanyani	Bukywaka A	High breed diary cattle, milk cooling plants, formation and training of dairy farmer associations and pesticides	4 cattle per village, 1 cooling plant per SC, 2 parish dairy farmer associations formed and trained	2	2	4
			Bwikhonge	Bukywaka B						
				Bunabiuro						
				Bulako						
4.1.1	Monitoring stations must be maintained and regularly calibrated. Gauge readers need to be trained and check mechanisms introduced to ensure stability and consistency in data	Bulambuli	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a
4.1.2	Expand, rehabilitate, and improve the water quality, evaporation, rainfall, ground water and streamflow monitoring network systems and lake and wetland water level monitoring gauges. Implement sedimentation monitoring	Bulambuli	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a
4.1.3	Monitor surface and ground water use and levels to prevent over - exploitation	Bulambuli	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a
4.2.1	Train a committed cadre of extension service providers to render inter - disciplinary, integrated extension service to include CMCs, CDOs etc.	Bulambuli	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a
4.2.2	Develop support materials for use by extension officers (building on currently available materials)	Bulambuli	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a
4.3.1	Develop training guidelines and awareness raising materials (building on currently available materials)	Bulambuli	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a
4.3.2	Introduction of a community radio programme dedicated to environmental matters	Bulambuli	District HQ			Air environment related programmes	3 programmes a week	1		

4.3.3	Sanitation project. Demonstration of ecosan and other sanitation systems. Provision of appropriate designs and training in construction. Support with provision of materials	Bulambuli	Bukhalu	Busiu	Buwakhanyunyi P/S	5	1 in each school	8	8
			Nabbongo	Bujumbura	Buwashaba P/S				
4.3.4	Implement demonstration projects - schools, model farms etc. (capital costed elsewhere)	Bulambuli	Bwikhonge	Bunangaka	Bunongaka P/S	3	3 demonstration farms	3	3
			Bulengeni	Buyaga	Buyaga P/S				
4.3.5	Introduction of awareness raising programmes in schools	Bulambuli	Bunambutye	Samazi	Samazi P/S	5	8 primary schools	8	8
			Nabbongo	Tabakonyi	Tabakonyi P/S				
4.4.1	Train experts (import expertise) in the development of technology guidelines, training and other approaches	Bulambuli	Atari	Atari	Atari P/S	N/A	N/A	N/A	N/A
			Nabbongo	Bujumbura	Buwashaba P/S				
4.4.2	Enhance and strengthen the capacity of BMUs	Bulambuli	Bwikhonge	Bunangaka	Bunongaka P/S	N/A	N/A	N/A	N/A
			Bulengeni	Buyaga	Buyaga P/S				
4.4.3	Enhance and strengthen the capacity of rice grower associations	Bulambuli	Bunambutye	Samazi	Samazi P/S	N/A	N/A	N/A	N/A
			Bwikhonge	Tabakonyi	Tabakonyi P/S				
4.5.1	Strengthen enforcement bodies with capacity	Bulambuli	Atari	Atari	Atari P/S	N/A	N/A	N/A	N/A
			Nabbongo	Bumufuni	Buwebele				
4.5.1	Strengthen enforcement bodies with capacity	Bulambuli	Bunambutye	Bunambutye	Bunambutye	N/A	N/A	N/A	N/A
			Bwikhonge	Bunaiwere	Sipi A				
4.5.1	Strengthen enforcement bodies with capacity	Bulambuli	Nabbongo	Bunankakha	Bunamono	N/A	N/A	N/A	N/A
			N/A	N/A	N/A				

**INTERVENTION SITES FOR THE OPTIONS**
**District: KAPCHORWA**

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
1.1.1	The preparation and dissemination of comprehensive and sustainable land and environmental management manual providing the technological approaches tailored for the Awoja catchment and Kyoga WMZ	Kapchorwa	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a
1.1.2	Design and pilot of individual farms according to sustainable land and environmental management principles. Layout to include contouring, drain and waterway layout and improvements, road design, runoff management, woodlot and agroforestry planning	Kapchorwa	Kap-chesombe	Kwoti	Kamagunga	Woodlots, trees around the home and gardens, agroforestry, trees along the parish and SC roads, contour bunds and grass planting and trees along the contours	110 km of contour bunds, 11 woodlots (1 ha per village)	4	5	11
			Kapsinda	Sengwel	Teryet					
					Kapsep					
					Ngangata					
					Chemuron					
					Chesabit					
					Towei					
				Kiring	Kapteka					
			Kaptanya	Tumboboi	Chebinyiny					
			Kapteret	Ngangata	Sweswet					
					Moron					
1.1.3	Identification and regular (annually) eradication of floating islands / invasive alien plants	Kapchorwa	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a
1.1.4	Development of a fire risk, fire control and fire protection plan, with controlled burning where required for grazing and biodiversity management and implement it	Kapchorwa	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a
1.1.5	River bank protection and stabilisation - gabions, management of cattle access points, protection of riparian vegetation	Kapchorwa	Kap-chesombe	Kaplak	Kaplak	Gabions, live - markers as demarcations, tree planting	River Atari - 4 km with 2 cattle access points, Kaplak stream - 1 km with 1 cattle access point in Kapchesosombe, River Sipi - 5 km with 2 cattle access points in Kapsinda	2	3	4
				Kongowo	Kapbkolo					
			Kapsinda	Sengwel	Chesabit					
					Kapsep					



<b>1.1.8</b>	Ecological water requirements: Revisiting legislation and catchment assessment	Kapchorwa	N/A	N/A	N/A	N/A	N/A	N/A	N/A	n/a	n/a	
<b>1.1.8.1</b>	Introduce improved farming practices	Kapchorwa	Kap-chesombe Kapsinda Gamogo	Kwoti Cheptuya Kiring Kapnarbababa	Kween Kapchemokok Kapteka Kiring Kapnarbababa	N/A	N/A	N/A	Contour bunds, trenches, planting trees, napping grass, mulching	Train 10 farmers per village	n/a	5
<b>1.1.9</b>	Build the capacity on conservation methods especially for wetlands	Kapchorwa	Kapsinda Kawowo	Tuyobei Sengwel Cheptuya Sanzara	Kuborit Kapsakai Kapteka Chemare	N/A	N/A	Training manuals	20 copies of training manuals, train community members in each village	N/A	n/a	4
<b>1.1.10</b>	Monitoring the impacts of sustainable land and environmental management in terms of improved farming practices (individual benefits) and downstream water management	Kapchorwa	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	n/a	n/a
<b>1.2.1</b>	Provide routine training (forestry handbook) to CMCs, forest management, land care and agricultural managers: 1 training in each district @ 2 yrs	Kapchorwa	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	n/a	n/a
<b>1.2.2</b>	Establish nurseries for provision of seedlings and distribution, training and management systems in the district - pilot projects	Kapchorwa	Kap-chesombe Kapsinda Kawowo Kaptanya	Kwoti Kaplak Tuyobei Kapsabuko Sanzara Kaptokwoi Tumboboi	Kamakunga Kaplak Kiborit Kapkwenbe Chemarey Kaptokwoi Kaplangoon	N/A	N/A	Tree nursery	1 nursery per village	N/A	n/a	7

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
1.2.3	Support the implementation of a reforestation programme aimed at restoring lost woodland and at establishing woodlots to reduce the pressure on natural forest. Link to agroforestry and sustainable land management	Kapchorwa	Kaptanya	Tumboboi	Sweswet	Tree nurseries, inventory reports, establish woodlots and agroforestry	8 tree nurseries, 1 ha woodlot per village, 1 ha agroforestry per village	4	6	8
			Kapteret	Kapangury	Cheptilial					
			Kapsinda	Cheptuya	Kapengurya					
			Gamogo	Kiring	Moron					
1.2.4	Planting trees in degraded areas	Kapchorwa	Kap-chesombe	Kapnarbababa	Kapnarbababa	Identify the most degraded areas in the 7 SCs, provide seedlings for indigenous and multipurpose trees	2 areas per SC (2 ha each)	7		
			Kapsinda							
			Kaptanya							
			Kapteret							
			Gamogo							
			Kawowo							
			Tegeres							
1.3.1	Regular updating of district wetland inventories by districts	Kapchorwa	Kapsinda	Kongowo	Towe	Inventory reports	Finish the current inventory since part of it was done by JICA. Update it once in every 3 years	3	5	9
					Sirinda					
					Kapsobuko					
					Ngangat					
					Cheromor					
					Chemarey					
			Kawowo	Sanzara	Moron					
			Kaptanya	Ngangata	Katakwo					
				Kaptkwoi	Tartar					
				Tumboboi						
1.3.2	Updating of demarcated protection zones and acceptable utilization of wetlands, producing GIS maps of wetlands at various levels	Kapchorwa	Kawowo	Sanzara	All villages	Demarcate protection zones, produce GIS maps	Update once in every 3 years	2	2	6
			Kapsinda	Tuyobei	Kiborit					
1.3.3	Study for economic valuation of wetland resources and disseminate the results	Kapchorwa	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a

1.3.4	Review and update the wetland management / action plans	Kapchorwa	Kaptanya	Kaptokwoi	Kawoyon	Establish wetland management plans for each wetland	Update once in every 3 years	3	4	4
			Kapsinda	Ngangata	Sirinda					
			Kawowo	Tuyobei	Kiborit					
				Sanzara	Chemarey					
1.3.5	Restoration of vital ( unique)critical (subject to on going degradation) wetlands	Kapchorwa	Kaptanya	Kaptokwoi	Kawoyon	Restoration of vegetation		3	4	4
			Kapsinda	Tuyobei	Kiborit					
				Kapsabuko	Cheptaburbur					
				Sanzara	Chemare					
1.4.1	Mapping, demarcation of riparian and roadside protection zones and identify and implement source protection measures	Kapchorwa	Kap-chesombe	Kaplak	Kaplak	Demarcation of River Sipi and its tributaries' protection zones, tree and grass planting		3	4	5
			Sipi	Kapkwirwok	Kongsikerwo					
			Kapsinda	Cheptuya	Sirinda					
				Kapsabuko	Kapteka					
2.1.1	Improve sanitation technology, and building materials, support and implement them	Kapchorwa	Sipi	Kapkwirwok	Kapkwirwok	Kapkwirwok market, TC for public use, at the police, Kapkwirwok P/S; Elgon P/S (Kapchorwa T/C), Chebonet Market: Ecosan toilets or lined VIP pit latrines depending on the site and plan	5 toilets	5	5	5
			Kapteret	Kapteret	Kapteret					
			Kapsinda	Cheptuya	Chebonet					
			Kapchorwa T/C	Chemonges Square	Kaptabomwo					
2.1.2	Improve faecal sludge management (collection, transportation, treatment and re-use) through clustering of small towns (Kumi, Sironko, Kapchorwa, Nakapiripit)	Kapchorwa	Tegeres	Tegeres	Cheptui	Cess pools, sewer pools, septic tanks	Kapchorwa town and schools with ecosan and lined toilets and latrines. Empty once every 3 month	1	1	1
			Kapchorwa T/C	Barawa word						
2.2.2	Refurbish valley dams and tanks	Kapchorwa	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
2.3.1	Design and construct river Agu scheme to supply Kumi and surrounds - water and waste water works	Kapchorwa	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a
2.3.2	Soroti treatment and distribution - expand in stages (NWSC)	Kapchorwa	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a
2.6.1	Feasibility studies and design of prioritised sand dams. Construction with cooperation and input from local communities	Kapchorwa	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a
2.7.1	Needs identification for location and type of dams and associated abstraction facilities.	Kapchorwa	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a
2.7.2	Feasibility and design of prioritised dams for stock watering and human needs. Construction with cooperation and input from local communities	Kapchorwa	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a
2.8.2	Enhancement of rain fed agriculture	Kapchorwa	Kawowo	Sanzara	Kapsinda Chemare	GFS	2	1	1	2
2.8.3	New irrigation schemes: Undertake feasibility studies of identified areas	Kapchorwa	Kapsinda	Cheptuya	Kapteka Chepkuripetin	GFS	4	3	4	4
2.8.4	Construction of new irrigation schemes: Improved (seasonal) wetland schemes	Kapchorwa	Kawowo	Sanzara	Chemare Tartar	GFS and valley dams	1	1	1	1
2.8.5	Construction of new irrigation schemes: Low - power pumped schemes that utilise water from nearby rivers, swamps and lakes	Kapchorwa	Kaptanya	Tumboboi	Kaplongon	GFS	1	1	1	1
2.8.6	Construction of new irrigation schemes: Simple gravity - fed schemes	Kapchorwa	Tegeres Kap-chesombe Kapteret Chema	Kabat Kaplak Tuban Chema	Kutung Atar Kaplak Posha Phema	GFS	GFSs from Rivers Atari, Cheseber and Kaptakwoi	4	4	5
2.8.7	Construction of new irrigation schemes: Type A formal irrigation	Kapchorwa	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a

<b>2.8.8</b>	Construction of new irrigation schemes: Type B formal irrigation	Kapchorwa	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	n/a	n/a
<b>2.9.1</b>	Water efficiency evaluation and recommendations	Kapchorwa	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	n/a	n/a
<b>2.10.1</b>	Investment and implementation in hydropower installations and grid distribution	Kapchorwa	Kap-chesombe	Kaplak	Titim Atar Kaplak	Kapkwirwok	Chepkwoi	Dams	3	2	2	3
<b>2.11.1</b>	Promote additional and alternative sources of energy including low cost solar panels to be used for lighting, radios and cell phones	Kapchorwa	Kaserem	Ngesi	Ngesi	Kapkwirwok	Kapkwirwok	Schools and health centres: e.g. Kapkwirwok P/S, Kapchai P/S, Chptuya HC III, Kaserme P/S, Tegeres P/S, Elgon P/S, Kaminy P/S, Demonstration P/S, Kokwo Murya HC	8 villages	5	8	8
<b>2.11.1</b>			Sipi	Kapkwirwok	Kapkwirwok	Sengwel	Kakwanja					
<b>2.11.1</b>			Kapsinda	Cheptuya	Chebonet							
<b>2.11.1</b>			Tegeres	Tegeres	Tapchor							
<b>2.11.1</b>				Kutung	Kutung							
<b>2.11.1</b>			Kapchorwa T/C	Kawowo	Chemonges Square							
<b>2.11.1</b>				Kapsinda	Kokwomury							
<b>2.11.2</b>	Promote use of energy efficient woodstoves by making the technology readily available	Kapchorwa	Tegeres	Upper Tegeres	Basaar			Train 15 households per village on multi-pot stove making and equip them	15 households per village	3	3	4
<b>2.11.2</b>			Chema	Chebaseri	Kapkween							
<b>2.11.2</b>			Kap-chesombe	Kwoti	Kamagunga							
<b>2.12.1</b>	Develop a manual on aquaculture techniques (building on available materials).	Kapchorwa	N/A	N/A	N/A			N/A	N/A	n/a	n/a	n/a
<b>2.12.2</b>	Assist farmers with the rehabilitation of viable aquaculture ponds and construction of new ponds-allowance made for a pilot.	Kapchorwa	Kawowo	Sanzara	Chemari			New fish ponds	1 per village	4	4	4
<b>2.12.2</b>			Kaptanya	Kaptokwoi	Kaptokwa							
<b>2.12.2</b>			Kap-chesombe	Kapchesombe	Kongsikerwo							
<b>2.12.2</b>			Chema	Kabore	Tulowa							
<b>2.12.3</b>	Train and assist farmers on the appropriate fishing techniques and equipment as well as the protection of breeding grounds	Kapchorwa	N/A	N/A	N/A			N/A	N/A	n/a	n/a	n/a

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
2.13.1	Create an ecological tourism organisation, train it and provide the necessary starting equipment e.g a boat	Kapchorwa	Sipi	Kapkwikwok	Kapkwikwok	Create and train a CBO, provide abseiling equipment	1	1	1	1
2.13.2	Promote horticulture	Kapchorwa	Kawowo Kapsinda Kap-chesombe Tegeres	Sanzara Kiring Kaplak Basaar	Chemera Kapteka Atari Basaar	Demonstration plots	3 households per village	4	4	4
2.13.3	Promote bee keeping	Kapchorwa	Kabeywa Kap-chesombe Tegeres Kapchorwa T/C	Kabeywa Kwoti Basaar Tegeres Kokwomury	Kabeywa Kakween Basaar Tapchor Kaptakwoi Kokwomury	Beehives (10 per farmer), harvesting gear, processing and packaging material, marketing, train farmers	5 farmers per village	4	5	6
3.1.1	Demarcate areas considered unsafe for habitation or other use and warn inhabitants	Kapchorwa	Kap-chesombe	Teriat	Titim	River Atari moves under the rock and people live above contaminating water which supplies various areas including Kapchorwa T/C	Demarcations in 5 areas	5	5	5
			Kapteret	Kapengurya	Kapengurya	Landslides				
			Gamogo	Kapnarababa	Kapnarababa	Landslides & erosion				
			Tegeres	Basaar	Basaar	Landslides & erosion				
			Cherna	Kapkwai	Amtek	Landslides & erosion				

3.1.2	Develop an early flood warning system	Kapchorwa	Kap-chesombe	Kaplak	Atar	Develop early warning systems: 2 for floods and 4 for landslides	6	6	6
			Kapteret	Kapengurya	Kapengurya				
			Gamogo	Kapnarababa	Kapnarababa				
			Tegeres	Basaar	Basaar				
			Kawowo	Sanzara	Chemare				
			Chema	Kapkwai	Amtek				
3.1.3	Development / compilation of a hazard / risk map for landslides / sedimentation / floods	Kapchorwa	N/A	N/A	N/A	N/A	n/a	n/a	n/a
3.3.1	Determine current stocking rates and assess carrying capacity of all districts. Develop a plan to keep the numbers of animals within the theoretical limits of carrying capacity	Kapchorwa	N/A	N/A	N/A	N/A	n/a	n/a	n/a
3.3.2	Livestock improvement programme	Kapchorwa	Kap-chesombe	Kaplak	Titim	Artificial insemination kits, improved breeds (cross breeds) incl. bulls, improved fodder and fodder banks, zero grazing units, veterinary services improved: vaccination, tick control, training of farmers	4	5	7
			Tegeres	Tegeres	Tapchor				
			Kaptanya	Tumboboi	Tumboboi				
					Tartar				
			Kapteret	Ngangata	Sirinda				
				Kaptokwoi	Kaptakwoi				
		Kokwomury							
3.3.3	Promote dairy farming	Kapchorwa	Kap-chesombe	Kaplak	Kaplak	Zero grazing units, fodder banks, milk coolers (3), train 15 farmers and equip them e.g. milk cans, cattle drugs, dairy animals (1 per farmer)	3	3	3
			Tegeres	Tegres	Tapchor				
			Kabeywa	Kabeywa	Bugimotwo				

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
4.1.1	Monitoring stations must be maintained and regularly calibrated. Gauge readers need to be trained and check mechanisms introduced to ensure stability and consistency in data	Kapchorwa	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a
4.1.2	Expand, rehabilitate, and improve the water quality, evaporation, rainfall, ground water and streamflow, monitoring network systems and lake and wetland water level monitoring gauges. Implement sedimentation monitoring	Kapchorwa	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a
4.1.3	Monitor surface and ground water use and levels to prevent over - exploitation.	Kapchorwa	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a
4.2.1	Train a committed cadre of extension service providers to render inter - disciplinary, integrated extension service to include CMCs, CDOs etc.	Kapchorwa	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a
4.2.2	Develop support materials for use by extension officers (building on currently available materials)	Kapchorwa	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a
4.3.1	Develop training guidelines and awareness raising materials (building on currently available materials)	Kapchorwa	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a
4.3.2	Introduction of a community radio programme dedicated to environmental matters	Kapchorwa	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a
4.3.3	Sanitation project. Demonstration of ecosan and other sanitation systems. Provision of appropriate designs and training in construction. Support with provision of materials	Kapchorwa	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a



<b>4.3.4</b>	Implement demonstration projects - schools, model farms etc. (capital costed elsewhere)	Kapchorwa	Kapchorwa T/C	Kawowo	Chemonges Square	Develop school farms for demonstrations purposes	4 schools	4	4	4			
											Sipi	Kapkwirwok P/S	Tegeres P/S
											Tegeres	Tegeres	
											Kapsinda	Tumboboi	
<b>4.3.5</b>	Introduction of awareness raising programmes in schools	Kapchorwa	Kapchorwa			Create and guide environmental committees in each school, drama groups etc., demonstrations	1 school per SC	12					
			chesombe										
			Kapsinda										
			Kaptanya										
			Kapteret										
			Gamogo										
			Kawowo										
			Tegeres										
			Chema										
			Kapchorwa T/C										
			Kabeywa										
			Sipi										
Kaserem													
<b>4.4.1</b>	Train experts (import expertise) in the development of technology guidelines, training and other approaches	Kapchorwa	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a			
<b>4.4.2</b>	Enhance and strengthen the capacity of BMUs	Kapchorwa	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a			
<b>4.4.3</b>	Enhance and strengthen the capacity of rice grower associations	Kapchorwa	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a			
<b>4.5.1</b>	Strengthen enforcement bodies with capacity	Kapchorwa	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a			
								<b>113</b>	<b>115</b>	<b>140</b>			

**INTERVENTION SITES FOR THE OPTIONS**
**District: KATAKWI**

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
1.1.1	The preparation and dissemination of comprehensive and sustainable land and environmental management manual providing the technological approaches tailored for the Awoja catchment and Kyoga WMZ	Katakwi	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1.1.2	Design and pilot of individual farms according to sustainable land and environmental management principles. Layout to include contouring, drain and waterway layout and improvements, road design, runoff management, woodlot and agroforestry planning	Katakwi	Toroma	Akulawo	Aeles	Woodlots and agroforestry	10 ha (1 ha per village)	5	5	10
			Kapujan	Kapujan	Magala					
			Magoro	Kamenu	Apure					
					Okii					
					Kamenu					
					Aeles					
			Katakwi	Aliakamar	Aputon					
					Aliakamar					
			Omodoi	Angodingod	Angodingod					
					Akalele					
1.1.3	Identification and regular (annually) eradication of floating islands / invasive alien plants(consider parishes since islands keep moving)	Katakwi	Toroma	Akurao	Akurao	Boats, hoes, wheel barrows	1 boat per village, 2 wheel barrows per village	3	9	9
				Ominya	Ominya					
				Uputoni	Uputoni					
			Kapujan	Akokorio	Akokorio					
					Kapiyan					
					Ollima					
			Magoro	Opeta	Opeta					
					Kamenu					
					Anyisa					
1.1.4	Development of a fire risk, fire control and fire protection plan, with controlled burning where required for grazing and biodiversity management and implement it	Katakwi	Kapujan	Kapujan	Kapujan	Sensitization of communities, by-laws, fire fighting equipment	5 villages	5	5	5
			Ongongoja	Ongongoja	Ongongoja					
			Palam	Palam	Palam					
			Toroma	Toroma	Usuk					
			Ngarlam	Ngarlam	Ngarlam					

<b>1.1.5</b>	River bank protection and stabilisation - gabions, management of cattle access points, protection of riparian vegetation	Katakwi	Ongongga Kapujan Usuk Katakwi Palam Katakwi TC	To be identified later due to the high number of rivers	To be identified later due to the high number of rivers	Sensitisation on buffer zones, access points for animals, river bank pegging	6		
<b>1.1.8</b>	Ecological water requirements: Revisiting legislation and catchment assessment	Katakwi	N/A	N/A	N/A	N/A	N/A	N/A	N/A
<b>1.1.8.1</b>	Introduce improved farming practices	Katakwi	Toroma Kapujan Magoro Katakwi Omodoi Ngariam Palam	Aleles Kapujan Kamono Aliakamel Angodingod Kaikamosing Angariam	Magala Apule Okii Kamono Aleles Apuuton Aliakel Akalele Kaikam Angariam	Improved seeds 20 farmers per village	7	7	10
<b>1.1.9</b>	Build the capacity on conservation methods especially for wetlands	Katakwi	Toroma Kapujan Magoro Katakwi Palam	Aleles Kapujan Kamono Aliakamel Angariam	Opeta wetland Bisina wetland Opet wetland Komolo wetland Palam wetland	Plant trees, registration by-law formation, establish structures to enforce e.g environmental force, demonstration sites, mulching	5	5	5
<b>1.1.10</b>	Monitoring the impacts of sustainable land and environmental management in terms of improved farming practices (individual benefits) and downstream water management	Katakwi	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
1.2.1	Provide routine training (forestry handbook) to CMCs, forest management, land care and agricultural managers: 1 training in each district @ 2 yrs	Katakwi	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1.2.2	Establish nurseries for provision of seedlings and establish distribution, training and management systems in all districts - pilot projects	Katakwi	Toroma Kapuian Magoro Katakwi Omodoi Ngariam Palam	Aleles Kapuian Kamono Aliakamel Angodingod Kaikamosing Angariam	Magala Apule Okii Kamono Aleles Apuuton Aliakel Akalele Kaikam Angariam	Nurseries	10 nurseries	7	7	10
1.2.3	Support the implementation of a reforestation programme aimed at restoring lost woodland and at establishing woodlots to reduce the pressure on natural forest. Link to agroforestry and sustainable land management	Katakwi	Toroma Kapuian Magoro Katakwi Omodoi Ngariam Palam	Aleles Kapuian Kamono Aliakamel Angodingod Kaikamosing Angariam	Magala Apule Okii Kamono Aleles Apuuton Aliakel Akalele Kaikam Angariam	Capacity building, tree nurseries, management structures (committees)	10 ha per village	7	7	10
1.2.4	Planting trees in degraded areas	Katakwi	Toroma Magoro Katakwi Palam Omodoi	Aputo Kamenu Alukuchok Ollim Omodoi	Akisim Obwokomolo Alukuchok Siliye Omodoi central	Planting trees in degraded areas	10 ha per village	7	7	7



Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
1.3.5	Restoration of vital (unique) critical (subject to on going degradation) wetlands	Katakwi	Toroma	Aleles	Opeta wetland	Plant trees, registration by - law formation, establish structures to enforce e.g environmental force	5 wetlands	5	5	5
			Kapujan	Kapujan	Bisina wetland					
			Magoro	Kamono	Opet wetland					
			Katakwi	Aliakamel	Komolo wetland					
			Palam	Angariam	Palam wetland					
1.4.1	Mapping, demarcation of riparian and roadside protection zones and identify and implement source protection measures	Katakwi	Ongongoja Katakwi	Ongongoja Getum	Ongongoja Getom	Roadside protection zone with tree planting	7 km	2	2	2
2.1.1	Improve sanitation technology and building materials, support and implement them	Katakwi	Magoro	Omasai	Kipnyani	Ecosan toilets, lined pit latrines	10 households per village	4	4	4
			Palam	Palam	Alenyenga					
			Ongongoja	Okuda	Okuda					
			Ngariam	Kaikamosi	Adokale B					
2.1.2	Improve faecal sludge management (collection, transportation, treatment and re-use) through clustering of small towns (Kumi, Sironko, Kapchorwa, Nakapiripit)	Katakwi	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2.2.2	Refurbish valley dams and tanks	Katakwi	Ongongoja	Akweta	Okwonwar (Okwonwar valley dam)	Rehabilitation of valley dams and tanks	4 dams, 2 tanks	5	6	6
				Ongongoja	Oroboi (Oroboi valley tank)					
			Palam	Ollili	Alelam (Aleiyanga valley dam)					
			Ngariam	Bisina	Okuso (Okwopoto valley dam)					
			Usuk	Akom	Ongore (Ongore valley dam)					
			Omodoi	Asuret	Omusuguny (Ate-kwa valley tank)					

<b>2.3.1</b>	Design and construct River Agu scheme to supply Kumi and surrounds water and waste water works	Katakwi	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
<b>2.3.2</b>	Soroti treatment and distribution - expand in stages (NWSC)	Katakwi	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
<b>2.6.1</b>	Feasibility studies and design of prioritised sand dams. Construction with cooperation and input from local communities	Katakwi	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
<b>2.7.1</b>	Needs identification for location and type of dams and associated abstraction facilities	Katakwi	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
<b>2.7.2</b>	Feasibility and design of prioritised dams for stock watering and human needs. Construction with cooperation and input from local communities	Katakwi	Ongongoja	Okocho	Okuliak	Okuliak dam proposed	1	1	1	1	1	1	1
<b>2.8.2</b>	Enhancement of rain fed agriculture	Katakwi	Toroma	Aleles	Magara	Demonstrate use of water jars and underground tanks, materials e.g cement, labor, capacity building, pumps, pipes, polythene bags	20 farmers per villages	10	10	10	10	10	10
			Kapujan	Kapujan	Apule								
			Magoro	Kamenu	Aleles								
			Katakwi	Aliakamel	Aliakel								
			Palam	Ngariam	Ngariam								
			Omodoi	Angodingod	Akalel								
			Ongongoja	Ongongoja	Ongongoja								
			Ngariam	Kaikamosing	Kaikamosing								
			Usuk	Usuk	Usuk								
			Katakwi TC	Northern ward	Dokomel								
<b>2.8.3</b>	New irrigation schemes: Undertake feasibility studies of identified areas	Katakwi	Kapujan	Olima	Ocherakwene	Feasibility study reports	3	3	3	3	3	3	3
			Ongongoja	Okocho	Okuliak								
			Magoro	Kamenu	Agritomu								
<b>2.8.4</b>	Construction of new irrigation schemes: Improved (seasonal) wetland schemes	Katakwi	Kapujan	Oricamaku	Oricamaku	6 schemes	6 schemes	3	4	4	4	4	6
				Kapujan	Kamenu								
			Magoro	Kamenu	Apuuton								
			Katakwi	Aliakamel	Aliakel								
					Akalele								

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village	
2.8.5	Construction of new irrigation schemes: Low-power pumped schemes that utilise water from nearby rivers, swamps and lakes	Katakwi	Kapujan	Olima	Ocherakwene		3 schemes	3	3		
			Ongongoja	Okocho	Okuliak						
			Magoro	Kamenu	Agritomu						
2.8.6	Construction of new irrigation schemes: Simple gravity - fed schemes	Katakwi	Ongongoja	Abela	Aboiboi	Construct 2 rock catchment based schemes	2	1	1		
						Cheleuko					
2.8.7	Construction of new irrigation schemes: Type A formal irrigation	Katakwi	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
2.8.8	Construction of new irrigation schemes: Type B formal irrigation	Katakwi	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
2.9.1	Water efficiency evaluation and recommendations	Katakwi	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
2.10.1	Investment and implementation in hydropower installations and grid distribution	Katakwi	Toroma	Toroma	Toroma TC	Poles, electric wires	50 km	3	3		
			Magoro	Magoro	Magoro TC						
			Kapujan	Orimai	Orimai						
2.11.1	Promote additional and alternative sources of energy including low cost solar panels to be used for led lighting, radios and cell phones	Katakwi	Toroma	Toroma	Atoroma Girls SS	Biogas technology and solar panels	2 secondary schools and 3 health centres	1	4		
					Toroma SS						
					Otur HC						
					Odike HC						
2.11.2	Promote use of energy efficient woodstoves by making the technology readily available	Katakwi	Toroma	Toroma	Cheleu HC	Demonstrations at institutional level, training	30 family heads trained per parish and 9 schools supported	5	5		
					Atoroma Girls Boarding School						
					Toroma Boys School						
					Katakwi High School						
					Usuk						
					Usuk Girls School						
	Aketa	Epel Memorial									
	Northern ward	Kaputon P/S									
		Katakwi Township									
		Katakwi P/S									



2.12.1	Develop a manual on aquaculture techniques (building on available materials)	Katakwi	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2.12.2	Assist farmers with the rehabilitation of viable aquaculture ponds and construction of new ponds - allowance made for a pilot	Katakwi	Kapujan Toroma Magoro Katakwi Katakwi TC	Kokorio Omenya Opeta Southern ward Katakwi	Olegia Osudan Agule wetland Aleles Ochoromoni	N/A	Rehabilitation of ponds	20 ponds	5	5	5	5
2.12.3	Train and assist farmers on the appropriate fishing techniques and equipment as well as the protection of breeding grounds	Katakwi	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2.13.1	Create an ecological tourism organisation, train it and provide the necessary starting equipment e.g a boat	Katakwi	Kapujan Magoro	Kokorio Orimai Opeta Kamenu	Oreja Agule Agule Kamenu	Creation of an ecological tourism organisation, training and support of its members, training of 8 guides, 4 binoculars, 4 boats	Training of the members of the organisation and training and support of 2 guides per village	2	4	4	4	4
2.13.2	Promote horticulture	Katakwi	Katakwi TC Omodoi Magoro	Southern ward Amusia Magoro	Ajeluk Amusia Magoro TC	Set up demonstration sites, seeds / organic farming, control pesticides usage, green house, treadle pumps, pipes	5 farmers per village	3	3	3	3	3
2.13.3	Promote bee keeping	Katakwi	Kapujan Ongongoja	Kokorio Olimaya	Oidotongole Goria	Set up beehives, capacity building	50 farmers per village	2	2	2	2	2
3.1.1	Demarcate areas considered unsafe for habitation or other use and warn inhabitants	Katakwi	Magoro Ngariam Palam Ongongoja	Angisa Kaikamosing Odoot Obwobwo	Angisa Kaikamosing Odoot Obwobwo		4	4	4	4	4	4

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village	
3.1.2	Develop an early flood warning system	Katakwi	Magoro	Angisa	Angisa	Development of early flood warning systems	4	4	4	4	
			Ngariam	Kaikamosing	Kaikamosing						
			Palam	Odoot	Odoot						
			Ongongoja	Obwobwo	Obwobwo						
3.1.3	Development / compilation of a hazard / risk map for landslides / sedimentation / floods	Katakwi	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
3.3.1	Determine current stocking rates and assess carrying capacity of all districts. Develop a plan to keep the numbers of animals within the theoretic limits of carrying capacity	Katakwi	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
3.3.2	Livestock improvement programme	Katakwi	Toroma	Akuraao	Akuraao	Sensitisation on artificial insemination, capacity building, demonstration materials, breeding centres, pest control structures, access to water points, improved breeding stock, enhanced veterinary services	20 farmers per village	10	10	10	10
			Kapujan	Kapujan	Kapujan						
			Magoro	Omasia	Omasia						
			Katakwi	Olela	Olela						
			Palam	Odoot	Odoot						
			Omodoi	Amusia	Amusia						
			Ongongoja	Ongongoja	Ongongoja						
			Ngariam	Kaikamosing	Kaikamosing						
			Usuk	Obwokogia	Obwokogia						
			Katakwi T/C	Ajeluk	Ajeluk						

<b>3.3.3</b>	Promote dairy farming	Katakwi	Toroma	Akurao	Akurao	20 farmers per village	10	10	10	Milk coolers, motorcycle, cans / carts, new breeds (fresians), increased pastures, improved management, introduce diary farming association
				Kapujan	Kapujan					
				Magoro	Omasia					
				Katakwi	Olela					
				Palam	Odoot					
				Omodoi	Amusia					
				Ongongoja	Ongongoja					
				Ngariam	Kaikamosing					
				Usuk	Obwokogia					
				Katakwi T/C	Ajeluk					
<b>4.1.1</b>	Monitoring stations must be maintained and regularly calibrated. Gauge readers need to be trained and check mechanisms introduced to ensure stability and consistency in data	Katakwi	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
<b>4.1.2</b>	Expand, rehabilitate and improve the water quality, evaporation, rainfall, ground water and streamflow monitoring network systems and lake and wetland water level monitoring gauges. Implement sedimentation monitoring	Katakwi	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
<b>4.1.3</b>	Monitor surface and ground water use and levels to prevent over - exploitation	Katakwi	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
<b>4.2.1</b>	Train a committed cadre of extension service providers to render inter - disciplinary, integrated extension service to include CMCs, CDOs etc.	Katakwi	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
<b>4.2.2</b>	Develop support materials for use by extension officers (building on currently available materials)	Katakwi	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
<b>4.3.1</b>	Develop training guidelines and awareness raising materials (building on currently available materials)	Katakwi	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
<b>4.3.2</b>	Introduction of a community radio programme dedicated to environmental matters (at district level)	Katakwi							Radio advert on weekly basis	

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
4.3.3	Sanitation project. Demonstration of ecosan and other sanitation systems. Provision of appropriate designs and training in construction. Support with provision of materials	Katakwi	Magoro	Omasai	Orau P/S	Demonstration of ecosan and other sanitation systems	5 stance toilets per school	4	4	6
					Magoro P/S					
					Palam P/S					
					Oliim P/S					
4.3.4	Implement demonstration projects - schools, model farms etc. (capital costed elsewhere)	Katakwi	Magoro	Omasai	Orau P/S	Woodlots, fruit trees, wheelbarrows, hoes, garden forks	2 acres per school (1 for woodlots and 1 for fruit trees)	4	4	4
					Palam P/S					
					Okuda P/S					
					Aperoodoot P/S					
4.3.5	Introduction of awareness raising programmes in schools	Katakwi	Magoro	Omasai	Orau P/S	Establish environmental clubs, IEC materials, drama clubs	6 schools	4	4	6
					Magoro P/S					
					Palam P/S					
					Oliim P/S					
4.4.1	Train experts (import expertise) in the development of technology guidelines, training and other approaches	Katakwi	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a
					Aperoodoot P/S					
					Okuda P/S					
					Palam P/S					
4.4.2	Enhance and strengthen the capacity of BMUs (Structure already established in Bisina and Opeta but no capacity to perform)	Katakwi	Kapuian	Kokorio	Agule	Training of BMU members	10 members per BMUs	2	3	4
					Onja					
					Agule					
					Kamenu					

4.4.3	Enhance and strengthen the capacity of rice grower associations	Katakwi	Magoro	Opeta	Opeta	Formation of rice grower associations and training on sustainable wetland use, agro - processing and marketing, equipment for milling, improved seed varieties	6	5	6	6
				Omasia	Omasia					
			Ngariam	Kaikamosing	Kaikamosing					
			Usuk	Abwokodiang	Abwokodiang					
			Katakwi	Aleles	Aleles					
			Kapujan	Abela	Abela					
4.5.1	Strengthen enforcement bodies with capacity	Katakwi	N/A	N/A	N/A	N/A	n/a	n/a	n/a	n/a
							176	185	219	

#### INTERVENTION SITES FOR THE OPTIONS

#### District: KUMI

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
1.1.1	The preparation and dissemination of comprehensive and sustainable land and environmental management manual providing the technological approaches tailored for the Awoja catchment and Kyoga WMZ	Kumi	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1.1.2	Design and pilot of individual farms according to sustainable land and environmental management principles. Layout to include contouring, drain and waterway layout and improvements, road design, runoff management, woodlot and agroforestry planning	Kumi	Ongino	Kapolin	Kapolin	Agroforestry	5 farmers	2	3	3
			Kumi	Agule	Agule		4 farmers			
1.1.3	Identification and regular (annually) eradication of floating islands / invasive alien plants	Kumi	Ongino	Akide	Akide	Kumi Technical school for woodlot and 6 farmers	2	1	2	2
				Tisai	Tisai					
1.1.4	Development of a fire risk, fire control and fire protection plan, with controlled burning where required for grazing and biodiversity management and implement it	Kumi	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
1.1.5	River bank protection and stabilisation - gabions, management of cattle access points, protection of riparian vegetation	Kumi	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1.1.8	Ecological water requirements: Revisiting legislation and catchment assessment	Kumi	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1.1.8.1	Introduce improved farming practices	Kumi	Ongino Kumi	Akide Omatenga	Akide Agolitom	Setup irrigation layout, improve farming practices (using grass bands, tree planting, cultivating across slopes, using cover crops and soil improving crops)	2 irrigation layouts, 4 demonstration farmers with improved farming practices	2	2	2
1.1.9	Build the capacity on conservation methods especially for wetlands	Kumi	Kumi	Asinge Otiye Omatenga Omoloonyo Agule Abata Okouba Oseera	Asinge wetland Otiye Omatenga Omoloonyo Agule Abata Okouba Oseera Wetland	Form parish environmental committees and train them on their roles, sensitization and capacity building of community members on the conservation of wetlands	13 villages	2	13	13
1.1.10	Monitoring the impacts of sustainable land and environmental management in terms of improved farming practices (individual benefits) and downstream water management	Kumi	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A



Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
1.3.1	Regular updating of district wetland inventories by districts	Kumi	Kumi		Kumi Omatenga wetland system	Establish and regularly update a District Wetland Inventory Data System	1 District Wetland Inventory Data System	2		2
			Ongino		Ongino wetland system					
1.3.2	Updating of demarcated protection zones and acceptable utilization of wetlands, producing GIS maps of wetlands at various levels	Kumi	Kumi		Kumi Omatenga wetland system	Produce GIS maps, demarcate zones		2		2
			Ongino		Ongino wetland system					
1.3.3	Study for economic valuation of wetland resources and disseminate the results	Kumi	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1.3.4	Review and update the wetland management /action plans	Kumi	Kumi		Kumi Omatenga wetland system	Process of making SC Wetland Action Plans is on-going with JICA	2	2		2
			Ongino		Ongino wetland system					
1.3.5	Restoration of vital (unique) critical (subject to on going degradation) wetlands	Kumi	Kumi	Asinge	Asinge (Asinge wetland)	Restore 2 wetlands, create user and buffer zones, form and train wetland management committees	2	1	1	2
					Ngabet (Ngabet wetland)					
1.4.1	Mapping, demarcation of riparian and roadside protection zones and identify and implement source protection measures	Kumi	Kumi	Agolitom	Agolitom	Protect lake shores by planting trees and grass, protect roadsides with trees for 20 km	6	2	6	6
					Agule					
					Oseera					
					Aakum					
					Akide					
					Totolim					
2.1.1	Improve sanitation technology, and building materials, support and implement them	Kumi	Ongino	Oseera	Oseera (Oseera P/S)	Construct lined pits	3	1	3	3
					Kapolin					
					Akide (Akide landing site)					



2.1.2	Improve faecal sludge management (collection, transportation, treatment and re-use) through clustering of small towns (Kumi Sironko, Kapchorwa, Nakapiripiti)	Kumi	Ongino	Ongino	Ongino	Ongino Hospital	Treatment facility for waste (Kumi TC is not part of Awoja)	1	1	1	1
2.2.2	Refurbish valley dams and tanks	Kumi	Kumi	Omatenga	Omatenga (Omatenga dam)	Kodukul (Kodukul dam)	Refurbishment of the dams	2	2	2	2
2.3.1	Design and construct river Agu scheme to supply Kumi and surrounds water and waste water works	Kumi					Plans are underway to construct the scheme				
2.3.2	Soroti treatment and distribution- expand in stages (NWSC)	Kumi	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2.6.1	Feasibility studies and design of proposed sand dams. construction with co operation and input from local communities	Kumi	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2.7.1	Needs identification for location and type of dams and associated abstraction facilities	Kumi	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2.7.2	Feasibility and design of prioritised dams for stock watering and human needs. Construction with cooperation and input from local communities	Kumi	Ongino	Kalengera	Kalengera	Agule	Feasibility of multi-purpose dams	3	2	3	3
2.8.2	Enhancement of rain fed agriculture	Kumi	Kumi	Omolokonyo	Omolokonyo	Ameje	Rain water harvesting tanks	10 homesteads with rain water harvesting tanks in each village	2	2	2
			Ongino	Kapolin	Kapolin						
2.8.3	New irrigation schemes: Undertake feasibility studies of identified areas	Kumi	Ongino	Kalengera	Kalengera	Kalengera	Irrigation schemes	8 schemes	2	8	8
					Akide	Akide					
					Totolim	Totolim					
					Akolitorom	Akolitorom					
					Akolum	Akolum					
					Oseera	Oseera					
					Omatenga	Omatenga					
Agule	Agule										

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
2.8.4	Construction of new irrigation schemes: Improved (seasonal) wetland schemes	Kumi	Ongino	Akolitorom	Akolitorom		6 schemes	2	6	6
				Akide	Akide					
				Oseera	Oseera					
				Aakum	Aakum					
				Okouba	Okouba					
				Omatenga	Omatenga					
2.8.5	Construction of new irrigation schemes: Low power pumped schemes that utilise water from nearby rivers, swamps and lakes	Kumi	Ongino	Akolitorom	Akolitorom		6 schemes	2	6	6
				Akide	Akide					
				Oseera	Oseera					
				Aakum	Aakum					
				Okouba	Okouba					
				Omatenga	Omatenga					
2.8.6	Construction of new irrigation schemes: Simple gravity - fed schemes	Kumi	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2.8.7	Construction of new irrigation schemes: Type A formal irrigation	Kumi	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2.8.8	Construction of new irrigation schemes: Type B formal irrigation	Kumi	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2.9.1	Water efficiency evaluation and recommendations	Kumi	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2.10.1	Investment and implementation in hydropower installations and grid distribution	Kumi	Kumi	Okouba	Okouba	Extension of grid for a distance of 12 km from Kumi town to Omatenga landing site	2	2	3	3
				Agule	Agule Landing site					
2.11.1	Promote additional and alternative sources of energy including low cost solar panels to be used for lighting, radios and cell phones	Kumi	Kumi	Okouba	Kumi Technical School	Solar panels	3	2	3	3
				Omatenga	Omatenga Health Centre II					
				Ongino	Ongino Health Centre III					

2.11.2	Promote use of energy efficient woodstoves by making the technology readily available	Kumi	Ongino	Oseera	Oseera	Oseera	Woodstoves, train households and school personnel	50 households per village	2	4	4
				Omolokonyo	Omolokonyo						
2.12.1	Develop a manual on aquaculture techniques (building on available materials)	Kumi	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
				Okouba	Kumi Technical School	N/A	N/A	N/A	N/A		
2.12.2	Assist farmers with the rehabilitation of viable aquaculture ponds and construction of new ponds - allowance made for a pilot	Kumi	Ongino	Olungia	Olelia	Rehabilitation of Olelia fish ponds	4	2	3	3	
				Akide	Akide	Pilot fish cage farming, construction of ponds	4 (2 in each village)				
2.12.3	Train and assist farmers on the appropriate fishing techniques and equipment as well as the protection of breeding grounds on Lake Bisina and Lake Opeta	Kumi	Ongino	Agule	Agule	Train fishermen (10 per village) on improved fishing techniques and equip them with fish nets, other equipments and life jackets	10 fishermen per village	2	4	7	
				Omatenga	Omatenga						
2.13.1	Create an ecological tourism organisation, train it and provide the necessary starting equipment e.g a boat	Kumi	Ongino	Oseera	Oseera	Form and train organisation, motorised boat, life jackets, binoculars, lodging facilities	1 organisation, 1 motor boat, life jackets, binoculars, lodging facilities	1	1	1	
				Okutot	Okutot						
2.13.2	Promote horticulture	Kumi	Kumi	Tisai	Tisai Island	Provide vegetable seeds and train farmers on how to plant and care for the vegetables	10 farmers per village	2	6	6	
				Akolotorom	Akolotorom						
				Akide	Akide						
				Osela	Osela						
				Aakum	Aakum						
				Okouba	Okouba						
				Omatenga	Omatenga						

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village	
2.13.3	Promote bee keeping	Kumi	Ongino	Kanapa	Kanapa	Procure bee equipment and bee hives and train farmers on bee keeping, processing and packaging equipment	10 farmers per village	2	3	3	
			Kumi	Totolim	Totolim						
3.1.1	Demarcate areas considered unsafe for habitation or other use and warn inhabitants	Kumi	Kumi	Agolitom	Agolitom	Demarcate flood prone areas	5 areas	2	5	5	
			Ongino	Kapolin	Kapolin						
				Akide	Akide						
				Oseera	Oseera						
3.1.2	Develop an early flood warning system	Kumi	Kumi	Agolitom	Agolitom	Develop early warning system in these areas	5 areas	2	5	5	
			Ongino	Kapolin	Kapolin						
				Akide	Akide						
				Kanapa	Kanapa						
3.1.3	Development/compilation of a hazard/risk map for landslides/sedimentation/ floods	Kumi	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
3.3.1	Determine current stocking rates and assess carrying capacity of all districts. Develop a plan to keep the numbers of animals within the theoretic limits of carrying capacity	Kumi	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
3.3.2	Livestock improvement programme	Kumi	Ongino	Tisai	Tisai Island	Improved breeds (cross breeds) incl. bulls, cattle dips and crushes, artificial insemination, improved fodder, good breeds of goat and sheep, zero grazing units, ...	12 villages	2	12	12	12
				Kanapa	Kanapa						
				Totolim	Totolim						
				Akide	Akide						
				Akum	Akum						
				Kapolin	Kapolin						
				Oseera	Oseera						
Cheelee	Cheelee										

3.3.3	Promote dairy farming	Kumi	Kumi	Ongino	Omatenga Agule Oogoria Asinge Tisai Kanapa Totolim Akide Akum Kapolin Osela Cheere Omatenga Agule Oogolia Asinge	Omatenga Agule Oogoria Asinge Tisai Island Kanapa Totolim Akide Akum Kapolin Osela Cheere Omatenga Agule Oogolia Asinge	...veterinary services improved: vaccination, tick control	Dairy animals, milk coolers, zero grazing units, training of farmers and provision of materials, vaccination and cattle spraying, tagging of the animals	4 farmers per village	2	12	12
4.1.1	Monitoring stations must be maintained and regularly calibrated. Gauge readers need to be trained and check mechanisms introduced to ensure stability and consistency in data	Kumi	Kumi	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4.1.2	Expand, rehabilitate, and improve the water quality, evaporation, rainfall, ground water and streamflow monitoring network systems and lake and wetland water level monitoring gauges. Implement sedimentation monitoring	Kumi	Kumi	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4.1.3	Monitor surface and ground water use and levels to prevent over - exploitation	Kumi	Kumi	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4.2.1	Train a committed cadre of extension service providers to render inter - disciplinary, integrated extension service to include CMCs, CDOs etc.	Kumi	Kumi	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4.2.2	Develop support materials for use by extension officers (building on currently available materials)	Kumi	Kumi	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village	
4.3.1	Develop training guidelines and awareness raising materials (building on currently available materials)	Kumi	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
4.3.2	Introduction of a community radio programme dedicated to environmental matters	Kumi				Broadcast an environmental programme	1 programme per week				
4.3.3	Sanitation project. Demonstration of ecosan and other sanitation systems. Provision of appropriate designs and training in construction. Support with provision of materials	Kumi	Kumi	Agulitom	Agulitom	Ecosan toilets, sensitisations of communities, composting incl. training for 2 people per village	1 public toilet per village	2	6	6	
				Ongino	Kapolin	Kapolin					
					Akide	Akide					
					Kanapa	Kanapa					
					Aku	Aku					
	Tisai	Tisai Island									
4.3.4	Implement demonstration projects - schools, model farms etc. (capital costed elsewhere)	Kumi	Ongino	Kapolin	Kapolin (Kapolin P/S)	School woodlots, fruit orchards and vegetable gardens for demonstration and agricultural learning	3 schools	2	2	3	
				Kumi	Kumi (Kumi P/S)						
					Kumi (Kumi Technical Sch)						
4.3.5	Introduction of awareness raising programmes in schools	Kumi	Kumi	Kumi	Kumi Technical School	Formation of environment clubs where Environment awareness campaigns and activities can be promoted	1 Technical School, 1 Secondary School and 2 Primary Schools	2	2	4	
					Kumi P/S						
					Ongino SS						
					Ongino P/S						
4.4.1	Train experts (import expertise) in the development of technology guidelines, training and other approaches	Kumi	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
4.4.2	Enhance and strengthen the capacity of BMUs	Kumi	Kumi	Agule	Agule BMU	Organize and train BMU members	7 BMUs	2	4	7	
					Omatenga						Omatenga BMU
					Oseera						Oseera BMU
					Okutot						Okutot BMU
					Nabiyoto BMU						



**District: KWEEN**

**INTERVENTION SITES FOR THE OPTIONS**

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
1.1.1	The preparation and dissemination of comprehensive and sustainable land and environmental management manual providing the technological approaches tailored for the Awoja catchment and Kyoga WMZ	Kween	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1.1.2	Design and pilot of individual farms according to sustainable land and environmental management principles. Layout to include contouring, drain and waterway layout and improvements, road design, runoff management, woodlot and agroforestry planning	Kween	Kitawoi	Kitawoi	Bosha Kapchekwot	Contour bunds, trenches, woodlots	50 km of bunds, 10 woodlots of 10 ha (50 ha per village)	1	1	2
1.1.3	Identification and regular (annually) eradication of floating islands / invasive alien plants	Kween	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1.1.4	Development of a fire risk, fire control and fire protection plan, with controlled burning where required for grazing and biodiversity management and implement it	Kween	Kiriki	Kiriki	Biiliak Chemurot Cheptuimat Kabunduki	Fire lines, create and train 1 fire risk management committee in each village, develop a fire control plan	Fire lines of 40 km (10 per village), 1 fire risk management committee per village	1	1	4
1.1.5	River bank protection and stabilisation - gabions, management of cattle access points, protection of riparian vegetation		Kwosir (River Kere)	Kere	Kere Kalamai Chekwutus Kabeliyo Arkut Sasur Chemuron Kere Kamwam Kapyomat Kwures					





Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
1.1.8	Ecological water requirements: Revisiting legislation and catchment assessment	Kween	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1.1.8.1	Introduce improved farming practices	Kween	Upper slope (greater Benet): Kitawoi Mid slope (greater Binyiny): Kaptoyoy Lower slope (greater Ngenge): Ngenge	Tereboy Kaptoyoy Kapkwt	Tereboy Tapot Sukut Kapchekwoi Kapsamyi Rwakoi Kaptulel Makunka Tuyobei	Contour bunds, trenches, planting trees, naper grass and mulching, training of farmers (210 farmers in total)	Contour bunds (3 km per village), trenches (2 km per village), tree planting on 40,000 ha, 45,000 ha of naper grass altogether, train 210 farmers in total	3	3	9
1.1.9	Build the capacity on conservation methods, especially for wetlands	Kween	Ngenge Kiriki Kaptoyoy	Sikwo Sundet Kiriki Kerop	Sikwo Sundet Nabucheche Kapkure	Develop training manuals, train community TOTs	20 copies of training manuals per S/C, train 10 TOTs per village/wetland, train community members	3	4	4
1.1.10	Monitoring the impacts of sustainable land and environmental management in terms of improved farming practices (individual benefits) and downstream water management	Kween	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1.2.1	Provide routine training (forestry handbook) to CMCs, forest management, land care and agricultural managers: 1 training in each district @ 2 yrs	Kween	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1.2.2	Establish nurseries for provision of seedlings and establish distribution, training and management systems in all districts - pilot projects	Kween	Binyiny TC	Kwobus	Kapnarongo	Nursery	1	1	1	1

1.2.3	Support the implementation of a reforestation programme aimed at restoring lost woodland and at establishing woodlots to reduce the pressure on natural forest. Link to agroforestry and sustainable land management	Kween	Benet	Kaseko	Kamasaren Chemanga Chepsemtton Kabaw Tambajja Kwenge Kachekworis Bosha Kapkwowet Tabagon Kapkwoballiat Cheptandan Sukat Kongta	Tree seedlings	50,000 tree seedlings	3	7	14	
											Tambajja
											Kitawoi
											Tabagon
											Kwosir
											Tuikat
											Kere
											Ngoryemwo
											Kapcheber
											Kapchemirirot
											Ngoryemwo
											Munda
											Bumotoi
											Cheburei
1.2.4	Planting trees in degraded areas	Kween	Kaptoyoy	Ngoryemwo	Kapcheber	Seedlings	25,000 seedlings	2	3	6	
											Kapkwokoi
											Nyimei
1.3.1	Regular updating of district wetland inventories by districts. This should be done on the following wetlands: Atari, Kere, Kiriki (Nabucheche), Sundet and Kubal	Kween	Ngenge	Sikwo	Sikwo (Atari)	Update inventory	Once in 3 years	3	5	5	
											Kere
											Sundet
											Kerop
Kaptoyoy											
Kiriki											
Kapchure (Kubal)											
Nabucheche (Kiriki)											

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
1.3.2	Updating of demarcated protection zones and acceptable utilization of wetlands; producing GIS maps of wetlands at various levels	Kween	Ngenge	Sikwo	Sikwo (Atari)	Demarcation pillars as boundary marks, production of maps	Update maps once in 3 years	3	5	5
				Sundet	Sundet (Sundet)					
			Kere	Kere (Kere)						
			Kerop	Kapkure (Kubal)						
1.3.3	Study for economic valuation of wetland resources and disseminate the results	Kween	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
				Kirikiri	Nabucheche (Kiriki)					
1.3.4	Review and update the wetland management / action plans	Kween	Ngenge	Sikwo	Sikwo	In process of developing community wetland management plans (5)	Update once in 3 years	3	5	5
				Sundet	Sundet (Sundet)					
			Kere	Sundet						
			Kerop	Kapkure						
1.3.5	Restoration of vital (unique) critical (subject to on-going degradation) wetlands	Kween	Kaptoyoy	Kirikiri	Nabucheche (Kiriki)	Fencing with live hedges	1 acre	1	1	1
				Kerop	Kapkure					
1.4.1	Mapping, demarcation of riparian and roadside protection zones and identify and implement source protection measures	Kween	Kaptoyoy	Kerop	Kerop - Kapnarkut road	4 km	Demarcate road reserves with pillars (both sides), plant trees as boundary markers for 26 km	5	5	5
					Benet					
			Katawoi	Mengya - Binyiny road						
			Kwosir	Tuikat road	10 km					
				Kaptum	Kaptum road	4 km				
			2.1.1	Improve sanitation technology and building material support and implement them	Kween	Kwanyiny				
Kapkwata	Kisangani									
			Kiriki	Kiriki	Kirikiri	Lined VIP latrines	5 per village (2stance each)			
					Korite					

2.1.2	Improve faecal sludge management (collection, transportation, treatment and re-use) through clustering of small towns (Kumi Sironko, Kapchorwa, Nakapiripirit)	Kween	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
2.2.2	Refurbish valley dams and tanks	Kween	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
2.3.1	Design and construct river Agu scheme to supply Kumi and surroundings - water and wastewater works	Kween	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
2.3.2	Soroti treatment and distribution - expand in stages (NWSC)	Kween	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
2.6.1	Feasibility studies and design of prioritised sand dams. Construction, with cooperation and input from local communities	Kween	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
2.7.1	Needs identification for location and type of dams and associated abstraction facilities	Kween	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
2.7.2	Feasibility & design of prioritized dams for stock watering and humans needs. Construction, with cooperation and input from local communities	Kween	Ngeenge	Sikwo	Valley dams	Valley tanks	Valley tanks	Valley tanks	Valley tanks	Valley tanks	Valley tanks	Valley tanks	Valley tanks	
2.8.2	Enhancement of rain fed agriculture	Kween	Ngeenge	Sundet	Sundet	Sundet	Sundet	Sundet	Sundet	Sundet	Sundet	Sundet	Sundet	
			Kiriki	Korite	Korite	Korite	Korite	Korite	Korite	Korite	Korite	Korite	Korite	
			Ngeenge	Kapkwot	Kapkwot	Kapkwot	Kapkwot	Kapkwot	Kapkwot	Kapkwot	Kapkwot	Kapkwot	Kapkwot	
2.8.3	New irrigation schemes: Undertake feasibility studies of identified areas	Kween	Ngeenge	Sikwo	GFS	GFS	GFS	GFS	GFS	GFS	GFS	GFS	GFS	
			Sundet	Sundet	Sundet	Sundet	Sundet	Sundet	Sundet	Sundet	Sundet	Sundet	Sundet	
			Kapkwot	Kapkwot	Kapkwot	Kapkwot	Kapkwot	Kapkwot	Kapkwot	Kapkwot	Kapkwot	Kapkwot	Kapkwot	
			Kere	Kere	Kere	Kere	Kere	Kere	Kere	Kere	Kere	Kere	Kere	
			Kiriki	Kiriki	Kiriki	Kiriki	Kiriki	Kiriki	Kiriki	Kiriki	Kiriki	Kiriki	Kiriki	Kiriki
			Kapswama	Kapswama	Kapswama	Kapswama	Kapswama	Kapswama	Kapswama	Kapswama	Kapswama	Kapswama	Kapswama	Kapswama
Kaporotwo	Kaporotwo	Kaporotwo	Kaporotwo	Kaporotwo	Kaporotwo	Kaporotwo	Kaporotwo	Kaporotwo	Kaporotwo	Kaporotwo	Kaporotwo	Kaporotwo		

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
2.8.4	Construction of new irrigation schemes: Improved (seasonal) wetland schemes	Kween	Ngenge	Sundet	Sundet	Valley dams	2	1	2	2
2.8.5	Construction of new irrigation schemes: Low - power pumped schemes that utilize water from nearby rivers, swamps and lakes	Kween	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2.8.6	Construction of new irrigation schemes: Simple gravity - fed schemes	Kween	Ngenge	Sikwo		GFS	3 (covering the different parishes)	1	5	5
2.8.7	Construction of new irrigation schemes: Type A Formal Irrigation	Kween	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2.8.8	Construction of new irrigation schemes: Type B Formal Irrigation	Kween	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2.9.1	Water efficiency evaluation and recommendations	Kween	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2.10.1	Investment and implementation in hydropower installations and grid distribution	Kween	Moyok (Kere River)			Dams	3	3		3
2.11.1	Promote additional and alternative sources of energy including low cost solar panels to be used for LED lighting, radios and cell phones	Kween	Kwanyiy (Siit River)							
			Benet (Atari River)							
			Kaptum	Kaptum	Reberwo PS	Solar panels in schools, HCs and TC, identify and train 5 households per village for biogas	Solar panels in 3 primary schools, 2 health centres and 1 town council, train 5 households per village for biogas	4	5	6
			Benet	Likil	Kapchemelei PS					
					Tuyobei TC					
				Mulungwa	Mulungwa PS					
			Kitawoi	Tereniboi	Tereniboi HC					
			Kaptoyoy	Kerop	Kapcheropta HC					



Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
2.13.3	Promote bee keeping	Kween	Benet	Mulungwa	Mulungwa	10 local beehives and 10 modern beehives (langstroth) per village, harvesting gear, processing and packaging material, marketing, value addition, train 5 farmers per village	5 farmers per village	3	3	4
			Kaptoyoy	Ngoryemwo	Sitotwet					
			Binyiny	Tukumo	Tukumo					
3.1.1	Demarcate areas considered unsafe for habitation or other use and warn inhabitants	Kween	Ngenge	Cheptere	Cheptere	Flooding	7 villages: 3 for flood and 4 for landslide prone area demarcations	3	5	7
			Kiriki		Seretyo					
			Benet	Kiriki	Nabucheche	Landslides				
				Likil	Kapchemeleye					
				Tambaya	Loch					
				Piswa	Tewenge					
		Kabarak								
3.1.2	Develop an early flood warning system	Kween	Ngenge	Cheptere	Cheptere	Early flood warning systems	7	3	5	7
			Kiriki		Seretyo					
			Benet	Kiriki	Nabucheche	Early flood warning systems				
				Likil	Kapchemeleye					
				Tambaya	Loch					
				Piswa	Tewenge					
		Kabarak								
3.1.3	Development / Compilation of hazard / risk map for landslides / sedimentation / floods	Kween	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
3.3.1	Determine current stocking rates and assess carrying capacity of all districts. Develop a plan to keep the numbers of animals within the theoretical limits of carrying capacity	Kween	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A



3.3.2	Livestock improvement programme	Kween	Kitawoi	Terenboy	Terenboy	6 artificial in-semination kits, improved breeds (cross breeds) incl. bulls, improved fodder, good breeds of goats and sheep, zero grazing units, veterinary services improved: vaccination, tick control	6 villages	2	2	6
			Ngenge	Kapkwot						
3.3.3	Promote dairy farming	Kween	Kitawoi	Terenboy	Terenboy	Zero grazing units, fodder banks, milk coolers (2), train 30 farmers and equip them e.g. milk cans, cattle drugs, dairy animals (1 per farmer)	5 farmers per village, 2 milk coolers (1 per parish), 30 dairy animals (1 per farmer)	2	2	6
			Ngenge	Kapkwot						
4.1.1	Monitoring stations must be maintained and regularly calibrated. Gauge readers need to be trained and check mechanisms introduced to ensure stability and consistency in data	Kween	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4.1.2	Expand, rehabilitate, and improve the water quality, evaporation, rainfall, ground water and streamflow monitoring network systems and lake and wetland water level monitoring gauges. Implement sedimentation monitoring	Kween	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4.1.3	Monitor surface and ground water use and levels to prevent over-exploitation	Kween	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4.2.1	Train a committed cadre of extension service providers to render interdisciplinary, integrated extension service to include CMCs, CDOs etc.	Kween	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4.2.2	Develop support materials for use by extension officers (building on currently available materials)	Kween	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
4.3.1	Develop training guidelines and awareness raising materials (building on currently available materials)	Kween	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4.3.2	Introduction of a community radio programme dedicated to environmental matters	Kween				Establish a radio station in Kaproron, radio talk shows on environmental matters and sustainable land management	4 times a month			
4.3.3	Sanitation project. Demonstration of ecosan and other sanitation systems. Provision of appropriate designs and training in construction. Support with provision of materials	Kween	Kwanyiny	Nyimei	Kwanyiy PS	Lined VIP latrines (4stance) plus handwashing facilities	4 schools	2	4	4
				Kapkwata	Kworus PS					
				Korite	Korite PS					
				Kapswama	Kapswama PS					
4.3.4	Implement demonstration projects - schools, model farms etc. (capital costed elsewhere)	Kween	Moyok	Kapyatei	Kere DFI	Demonstration plot	1	6	13	
				Kwanyiny	Kaporotwo PS	Develop school farms (1 ha per school) and equip them	12 schools			
					Kapkwata PS					
					Nyimei PS					
				Benet	Taragon PS					
					Likil PS					
					Chemanga PS					
				Kwosir	Kwosir PS					
					Kere PS					
				Kaptum	Cheminy PS					
Kaptum PS										
Kaproron	Kaproron PS									
	Chemwania PS									

<b>4.3.5</b>	Introduction of awareness raising programmes in schools	Kween	Kwanyiny			Kaporotwo PS Kapkwata PS Nyimej PS Taragon PS Likil PS Chemanga PS Kwosir PS Kere PS Cheminy PS Kaptum PS Kaproron PS Chemwania PS	Environmental committees in each school, drama groups etc., posters, pamphlets	5	12				
										N/A	N/A	N/A	N/A
										N/A	N/A	N/A	N/A
										N/A	N/A	N/A	N/A
										N/A	N/A	N/A	N/A
										N/A	N/A	N/A	N/A
										N/A	N/A	N/A	N/A
										N/A	N/A	N/A	N/A
										N/A	N/A	N/A	N/A
										N/A	N/A	N/A	N/A
<b>4.4.1</b>	Train experts (import expertise) in the development of technology guidelines, training and other approaches	Kween	N/A	Kapkwot	Tuyobei	N/A	N/A	N/A	N/A				
<b>4.4.2</b>	Enhance and strengthen the capacity of BMUs	Kween	N/A	Kapkwot	Nabucheche	N/A	N/A	N/A	N/A				
<b>4.4.3</b>	Enhance and strengthen the capacity of rice grower associations	Kween	Kiriki	Kiriki		Create and train 2 rice grower associations, formulate association constitutions, develop training manuals, registration certificates, 1 exchange visit to established associations	2	2	2				
<b>4.5.1</b>	Strengthen enforcement bodies with capacity	Kween	N/A	N/A	N/A	N/A	N/A	N/A	N/A				
								<b>94</b>	<b>114</b>	<b>212</b>			

**INTERVENTION SITES FOR THE OPTIONS**

**District: NAKAPIRIPIT**

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
1.1.1	The preparation and dissemination of comprehensive and sustainable land and environmental management manual providing the technological approaches tailored for the Awoja catchment and Kyoga WMZ	Nakapiripirit	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1.1.2	Design and pilot of individual farms according to sustainable land and environmental management principles. Layout to include contouring, drain and waterway layout and improvements, road design, runoff management, woodlot and agroforestry planning		Namalu	Lokatapan	Komoojij Nakilor Nakuluny Aoyalira Kawach Lokwasinyon Lomototo Nakayot Apeded Nakwanga Nasinyono	Establishment of woodlots, maintenance of community access roads Kagata-Lomomor (5 km) and Kagata-Lomorunyagae (3 km)	Woodlots: 1 in each village of 1 ha, community access roads: 2	4	12	27
				Loperot						
				Kaiku						
				Kokuwam						
			Loregae	Loreng	Loreng Kobeyon Aoyareng					
				Loatham	Nabata Arecheck					
			Lolachat	Natirae	Kanangakinoui Moruangamion Nachele Lokidodoka Nathinyonoit					
				Sakale						
			Kakomongole	Namorototo Akuyam Okwapon	Lorengedwat Lokale Alibumun					



Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
			Lorengedwat	Omaniman River Kabilamerok River Naroror River Aperikipe River						
1.1.8	Ecological water requirements: Revisiting legislation and catchment assessment	Nakapiripirit	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1.1.8.1	Introduce improved farming practices	Nakapiripirit	Lorengedwat	Narisai Nasiyoroit Kamaturu Acegeretolim Lokale Nakobekobe Moruanyibuin	Nangamit Nadi Nayoet Lonagat Lokwakwa Kamaturu Lotede Nacucu Napanyan Napongai Nasinyonoit Narukeng Ariamaoi	Irrigation by introducing treadle pumps and drip irrigation, contouring - strip planting, agroforestry: crops and trees in mixed bands, hands on training	Already established groups and a few individuals (2 in each village), 1 ha of agroforestry in each village	2	7	13
1.1.9	Build the capacity on conservation methods, especially for wetlands	Nakapiripirit	Namalu Loregae	Kokuwam Loperot Lokatapan Losang	Kocolikokoi Okudud Lokitelalokwa Nacucu (Nakilerero) Komojoj Lomorunyagan Lomanakalele Kalokarese	Form (if necessary) and train wetland user committees, sensitization meetings on wetland management	1 committee for each wetland, sensitisation meetings	5	9	13



Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
				Okwapun	Nacele Acelel Alibamun Lopeduru Lokeruman					
			Lorengedwat Loregae	Masinyonit Naturum Moruegatuny	Kalonyama Kiraido Nabulanger					
1.2.4	Planting trees in degraded areas	Nakapiripirit	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1.3.1	Regular updating of district wetland inventories by districts	Nakapiripirit	Namalu	Kokuwam Loperot Lokatapan	Kocilikokoi Okudud Lokitelalokwa Nacucu (Naki-lero) Komojoj Lomonunyagan	Develop an inventory on wetlands, then update it yearly, procure GIS equipment, train communities and focal point persons	Develop a wetlands inventory, train 13 villages on wetlands inventory and management	5	9	13
			Loregae	Losang	Lomanakalele Kalokarese					
			Lolachat	Loregae Natiria	Kalosepic Naitakosowan					
			Nabilatuk	Sokale Kosike	Kolobebe Tirkol / Kamosiny					
			Lorengedwat	Narisia	Lomogol					
1.3.2	Updating of demarcated protection zones and acceptable utilization of wetlands, producing GIS maps of wetlands at various levels	Nakapiripirit	Namalu	Kokuwam Loperot Lokatapan	Kocilikokoi Okudud Lokitelalokwa Nacucu (Naki-lero)	Erect demarcation pillars		5	9	13





Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
1.4.1	Mapping, demarcation of riparian and roadside protection zones and identify and implement source protection measures	Nakapiripirit	Namalu	Amaler River		Carry out mapping of the riparian zones, community sensitisations, establish protection zones, woodlots, desiltation and gabions, grass incl. elephant grass and tree planting incl. fruit trees (mangos, oranges etc.) and acacia, weirs to control the water flow, cattle rams for cattle to access the water (1 per river), 15 bridges (1 per river), 15 bridges (1 per river), regulations of activities along the riverbanks	15 bridges and 15 rams as cattle access points to the water, grass and tree planting (60 km altogether), 15 woodlots of 1 ha each	6	15	
				Kanapu River						
				Namalu River						
				Alibamu River						
				Angoleturot River						
				Akwamuyen River						
				Napiananya River						
				Kanyipa River						
				Nataa/Kamusing R.						
				Lolelia River						
				Nabilatuk River						
				Omaniman River						
				Kabilamerok River						
				Naroror River						
Aperikipe River										
2.1.1	Improve sanitation technology and building material support and implement them	Nakapiripirit	Namalu	Namalu TC	St. Mary's P.S.	Establish flush toilets (5 stances) following the development of piped water systems and drainable VIPs in institutions	30 toilets	5	5	30
					Namalu Mixed P.S.					
					Kagata P.S.					
					Namalu SC HQ					
					Health Centre 3					



Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
			Loregae	Loregae TC	Loregae SC HQ Napenaya P.S. Nabulengor HC 2 Nambole market					
2.1.2	Improve faecal sludge management (collection, transportation, treatment and re-use) through clustering of small towns (Kumi Sironko, Kapchorwa, Nakapiripirit)	Nakapiripirit	Nakapiripirit TC			Procure a cesspool for the district, establish and protect lagoons, construct a sewage system				
2.2.2	Refurbish valley dams and tanks	Nakapiripirit	Lolachat	Natirai	Okutot Lochagar Aoilem Trikae Lollimat Namutealoma	Valley tanks	15 valley tanks	5	9	15
					Mungamit Naotaba Kamaturu Locilimukat Akwarunyeyen Komuriapus/Kidule Kabong Manenei Loporinadotukas					
					Lorengedwat Loregae Namalu					

<b>2.3.1</b>	Design and construct river Agu scheme to supply Kumi and surroundings - water and wastewater works	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
<b>2.3.2</b>	Soroti treatment and distribution - expand in stages (NWSC)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
<b>2.6.1</b>	Feasibility studies and design of prioritised sand dams. Construction, with cooperation and input from local communities ( River Ominiman)	Lolachat	Locorkamodoi River	Nataba River	Omaniman River	Nakirienget River					4	4		
<b>2.7.1</b>	Needs identification for location and type of dams and associated abstraction facilities	Nabiatuk	Kalokameri	Kosike	Losimit	Nanyonai-angialo	Lolermut	Naoi (Kojam)	4 dams	Site for dam in Lorengedwat: Kojam and 3 water dams in Nabiatuk	2	3	4	
		Lorengedwat	Narisai											
		Nabiatuk	Kalokameri	Kosike	Losimit	Nanyonai-angialo	Lolermut	Naoi (Kojam)	4 dams	Site for dam in Lorengedwat: Kojam and 3 water dams in Nabiatuk	2	3	4	
<b>2.7.2</b>	Feasibility & design of prioritized dams for stock watering and humans needs. Construction, with cooperation and input from local communities	Lorengedwat	Narisai											
<b>2.8.2</b>	Enhancement of rain fed agriculture	Nabiatuk	Nabiatuk SC HQ		4 P.S.	1 S.S.	Health centre 4	Nabiatuk SC HQ	15 primary schools, 2 secondary schools, 2 health centres, 4 SC headquarters and 30 households in each SC	Rainwater harvesting technologies in schools, health centres, SC headquarters and households	4	4	12	
		Lorengedwat	Lorengedwat SC HQ		3 P.S.	Lorengedwat SC HQ	Health centre							
		Lolachat	Lolachat SC HQ											

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
			Loregae	Loregae SC HQ	4 P.S. 1 S.S. Loregae SC HQ					
2.8.3	New irrigation schemes: Undertake feasibility studies of identifies areas	Nakapiripirit	Lorengedwat Nabilatuk	Narisai Acegeretolim	Lokwamer Nayonai angiminito	Irrigation schemes	4 irrigation schemes	3	4	4
			Namalu	Kokuwam Lokatapan	Lolelarenagan Kagata					
2.8.4	Construction of new irrigation schemes: Improved (seasonal) Wetlands Schemes	Nakapiripirit	Loregae	Losam	Napomcholot Locholi	Irrigation schemes	6 irrigation schemes	2	2	6
			Namalu	Lokatapan	Komojoj Nacucu / Nakiloro Lokitelalokwa Okudud					
2.8.5	Construction of new irrigation schemes: Low - power pumped schemes that utilize water from nearby rivers, swamps and lakes	Nakapiripirit	Namulu	Kokuwam Kaiku	Namalu River Amaler	Irrigation schemes	4 irrigation schemes	2	3	4
			Kakomongole	Namorotot	Alibamun Lorengedwat/ Curuideng					
2.8.6	Construction of new irrigation schemes: Simple gravity - fed schemes	Nakapiripirit	Namalu	Kokuwam Kaiku	Nasiyono Lokiteladida	Irrigation schemes	3 irrigation schemes	2	3	3
			Kakomongole	Namorotot	Kawar Naparan					
2.8.7	Construction of new irrigation schemes: Type A Formal Irrigation	Nakapiripirit	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2.8.8	Construction of new irrigation schemes: Type B Formal Irrigation	Nakapiripirit	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2.9.1	Water efficiency evaluation and recommendations	Nakapiripirit	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

2.10.1	Investment and implementation in hydropower installations and grid distribution	Nakapiripirit	Loregae Lolachat Nabliatuk	Naturum	Lorengedwat P.S. Kamaturu P.S. St.Kizito S.S. Health Centre 3 Lorengedwat market Lorengedwat SC HQ	Establish connections to the national grid from Namalu to the SCs	30 km stretch to the national grid	5	5	30
2.11.1	Promote additional and alternative sources of energy including low cost solar panels to be used for LED lighting, radios and cell phones	Nakapiripirit	Loregae	Loregae TC	Loregae SC HQ Napenaya P.S. Nabulengor HC 2 Nambole market	Establish solar power in Lorengedwat SC in the institutions and wind power in the other SCs	30 km stretch to the national grid	5	5	30
2.11.1	Promote additional and alternative sources of energy including low cost solar panels to be used for LED lighting, radios and cell phones	Nakapiripirit	Namalu	Namalu TC	St. Mary's P.S. Namalu Mixed P.S. Kagata P.S. Namalu SC HQ Health Centre 3 Amaler P.S. Namalu market Namalu Catholic Church	Establish solar power in Lorengedwat SC in the institutions and wind power in the other SCs	30 km stretch to the national grid	5	5	30

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
					Namalu Church of Uganda Namalu Police Station Nabiatuk TC P.S. Arenyeseef S.S. Health Centre 4 Acegeretolim Girls P.S. Nabiatuk market Nabiatuk Police Station Health Centre 4 Tokora P.S. Okwapon P.S. Tokora TC					
2.11.2	Promote use of energy efficient woodstoves by making the technology readily available	Nakapiripirit	Namalu Loregae Lorengedwat Kakomongole Nabiatuk N/A	All parishes All parishes All parishes All parishes All parishes N/A		Training private households on woodstove technology	10 households per parish	5	All	All
2.12.1	Develop a manual on aquaculture techniques (building on available material)	Nakapiripirit	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2.12.2	Assist farmers with rehabilitation of viable aquaculture ponds and in the construction of new ponds - allowance made for a pilot	Nakapiripirit	Namalu Loregae Kakomongole Nakapiripirit TC	Loperot Loreng Okwapun Lobuneit	Loperot Kobenyon Lopeduru Lobuneit	Construction of (50*25) m fish ponds	4 fish ponds	4	4	4



<b>2.12.3</b>	Train and assist farmers on the appropriate fishing techniques and equipment as well as the protection of breeding grounds	Nakapiripirit	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
<b>2.13.1</b>	Create an ecological tourism organisation, train it and provide the necessary starting equipment e.g a boat	Nakapiripirit	Lorengae	Nakaale	N/A	Nakathian	N/A	Establish an arts and craft centre, promote Mount Kadam for tourism, establish a campsite and a restaurant, train guides	1 arts and craft centre, establish 1 campsite and 1 restaurant, train 3 guides	1	1	N/A
<b>2.13.2</b>	Promote horticulture	Nakapiripirit	Namalu Lolachat Kakomongole Nabilatuk Lorengedwat Lorengae					Train 50 farmers per SC (to be identified according to defined criteria) and provide them with starting kits (seeds for water melon, sunflower, sirmsim etc.)	Train 50 farmers per SC and provide them with starting kits (seeds for water melon, sunflower, sirmsim etc.)	6		6
<b>2.13.3</b>	Promote bee keeping and processing	Nakapiripirit	Namalu Lolachat Kakomongole Nabilatuk Lorengedwat Lorengae					Train 20 farmers per SC (to be identified according to defined criteria) on harvesting techniques and processing, provide them with bee hives and honey processing equipment	Train 20 farmers per SC on harvesting techniques and processing, provide them with bee hives (5 per farmer) and honey processing equipment	6		6

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
3.1.1	Demarcate areas considered unsafe for habitation or other use and warn inhabitants	Nakapiripirit	Namalu	Kokuwam	Namalu	Land slides	11 landslide prone areas			
				Kaiku	Masiyono Amaler Lokiteludida Nameiasi Mokiperet Lokurasiyon					
			Kakomongole	Namorotot	Alibamun Lorengedwat/ Curudeng Kawar Naparan Nadip	Flooding	23 flood prone areas			
				Tokora	Loperot Lokitelokwa Mukulungi Apeicherait Lokoreto Okudud Aolira Namalu TC					
				Lokatapan	Makiloro Komojoj Naminit Lokinyergunet West Loberro Lowatachin Lokinyergunet East					



Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
				Lokatapan	Makloro Komojoj Naminit Lokinyergunet West Loberro Lowatatchin Lokinyergunet East Alamaer Loreng / Lopirai Mayoroit Arechek Nacile Lokebui Lotikotoi Naitakosowan					
3.1.3	Development / compilation of hazard / risk map for landslides / sedimentation / floods	Nakapiripirit	N / A	N / A	N / A	N / A	N / A	N / A	N / A	N / A
3.3.1	Determine current stocking rates and assess carrying capacity of all districts. Develop a plan to keep the numbers of animals within the theoretical limits of carrying capacity	Nakapiripirit	N / A	N / A	N / A	Carry out live-stock census, train CAHWS, livestock enumerators and veterinary officers		N / A	N / A	N / A

3.3.2	Livestock improvement programme	Nakapiripirit	Namalu Kakomongole Lolachat Nabilatuk Loregae Lorengedwat				Improve on ticks of cattle: cattle dips and acaricides (2 per SC), vaccination programmes, establish watering points (1 per parish), establish an animal drug store (1 per SC), training on the management of livestock, capacity building for veterinary staff and animal health workers, improve on quality of breeds / cross breeding, demonstration ranches (1 per SC)	Cattle dips and acaricides (2 per SC), vaccination programmes, establish watering points (1 per parish), establish an animal drug store (1 per SC), training on the management of livestock, capacity building for veterinary staff and animal health workers, improve on quality of breeds / cross breeding, demonstration ranches (1 per SC)	6	6
									6	6
3.3.3	Promote dairy farming	Nakapiripirit	Namalu Lolachat Kakomongole Nabilatuk Lorengedwat Lorengae				Identify model dairy farmers (5 per SC), train them and provide them with start up capital (land, 2 cows and 1 bull per SC), drugs and milking machine	5 model farmers per SC, train them, start up capital: land, 2 cows and 1 bull per SC, drugs and milking machine	6	6

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
4.1.1	Monitoring stations must be maintained and regularly calibrated. Gauge readers need to be trained and check mechanisms introduced to ensure stability and consistency in data	Nakapiripirit	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4.1.2	Expand, rehabilitate, and improve the water quality, evaporation, rainfall, ground water and streamflow monitoring network systems and lake and wetland water level monitoring gauges. Implement sedimentation monitoring	Nakapiripirit	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4.1.3	Monitor surface and ground water use and levels to prevent over - exploitation.	Nakapiripirit	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4.2.1	Train a committed cadre of extension service providers to render inter - disciplinary, integrated extension service to include CMCs, CDOs etc.	Nakapiripirit	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4.2.2	Develop support materials for use by extension officers (building on currently available materials)	Nakapiripirit	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4.3.1	Develop training guidelines and awareness raising materials (building on currently available materials)	Nakapiripirit	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4.3.2	Introduction of a community radio programme dedicated to environmental matters	Nakapiripirit				Facilitate radio talk show messages for all SCs, establish a radio station in Nakapiripirit TC				

4.3.3	Sanitation project. Demonstration of ecosan and other sanitation systems. Provision of appropriate designs and training in construction. Support with provision of materials	Nakapiripirit	Namalu	Namalu TC	St. Mary's P.S. Namalu Mixed P.S. Kagata P.S. Namalu SC HQ Health Centre 3 Amaler P.S. Namalu market Namalu Catholic Church Namalu Church of Uganda Namalu Police Station Nabiatuk TC P.S. Arenyeseef S.S. Health Centre 4 Acegeretolim Girls P.S. Nabiatuk market Nabiatuk Police Station Health Centre 4 Tokora P.S. Okwapon P.S. Tokora TC	Establish flush toilets (5 stances) following the development of piped water systems and drainable VIPs and handwashing facilities in institutions	30 toilets and handwashing facilities	5	5	30				
											Nabiatuk	Nabiatuk TC		
													Kakomongole	Tokora TC

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
			Lorengedwat	Naturum	Lorengedwat P.S. Kamaturu P.S. St.Kizito S.S. Health Centre 3 Lorengedwat market Lorengedwat SC HQ					
			Loregae	Loregae TC	Loregae SC HQ Napenaya P.S. Nabulengor HC 2 Nambole market					
4.3.4	Implement demonstration projects - schools, model farms etc. (capital costed elsewhere)	Nakapiripirit	Namalu Lolachat Kakomongole Nabiatuk Lorengedwat Lorengae Nakapiripirit TC			Establish school gardens, form young farmers associations	In all schools in all SCs (43 schools)	7		7





**INTERVENTION SITES FOR THE OPTIONS** **District: NAPA**

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
1.1.1	The preparation and dissemination of comprehensive and sustainable land and environmental management manual providing the technological approaches tailored for the Awoja catchment and Kyoga WMZ	Napak	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1.1.2	Design and pilot of individual farms according to sustainable land and environmental management principles. Layout to include contouring, drain and waterway layout and improvements, road design, runoff management, woodlot and agroforestry planning	Napak	Lorengecora	Kokipurat	Kokipurat	Agroforestry, woodlots, small-scale irrigation	4 ha per village	4	4	7
			Iriri	Iriri	Alekilek					
			Lotome	Morungor	Naooi					
			Matany	Nakichumet	Naitakosowan					
					Kokoris					
					Kotipe					
					Nakichumet					
1.1.3	Identification and regular (annually) eradication of floating islands / invasive alien plants		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1.1.4	Development of a fire risk, fire control and fire protection plan, with controlled burning where required for grazing and biodiversity management and implement it	Napak	Matany	Nakichumet	Nakichumet	Fire fighting equipment, train communities on fire fighting, form and train committees on fire fighting, ordinance and bylaws, sensitizations	1 fire fighting committee per parish, community trainings	5	14	41
					Natirae					
					Poron					
					Komutiurunyo					
				Morulinga	Nasinyonoit					
					Kogete					
					Nachuka					
				Lokali	Morualoyete					
					Nasiloit					
			Lotome	Kalokengel East	Kotiti					
				Nariamaregae	Korisae					
					Nakale					



Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
1.1.5	River bank protection and stabilisation - gabions, management of cattle access points, protection of riparian vegetation	Napak	Lotome Iri Matany	Moruoungor River Omani-man Lokupoi Lopeei	Omaniman river bank	Demarcation of buffer zones, tree planting (species: Neem, tick eu-calyptus, acacia, pine), fodder grass, stabilization gabions, seedlings, cattle access points	50,000 seedlings, 2 cattle access points	3	4	
1.1.8	Ecological water requirements: Revisiting legislation and catchment assessment	Napak	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1.1.8.1	Introduce improved farming practices	Napak	Lotome Iri Matany	Kalokengel East Iri Nabwal Nakicumet	Nachuka Akwapua Nakisilet Naturumurum Kodike Kokeris Natirae Komutiurunyo	Train 15 farmers per village on water and soil conservation practices, adaptable tree seedlings and seeds, drought resistant crops, mobile abattoir	11 villages	4	7	11
1.1.9	Build the capacity on conservation methods, especially for wetlands	Napak	Matany Lorengecora	Nakicumet Choichol	Nakicumet Kotipe Arecheck Lodoon Komo Nawatom	Refresh trainings for wetland management committees, awareness creation against encroachment of water catchment areas	6 villages	2	2	6

1.1.10	Monitoring the impacts of sustainable land and environmental management in terms of improved farming practices (individual benefits) and downstream water management	Napak	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1.2.1	Provide routine training (forestry handbook) to CMCs, forest management, land care and agricultural managers: 1 training in each district @ 2 yrs	Napak	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1.2.2	Establish nurseries for provision of seedlings and establish distribution, training and management systems in all districts - pilot projects	Napak	Lotome Matany	Moruongor Nakichumet	Naitakosowan Arecheck	Establish and equip greenhouse and train farmers	2 nurseries	2	2	2	2	2	2
1.2.3	Support the implementation of a reforestation programme aimed at restoring lost woodland and at establishing woodlots to reduce the pressure on natural forest. Link to agroforestry and sustainable land management	Napak	Lotome Lorengecora	Moruongor Lomuno Kalokengel East Cholichol	Naitakosowan Nangirongole Koifiti Lomuruchubae Lopuke Lokeru Komo Lokupoi Nawatom	Woodlots (60), seedlings (500,000), 1 acre per village	60 woodlots, 500,000 seedlings, 1 acre per village	5	9	15	15	15	15
1.2.4	Planting trees in degraded areas	Napak	Lotome Lorengecora TC	Moruongor Lomuno Choichol	Naitakosowan Kaingolejek Nangirongole Komo Cholichol	Provision of tree seedlings, identification of degraded areas	3,500 seedlings (500 seedlings for each village)	4	5	7	7	7	7

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
			Matany	Lokuwas	Lorukumo					
			Irimi	Tepeth	Pilas					
1.3.1	Regular updating of district wetland inventories by districts	Napak	Matany	Nakicumet	Kotipe Swamp	Update every quarter, vehicle, funds, GIS software	4	3	4	4
			Lotome	Kalokengel West	Nangirongole Swamp					
			Lorengecora	Lolet	Lomuribangalepan Swamp					
				Kokipurat	Kalokwangaese Swamp					
1.3.2	Updating of demarcated protection zones and acceptable utilization of wetlands, producing GIS maps of wetlands at various levels	Napak	Matany	Nakicumet	Kotipe Swamp	Demarcation, annual update, GIS software	1	3	4	4
			Lotome	Kalokengel West	Nangirongole Swamp					
			Lorengecora	Lolet	Lomuribangalepan Swamp					
				Kokepurat	Kalokwangaese Swamp					
1.3.3	Study for economic valuation of wetland resources and disseminate the results	Napak	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1.3.4	Review and update the wetland management / action plans	Napak	Matany	Nakicumet	Kotipe Swamp	Develop an action plan for the 4 wetlands, update quarterly	4	3	4	4
			Lotome	Kalokengel West	Nangirongole Swamp					
			Lorengecora	Lolet	Lomuribangalepan Swamp					
				Kokepurat	Kalokwangaese Swamp					

1.3.5	Restoration of vital (unique) critical (subject to on-going degradation) wetlands	Napak	Matany Lotome Lorengecora	Nakicumet Kalokengel West Lolet Kokepurat	Kotipe Swamp Nangirongole Swamp Lomuribangalepan Swamp Kalokwangaese Swamp	Demarcation, bye laws / ordinance, grass and tree planting, awareness creation	4	3	4	4
1.4.1	Mapping, demarcation of riparian and roadside protection zones and identify and implement source protection measures	Napak	Irir Lorengecora Lotome	Nabwal Irir Cholicholi Lolet Nagule Angolol	Nabwal Alekkilek Koomo Kobulin Nagule Angolol	Omaniman river: flood control, tree planting (50,000 seedlings), fodder grass planting, stabilisation - gabions	50,000 seedlings	3	6	6
2.1.1	Improve sanitation technology and building material support and implement them	Napak	Irir Matany Lotome Lorengecora	Irir Nakicumet Lomuno Moruongor Lolet	Kasile Kokeris Kacurokimak Naronit Naitakosowan Lolet TC	Public toilets (4stance with urnal and hand-washing facility) in trading centres constructed out of local material, provision of materials (wheelbarrows, spades, pickaxes, rex, hoes, slasher), promotion of hygiene and sanitation and awareness raising	6	4	5	6
2.1.2	Improve faecal sludge management (collection, transportation, treatment and re-use) through clustering of small towns (Kumi Sironko, Kapchorwa, Nakapiripirt)	Napak	Irir Matany Ngoleriet	Irir Lokuwas Lokoreto	Irir TC Matany TC Kangole TC	Promote use of effective micro organism (EMO) for sludge reduction, provision of cesspool emptier, establish a lagoon in Napak	3	3	3	3

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
2.2.2	Refurbish valley dams and tanks	Napak	Lorengecora	Cholicholi	Koomo (dam)	Dam	1	2	2	2
			Matany	Nakicumet	Nakicumet (tank)	Tank	1			
2.3.1	Design and construct river Agu scheme to supply Kumi and surroundings - water and wastewater works	Napak	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2.3.2	Soroti treatment and distribution - expand in stages (NWSC)	Napak	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2.6.1	Feasibility studies and design of prioritised sand dams. Construction, with cooperation and input from local communities	Napak	Matany	Lokupoi	Lokupoi	Construction of sand dams along Omaniman river, training of sand dam management committees	3	2	3	3
			Lotome	Lomungo	Lomungo					
				Moruongor	Kaingolejek					
2.7.1	Needs identification for location and type of dams and associated abstraction facilities	Napak	Matany	Moruongor	Natirae	Feasibility study to identify dam sites and water for abstraction facilities	4	3	4	4
				Nakichumet	Nakichumet					
			Lorengecora	Kokipurate	Kocito					
			Lotome	Lomuno	Nangirongole					
2.7.2	Feasibility & design of prioritized dams for stock watering and humans needs. Construction, with cooperation and input from local communities	Napak	Matany	Moruongor	Natirae	Feasibility study to identify dam sites and water for abstraction facilities	4	3	4	4
				Nakichumet	Nakichumet					
			Lorengecora	Kokipurate	Kocito					
			Lotome	Lomuno	Nangirongole					
2.8.2	Enhancement of rain fed agriculture	Napak	Matany	Nakicumet	Arecheck	Treadle pumps	50	4	4	4
			Lotome	Moruongor	Naitakosowan	Sprinkler irrigation	50			
			Lorengecora	Kokipurat	Lobok	Training farmers on soil/water conservation	50			
			Iriiri	Nabwal	Kodike					
2.8.3	New irrigation schemes: Undertake feasibility studies of identifies areas	Napak	Matany	Nakicumet	Arecheck	Feasibility study to identify schemes	4 areas	4	4	4
			Lotome	Moruongor	Naitakosowan					
			Lorengecora	Kokipurat	Lobok					
			Iriiri	Nabwal	Kodike					



2.8.4	Construction of new irrigation schemes: Improved (seasonal ) Wetlands Schemes	Napak	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
2.8.5	Construction of new irrigation schemes: Low - power pumped schemes that utilize water from nearby rivers, swamps and lakes	Napak	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
2.8.6	Construction of new irrigation schemes: Simple gravity - fed schemes	Napak	Iri	Nabwal	Kodike Amedele							1	1	2
2.8.7	Construction of new irrigation schemes: Type A Formal Irrigation	Napak	N/A	N/A	N/A							N/A	N/A	N/A
2.8.8	Construction of new irrigation schemes: Type B Formal Irrigation	Napak	N/A	N/A	N/A							N/A	N/A	N/A
2.9.1	Water efficiency evaluation and recommendations	Napak	N/A	N/A	N/A							N/A	N/A	N/A
2.10.1	Investment and implementation in hydropower installations and grid distribution	Napak	N/A	N/A	N/A							N/A	N/A	N/A
2.11.1	Promote additional and alternative sources of energy including low cost solar panels to be used for LED lighting, radios and cell phones	Napak	Lotome Matany	Moroungor Lokuwas	St. Andrews SS St. Daniel Korn-bony							7	8	8
			Lorengecora	Lorengecora TC	Lorengecora PS									
			Iri	Iri	Kapwat PS									
			Matany	Nakicumet	Nakicumet HC									
			Iri	Tepeth	Naturumum HC									
				Iri	Namendera HC									
			Lotome	Lomuno	Lomuno PS									
2.11.2	Promote use of energy efficient woodstoves by making the technology readily available	Napak	Iri	Iri	Kapuat P/S							4	4	4
			Lorengecora	Cholicholi	Cholicol P/S									
			Lorengecora TC	Lorengecora A	Lorengecora P/S									
			Matany	Lokuwas	Matany P/S									

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
2.12.1	Develop a manual on aquaculture techniques (building on available material)	Napak	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2.12.2	Assist farmers with rehabilitation of viable aquaculture ponds and in the construction of new ponds - allowance made for a pilot	Napak	Lotome Matany	Kalokengel West Nakicumet	Naitakwae Nakicumet	Construction of fish ponds	2	2	2	2
2.12.3	Train and assist farmers on the appropriate fishing techniques and equipment as well as the protection of breeding grounds	Napak	Matany	Nakicumet	Arecheck	Training of farmers on improved fishing techniques, support farmers with improved fishing gears	50 farmers	1	1	1
2.13.1	Create an ecological tourism organisation, train it and provide the necessary starting equipment e.g a boat	Napak	Iriiri	Nabwal	Micoko Kodike Dwol Nacorria	Establish eco tourism sites, empower communities to form and register eco tourism groups / organisations, establish campsites, restaurants / kitchens, train guides	4 eco tourism groups, 4 camp sites, train 8 guides	1	1	4
2.13.2	Promote horticulture	Napak	Matany Lotome Lorengecora	Nakicumet Moruongor Lolet	Arecheck SC HQ Lolet TC	Provision of green houses, seeds and technical assistance to farmers	3 green houses, 20 farmers in each village	3	3	3
2.13.3	Promote bee keeping and processing	Napak	Lotome Iriiri Matany	Naramaregae Tepeth Nakicumet	Nakale Naturumurun Kaeselem	Provision of modern bee hives and bee processing, training of farmers on modern bee keeping practices, processing materials, equipment for marketing the honey	50 bee hives in 1 village for 10 farmers per village	3	3	3

3.1.1	Demarcate areas considered unsafe for habitation or other use and warn inhabitants	Napak	Lotome Irir Matany Lorengecora	Kalokengel East Nabwal Nakicumet Cholicoi	Korisae Nabwal Nakayot Dwol Alakas Poron Natrae Komuturunyo Lomorucubai Lokeru Lopuke	Wildlife reserves, forest reserves, road reserves, mineral rich areas, wetlands, hills, flood prone areas	11 areas	4	4	11
3.1.2	Develop an early flood warning system	Napak	Lotome Matany	Kalokengel East Kalokengel West Morulinga Lokupoi	Nachuka Akwapua Loluk Koifiti Angarab Naitakwae Lobeei Naregae Loroo Lominit Nakoreto Nasinyonoit Kogete Naachuka Naro Kokweta Naro Apaoti-yanwo Namukure Kokorio Naligoi	Development of early warning systems / signs, community consultations	44 villages	4	8	44

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
					Lorengkungin A					
					Lorengkungin B					
					Moruongor					
					Lokupoi T C					
					Chelele					
					Lomariamomg					
					Namoruongora					
					Nakoelele					
				Nakichumet	Kokeris					
					Losidongor					
					Kanaura					
					Lokwakais					
					Komo					
			Lorengecora	Cholicholi	Nawatom					
					Cholichol					
					Lorikita					
					Lomasenik					
					Lokupoi					
				Kokipurat	Kokipurat					
					Nakwakwa					
					Lobok					
					Kocito					
					Repada					
			Iri	Iri	Alekitek					
					Lomaratoit					
					Namendera					

<b>3.1.3</b>	Development / Compilation of hazard / risk map for landslides / sedimentation / floods	Napak	N/A	N/A	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a
<b>3.3.1</b>	Determine current stocking rates and assess carrying capacity of all districts. Develop a plan to keep the numbers of animals within the theoretical limits of carrying capacity	Napak	N/A	N/A	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a
<b>3.3.2</b>	Livestock improvement programme	Napak	Lofome	Kalokengel West	Naitakwae Lobeeli Naregae Loroo Lominit Nakoreto	Restocking with local breeds, cross breeding, veterinary services incl. vaccination, cattle dips, fodder grass	98 villages	3	13	98		
				Kalokengel East	Nachuka Akwapua Loluk Koitiiti Angarab							
				Lomuno	Natapar apalemu Lolet bita Lopuu Naoyaminit Aduaramukuny							
				Moruongor	Naitakosowan Loolim Angaro Naronit Naooi Kaingolejek Lolet Longaroi							
				Nariamaregae								

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
			Matany	Lokuwas	Nakale Matany TC East Matany TC West Lolain Kololo Napeipelu Logolei Locholi Kongkwa Nasiloit Nakanikan Kooriaba Lorukumo Kalopajak					
				Lokupoi	Kokorio Naligoi Lorengkungjin A Lorengkungjin B Moruongor Lokupoi TC Chelele Lomariamomg Namoruongora Nakoelelei Kokeris Losidongor Kanaura					
				Nakichumet						



Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
					Nakwanamoru Nakilet Losikait Akore Nakoyot Camp Alakas Camp Irir TC Lomaratoit Namendera Aleklek Kasile Go down Moru sapir Kaurikiakine Kalepedinga Lobulio Loyep Camp Ariamoakot Loyep Toto					
3.3.3	Promote dairy farming	Napak	Iriiri Lorengecora	Nabwal Cholicholi	Nakayot Lokeru	Promotion of high milk yielding livestock, value addition of milk products, promotion of fodder grass like alfalfa	2 villages	2	2	2
4.1.1	Monitoring stations must be maintained and regularly calibrated. Gauge readers need to be trained and check mechanisms introduced to ensure stability and consistency in data	Napak	N/A	N/A	N/A	N/A	N/A	N/A	N/A	n/a



4.1.2	Expand, rehabilitate, and improve the water quality, evaporation, rainfall, ground water and streamflow monitoring network systems and lake and wetland water level monitoring gauges. Implement sedimentation monitoring	Napak	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	n/a
4.1.3	Monitor surface and ground water use and levels to prevent over - exploitation	Napak	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	n/a
4.2.1	Train a committed cadre of extension service providers to render inter - disciplinary, integrated extension service to include CMCs, CDOs etc.	Napak	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	n/a
4.2.2	Develop support materials for use by extension officers (building on currently available materials)	Napak	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	n/a
4.3.1	Develop training guidelines and awareness raising materials (building on currently available materials)	Napak	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
4.3.2	Introduction of a community radio programme dedicated to environmental matters	Napak						Quarterly radio talk shows and radio spot messages, provision of IEC materials with key environmental messages for dissemination, establish a radio station in Napak	4 p.a.		
4.3.3	Sanitation project. Demonstration of ecosan and other sanitation systems. Provision of appropriate designs and training in construction. Support with provision of materials	Napak	Lorengecora TC	Lorengecora TC	Lorengecora TC	Lorengecora TC	Lorengecora TC	Equipment of rubbish skips, awareness raising and training of communities, empowerment sanitation groups, study for collapsable soil (black cotton soil) to improve the toilet problem, removable slabs	2 rubbish skips, 1 awareness raising campaign, 1 training of communities, 1 study	1	1

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
4.3.4	Implement demonstration projects - schools, model farms etc. (capital costed elsewhere)	Napak	Lotome	Kalokengel East	Naachuka P/S	Open school farms for 4 primary schools	4	4	4	4
			Lorengecora	Kokikpurat	Kokikpurat P/S					
			Matany	Lokupoi	Namoruongora P/S					
			Iri	Iri	Kaurikakire P/S					
4.3.5	Introduction of awareness raising programmes in schools	Napak	Lotome	Kalokengel East	Naachuka P/S	Establish environmental and sanitation clubs in schools, training of science teachers on POPs (4 primary schools)	4	4	4	4
			Lorengecora	Kokikpurat	Kokikpurat P/S					
			Matany	Lokupoi	Namoruongora P/S					
		Iri	Iri	Kaurikakire P/S						
4.4.1	Train experts (import expertise) in the development of technology guidelines, training and other approaches	Napak	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a
4.4.2	Enhance and strengthen the capacity of BMUs	Napak	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a
4.4.3	Enhance and strengthen the capacity of rice grower associations	Napak	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a
4.5.1	Strengthen enforcement bodies with capacity	Napak	Matany	Nakicumet	District HQ	Training of police in environmental affairs, increase of no. of environmental police in Napak	2	1	1	1
								114	158	333

**INTERVENTION SITES FOR THE OPTIONS**
**District: NGORA**

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
1.1.1	The preparation and dissemination of comprehensive and sustainable land and environmental management manual providing the technological approaches tailored for the Awoja catchment and Kyoga WMZ	Ngora	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1.1.2	Design and pilot of individual farms according to sustainable land and environmental management principles. Layout to include contouring, drain and waterway layout and improvements, road design, runoff management, woodlot and agroforestry planning	Ngora	Mukura	Akeit	Akeit	Woodlot	2	1	2	2
				Morukakise	Okomion	Agroforestry				
1.1.3	Identification and regular (annually) eradication of floating islands / invasive alien plants	Ngora	Kapir	Omitto	Kakor	Identification and eradication of floating islands on Lake Bisina	3	2	2	3
				Kodikie	Agule					
					Kodikie					
1.1.4	Development of a fire risk, fire control and fire protection plan, with controlled burning where required for grazing and biodiversity management and implement it	Ngora	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1.1.5	River bank protection and stabilisation - gabions, management of cattle access points, protection of riparian vegetation	Ngora	Ngora	Agu	River Agu	Protection of vegetation (tree planting, fodder grass and crops) 15 km of River Agu and 10 km of River Kodike	2	2	2	2
				Kodikie	River Kodike					
1.1.8	Ecological water requirements: Revisiting legislation and catchment assessment	Ngora	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1.1.8.1	Introduce improved farming practices	Ngora	Ngora	Tididiek	Tididiek	Improve farming practices (using grass bands, tree planting, cultivating across slopes, using covercrops and soil improving crops)	10 farmers per village	2	2	2
				Mukura	Puna					

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
1.1.9	Build the capacity on conservation methods especially for wetlands	Ngora	Ngora		Kopeke wetland	Reactivate parish environmental committees and train them on their roles, participate in facilitating the finalisation of the wetlands ordinance of Ngora district, sensitization and capacity building on the conservation of wetlands		4		16
					Agu wetland					
					Omadito wetland					
			Kapir		Abuya wetland					
					Adiesa wetland					
					Orisai wetland					
					Kokong wetland					
			Kobwin		Agule wetland					
					Aciisa wetland					
					Aswara wetland					
					Kodike wetland					
					Agule wetland					
			Mukura		Nyaguo wetland					
	Opot wetland									
	Kamadokima wetland									
		Ajamaka wetland								
1.1.10	Monitoring the impacts of sustainable land and environmental management in terms of improved farming practices (individual benefits) and downstream water management	Ngora	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
1.2.1	Provide routine training (forestry handbook) to CMCs, forest management, land care and agricultural managers: 1 training in each district @ 2 yrs	Ngora	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1.2.2	Establish nurseries for provision of seedlings and establish distribution, training and management systems in all districts - pilot projects	Ngora	Mukura	Mukura	Mukura	Establish tree nursery	1	1	1	1
1.2.3	Support the implementation of a reforestation programme aimed at restoring lost woodland and at establishing woodlots to reduce the pressure on natural forest. Link to agroforestry and sustainable land management	Ngora	Kapir	Omitto	Kakor	Reforestation of lost woodlots	2	2	2	2
			Ngora	Tididiek	Okorom					

1.2.4	Planting trees in degraded areas	Ngora	Ngora	Tididiek	Okorom	Planting trees on degraded areas	2,000 trees	1	1	1
1.3.1	Regular updating of district wetland inventories by districts	Ngora	Ngora		Kopeke wetland Oduarat wetland Agu wetland Omadito wetland Abuya wetland Oledai wetland Adiesa wetland Orisai wetland Kakor wetland Kokong wetland Agule wetland Atapar wetland Aciisa wetland Okape wetland Oshera wetland Aswara wetland Kodike wetland Agule wetland Nyaguo wetland Nyasala wetland Opot wetland Morukokise wetland Kamadokima wetland Puna wetland Kagamaka wetland	Extract inventory from Kumi district and establish it, update regularly afterwards	4			25

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
1.3.2	Updating of demarcated protection zones and acceptable utilization of wetlands, producing GIS maps of wetlands at various levels	Ngora	Ngora		Kopeke wetland	Complete demarcation of wetlands and their utilisation, produce GIS maps		4		
					Oduarat wetland					
					Agu wetland					
					Omadito wetland					
					Abuya wetland					
					Oledai wetland					
					Adiesa wetland					
					Orisai wetland					
					Kakor wetland					
					Kokong wetland					
					Agule wetland					
					Atapar wetland					
					Aciisa wetland					
					Okape wetland					
					Oshera wetland					
					Aswara wetland					
					Kodike wetland					
Agule wetland										
Nyaguo wetland										
Nyasala wetland										
Opot wetland										
Morukokise wetland										
Kamadokima wetland										
Puna wetland										
Ajamaka wetland										
1.3.3	Study for economic valuation of wetland resources and disseminate the results	Ngora	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a

1.3.4	Review and update the wetland management / action plans	Ngora	Ngora	Ngora	Kopeke wetland Oduarat wetland Agu wetland Omadito wetland Abuya wetland Oledai wetland Adiesa wetland Orisai wetland Kakor wetland Kokong wetland Agule wetland Atapar wetland Acisa wetland Okape wetland Oshera wetland Aswara wetland Kodike wetland Agule wetland Nyaguo wetland Nyasala wetland Opot wetland Morukokise wetland Kamadokima wetland Puna wetland Kagamaka wetland	Review and update action plan	4	25
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Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village	
1.3.5	Restoration of vital (unique) critical (subject to on-going degradation) wetlands	Ngora	Ngora		Kopeke wetland	Restoration of fish and vegetation, protection of birds, Acisa, Aswara, Kamadokima, Kagamaka: sensitisation due to encroachment through rice cultivation and create by-laws, Kagamaka: tree planting to protect valley dam, Opot: conflicts between rice growers and livestock farmers avoided by demarcations, by laws, sensitisations and conflict resolution		4			16
					Agu wetland						
					Omadito wetland						
			Kapur		Abuya wetland						
					Adiesa wetland						
					Orisai wetland						
					Kokong wetland						
			Kobwin		Agule wetland						
					Acisa wetland						
					Aswara wetland						
					Kodike wetland						
					Agule wetland						
			Mukura		Nyaguo wetland						
	Opot wetland										
	Kamadokima wetland										
	Kagamaka wetland										
1.4.1	Mapping, demarcation of riparian and roadside protection zones and identify and implement source protection measures	Ngora	Agu	Agu	Demarcation of vegetation wetlands, by laws, tree planting, zoning of river banks for cattle, form an interdistrict management committee between Ngora and Serere		1	1		1	
2.1.1	Improve sanitation technology and building materials, support and implement them	Ngora	Ngora	Kopeke	Kopeke	Pit latrines with slabs for the community	2 per village	2	2		4
				Agule	Agule						
			Kobwin	Kees	Kees	Ecosan toilets (with sensitisation) for the community					
				Swara	Swara						



2.1.2	Improve faecal sludge management (collection, transportation, treatment and re-use) through clustering of small towns (Kumi Sironko, Kapchorwa, Nakapiripirit)	Ngora	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a
2.2.2	Refurbish valley dams and tanks	Ngora	Ngora Kapir Mukura	Omadito Akisim Mukura	Omadito Alondo Kajamaka	N/A	3	3	3	3	n/a	n/a	3
2.3.1	Design and construct River Agu scheme to supply Kumi and surrounds water and waste water works	Ngora	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a
2.3.2	Soroti treatment and distribution - expand in stages (NWSC)	Ngora	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a
2.6.1	Feasibility studies and design of prioritised sand dams. Construction with co operation and input from local communities	Ngora	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a
2.7.1	Needs identification for location and type of dams and associated abstraction facilities	Ngora	Ngora Mukura Kapir	Omadito Mukura Akisim	Omadito Kajamaka Akisim	N/A	3	3	3	3	3	3	3
2.7.2	Feasibility and design of prioritised dams for stock watering and human needs. Construction with cooperation and input from local communities	Ngora	Ngora Mukura Kapir	Omadito Mukura Akisim	Omadito Ajamaka Akisim	N/A	3	3	3	3	3	3	3
2.8.2	Enhancement of rain fed agriculture	Ngora	Kapir	Omitto	Kakor	N/A	1	1	1	1	1	1	1
2.8.3	New irrigation schemes: Undertake feasibility studies of identified areas	Ngora	Mukura Kapir Kobwin	Puna Omitto Ojere	Puna Kakor Ojere	N/A	3	3	3	3	3	3	3
2.8.4	Construction of new irrigation schemes: Improved (seasonal) wetland scheme	Ngora	Ngora Mukura	Agu Agogomi	Agu Agogomi	N/A	2	2	2	2	2	2	2
2.8.5	Construction of new irrigation schemes: Low-power pumped schemes that utilise water from nearby rivers, swamps and lakes	Ngora	Ngora	Agu	Agu	N/A	1	1	1	1	1	1	1
2.8.6	Construction of new irrigation schemes: Simple gravity - fed schemes	Ngora	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
2.8.7	Construction of new irrigation schemes: Type A formal irrigation	Ngora	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a
2.8.8	Construction of new irrigation schemes: Type B formal irrigation	Ngora	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a
2.9.1	Water efficiency evaluation and recommendations	Ngora	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a
2.10.1	Investment and implementation in hydropower installations and grid distribution	Ngora	Ngora	Kopeke	Kopeke	Extension of grid	7 km from Omadito	1	1	1
2.11.1	Promote additional and alternative sources of energy including low cost solar panels to be used for lighting, radios and cell phones	Ngora	Ngora	Ngora	Ngora (Ngora New P/S)	Solar panels	8 schools	4	8	
				Odwarat	Odwarat (Odwarat P/S)					
			Mukura	Morukakise	Puna (Puna P/S)					
				Odoudo	Olilim (Kumel P/S)					
			Kapir	Atapar	Atapar (Atapar P/S)					
				Omitto	Agule (Agule Omitto P/S)					
			Kobwin	Kodike	Kodike (Kodike P/S)					
				Aciisa	Aciisa (Aciisa P/S)					
2.11.2	Promote use of energy efficient woodstoves by making the technology readily available	Ngora	Ngora	Kobuku	Institutional complex A (Ngora girls Sch.)	10 households trained per village	4	10	10	
			Agu	Agu						
			Kopege	Kopege						
		Kapir	Orisai	Orisai (Orisai P/S)						
			Omitto	Kakor						
			Akisim	Akisim						
		Mukura	Morukakise	Morukokise						
		Kobwin	Komodokima	Komodokima						
			Okapale	Okapale						
			Ocereen	Ocereen						

2.12.1	Develop a manual on aquaculture techniques (building on available materials)	Ngora	N/A	N/A	N/A	N/A	N/A	N/A	N/A	n/a	n/a
2.12.2	Assist farmers with the rehabilitation of viable aquaculture ponds and construction of new ponds - allowance made for a pilot	Ngora	Kobwin	Acisa	Acisa	Kofope	Acisa	Rehabilitation of ponds	2	6	6
			Mukura	Akeit	Akeit	Tididiek	Akeit	Establishment of new fish ponds and equipment	4		
			Ngora	Tididiek	Tididiek	Kakor	Tididiek				
			Kapir	Omitto	Omitto	Kakor	Kakor				
			Kobwin	Atiesa	Atiesa		Atiesa				
			Mukura	Mukakise	Mukakise	Ariet	Ariet	10 fishermen in each village trained and equipped	10 fishermen per village	4	4
2.12.3	Train and assist farmers on the appropriate fishing techniques and equipment as well as the protection of breeding grounds	Ngora	Ngora	Agu	Agu	Kakor	Agu				
			Kapir	Omitto	Omitto	Kakor	Kakor				
			Kobwin	Acisa	Acisa	Nyajuo	Nyajuo				
			Kapir	Omitto	Omitto	Kakor	Kakor	Create and train 3 ecological tourism organisations, training of communities, 3 binoculars, 3 motor boats, 12 life jackets, 3 cameras	3	3	3
			Ngora	Kopeke	Kopeke	Kopeke	Kopeke				
			Mukura	Kamodokima	Kamodokima		Kamodokima				
2.13.2	Promote horticulture	Ngora	Kobwin	Acisa	Acisa	Orisai	Acisa	Train farmers in horticulture, provide inputs (seeds, equipment)	2	2	2
			Kapir	Orisai	Orisai		Orisai				
2.13.3	Promote bee keeping	Ngora	Mukura	Mukura	Mukura	Mukura	Mukura	Training of 3 groups, packaging, marketing, processing, harvesting gear, material for making beehives	3	3	3
			Ngora	Apama	Apama	Apama	Apama				
			Ngora	Tididiek	Tididiek	Tididiek	Tididiek				
3.1.1	Demarcate areas considered unsafe for habitation or other use and warn inhabitants	Ngora	Ngora	Ngora	Ngora	Kofope	Kees		7	6	7
			Ngora	Kofope	Kofope	Kofope	Kofope				
			Ngora	Omadito	Omadito	Kopelu	Kopelu				
			Kapir	Orisai	Orisai	Orisai	Orisai				
			Kapir	Orit	Orit		Orit				
			Mukura	Akarukei	Akarukei	Akarukei	Ajesa				
Mukura	Puna	Puna		Puna							

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
3.1.2	Develop an early flood warning system	Ngora	Ngora	Ngora	Kees	Develop early flood warning system in each village	7	3	6	7
				Kopege	Kopege					
				Omadito	Kopelu					
			Kapir	Orisai	Orisai					
					Orit					
				Akarukei	Akarukei Ajesa					
3.1.3	Development/compilation of a hazard/risk map for landslides/sedimentation/ floods	Ngora	Mukura	Puna	Puna	N/A	N/A	n/a	n/a	n/a
			N/A	N/A	N/A					
3.3.1	Determine current stocking rates and assess carrying capacity of all districts. Develop a plan to keep the numbers of animals within the theoretic limits of carrying capacity	Ngora	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a
3.3.2	Livestock improvement programme	Ngora	Ngora	Agu	Agu	Sensitisation, artificial insemination, establishment of improved pasture	5 farmers per village	2	3	3
				Kodike	Kodike					
				Atoot	Atoot					
3.3.3	Promote dairy farming	Ngora	Ngora	Agu	Agu	Improved pasture, up-grade breeds, cooling plants, milk testing kit, transport equipment for milk, create dairy farmer's association and train them	3	2	3	3
				Kodike	Kodike					
				Atoot	Atoot					
4.1.1	Monitoring stations must be maintained and regularly calibrated. Gauge readers need to be trained and check mechanisms introduced to ensure stability and consistency in data	Ngora	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a
4.1.2	Expand, rehabilitate, and improve the water quality, evaporation, rainfall, ground water and streamflow monitoring network systems and lake and wetland water level monitoring gauges. Implement sedimentation monitoring	Ngora	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a

4.1.3	Monitor surface and ground water use and levels to prevent over - exploitation	Ngora	N/A	N/A	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a
4.2.1	Train a committed cadre of extension service providers to render inter - disciplinary, integrated extension service to include CMCs, CDOs etc.	Ngora	N/A	N/A	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a
4.2.2	Develop support materials for use by extension officers (building on currently available materials)	Ngora	N/A	N/A	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a
4.3.1	Develop training guidelines and awareness raising materials (building on currently available materials)	Ngora	N/A	N/A	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a
4.3.2	Introduction of a community radio programme dedicated to environmental matters	Ngora							1 programme on all environmental sub-jects			
4.3.3	Sanitation project. Demonstration of ecosan and other sanitation systems. Provision of appropriate designs and training in construction. Support with provision of materials	Ngora	Kapir	Akisim	Akisim	Akisim			VIP latrines in Akisim market, Kaluke market, Mukakise TC, train people in management, operation and maintenance of latrines	3	3	3
			Kobwin	Akaruke		Kaluke						
			Mukura	Mukakise		Mukakise						
4.3.4	Implement demonstration projects - schools, model farms etc. (capital costed elsewhere)	Ngora	Kapir	Kapir	Kapir	Okape High School		Demonstrations of agroforestry	2	3	3	
			Kobwin	Kobwin		Kobwin Sec. School						

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
4.3.5	Introduction of awareness raising programmes in schools	Ngora	Ngora	Agu	Agu (Agu P/S)	Awareness raising on environmental matters	9 schools	4	9	9
				Kalengo	Agolitu (Agolitu P/S)					
				Oteteen	Oteteen (Peace Sec. Sch)					
			Kapir	Koloin	Koloin (Koloin P/S)					
				Akisim	Akisim (St. Stephen SS)					
			Mukura	Kaler	Kaler (Mukura Mem. SS)					
				Akubwi	Akubwi (Akubwi P/S)					
			Kobwin	Kobwin	Kobwin (Kobwin Sec. Sch)					
Tilling	Gawa (Gawa P/S)									
4.4.1	Train experts (import expertise) in the development of technology guidelines, training and other approaches	Ngora	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a
4.4.2	Enhance and strengthen the capacity of BMUs	Ngora	Kapir	Omitto	Kakor	Train and reactivate the BMUs committee	3 committees, 9 members in each committee	3	3	3
				Mukura	Kamodokima					
				Kobwin	Kodike					
4.4.3	Enhance and strengthen the capacity of rice grower associations	Ngora	Kobwin	Kobwin	Kobwin	Establish an association, train 20 members in sustainable and wise use of wetlands	Train 10 people per association	1	1	1
4.5.1	Strengthen enforcement bodies with capacity	Ngora	N/A	N/A	N/A	N/A	N/A	n/a	n/a	n/a
								100	105	217

**INTERVENTION SITES FOR THE OPTIONS**
**District: SERERE**

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
1.1.1	The preparation and dissemination of comprehensive and sustainable land and environmental management manual providing the technological approaches tailored for the Awoja catchment and Kyoga WMZ	Serere	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1.1.2	Design and pilot of individual farms according to sustainable land and environmental management principles. Layout to include contouring, drain and waterway layout and improvements, road design, runoff management, woodlot and agroforestry planning	Serere	Kyere	Kamurojo	Abuket	Capacity building, seedlings for 2 nursery beds per village, sensitization on landuse management	14 nurseries	3	4	7
			Atiira	Kangodo	Moru					
				Asilang	Asilang					
					Obit					
				Kateta	Okaalen					
					Aisin					
					Olupe					
1.1.3	Identification and regular (annually) eradication of floating islands / invasive alien plants	Serere	Kyere	Kamurojo	Abuket	1 boat, 1 tractor, equipment	Twice a year eradication of plants	1	1	1
1.1.4	Development of a fire risk, fire control and fire protection plan, with controlled burning where required for grazing and biodiversity management and implement it	Serere	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1.1.5	River bank protection and stabilisation - gabions, management of cattle access points, protection of riparian vegetation	Serere	Kyere	Kamurojo	Abuket	Riparian vegetation, gabions	5 km each in each village	1	1	2
1.1.8	Ecological water requirements: Revisiting legislation and catchment assessment	Serere	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1.1.8.1	Introduce improved farming practices	Serere	Kyere	Kamurojo	Abuket	Agroforestry, animal husbandry, organic manure, soil management, zero grazing	3 farmers per village	2	3	3
			Atiira	Kangodo	Moru					
				Asilang	Asilang					
1.1.9	Build the capacity on conservation methods, especially for wetlands	Serere	Pingire	Agonyo	Agonyo 1	Form and train 2 wetland users as-sociations, training on suitable use of wetlands for 10 farmers per village	20 farmers	1	1	2
					Agonyo 2					

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
1.1.10	Monitoring the impacts of sustainable land and environmental management in terms of improved farming practices (individual benefits) and downstream water management	Serere	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1.2.1	Provide routine training (forestry handbook) to CMCs, forest management, land care and agricultural managers: 1 training in each district @ 2 yrs	Serere	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1.2.2	Establish nurseries for provision of seedling and establish distribution, training and management systems in all districts - pilot projects	Serere	Kyere Atiira Kateta	Kyere HQ Atiira HQ Kateta HQ	Kyere HQ Atiira HQ Kateta HQ	Establish 3 nurseries	3 nurseries	3	3	3
1.2.3	Support the implementation of a reforestation programme aimed at restoring lost woodland and at establishing woodlots to reduce the pressure on natural forest. Link to agroforestry and sustainable land management	Serere	Kyere Atiira Kateta	Akuja Kelim Atiira Asilang Kateta Olupe	Akuja Abuket Omagoro Apokol Asilang Olupe	Sensitisation, woodlots and agroforestry, establishment of 2 nurseries per village	12 nurseries (6 for woodlots and 6 for agroforestry)	3	5	6
1.2.4	Planting trees in degraded areas	Serere	Kateta	Owiny	Owiny Agule Alos Kyere Omulo Opuure	1 tree nursery per village	6 nurseries	3	5	6
1.3.1	Regular updating of district wetland inventories by districts	Serere	Kyere Kateta	Kamurojo Kelim Kangodo Kamusala	Abuket (Abuket wetland) Omagoro (Omagoro wetland) Ojama (Aminit wetland) Kamusala (Kamusala wetland)	Provide a GPS per village and relevant software, update wetland inventory regularly	8 GPSs	3	8	8





Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
1.3.4	Review and update the wetland management / action plans	Serere	Kyere	Kamurojo	Abuket (Abuket wetland)	Wetlands management plan is in process of being developed, update regularly		3	8	8
				Kelim	Omagoro (Omagoro wetland)					
				Kangodo	Ojama (Aminit wetland)					
			Kateta	Kamusala	Kamusala (Kamusala wetland)					
				Ojetyayang	Owiny (Owiny wetland)					
				Kanyangan	Awoja (Owiny wetland)					
			Atiira	Opuure	Opuure (Akwang Kituke wetland)					
				Osilang	Opiin (Opiin wetland)					
1.3.5	Restoration of vital (unique) critical (subject to on-going degradation) wetlands	Serere	Kyere	Kamurojo	Abuket (Abuket wetland)	Restoration of wetlands	8 wetlands	3	8	
				Kelim	Omagoro (Omagoro wetland)					
				Kangodo	Ojama (Aminit wetland)					
			Kateta	Kamusala	Kamusala (Kamusala wetland)					
				Ojetyayang	Owiny (Owiny wetland)					
				Kanyangan	Awoja (Owiny wetland)					
			Atiira	Opuure	Opuure (Akwang Kituke wetland)					
				Osilang	Opiin (Opiin wetland)					

1.4.1	Mapping, demarcation of riparian and roadside protection zones and identify and implement source protection measures	Serere	Kyere	Kamurojo	Abuket Agu	Mapping, demarcation pillars, riparian vegetation, gabions	5 km each in each village	1	1	2
2.1.1	Improve sanitation technology and building material support and implement them	Serere	Kyere	Kamurojo	Abuket TC	Construct 3 lined pit latrines and handwashing facilities	Abuket P/S and Ojama P/S (each 2 x 5 stance toilets) and market (2 x 3 stance toilets)	1	1	2
2.1.2	Improve faecal sludge management (collection, transportation, treatment and re-use) through clustering of small towns (Kumi Sironko, Kapchorwa, Nakapiripiti)	Serere	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2.2.2	Refurbish valley dams and tanks	Serere	Kyere	Kangodo	Aminit	Ojama dam	1	1	1	1
2.3.1	Design and construct river Agu scheme to supply Kumi and surroundings - water and wastewater works	Serere	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Design and construct River Agu / Abuket scheme to supply Kyere, Ocapa and surroundings - water and waste water works	Serere	Kyere Kateta	Abuket Akoke	Abuket Ocapa	2 pipelines	2	2	2	2
2.3.2	Soroti treatment and distribution - expand in stages (NWSC)	Serere	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2.6.1	Feasibility studies and design of prioritised sand dams. Construction, with cooperation and input from local communities	Serere	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2.7.1	Needs identification for location and type of dams and associated abstraction facilities	Serere	Kyere	Kangodo	Ojama	Valley dam	1	1	1	1
2.7.2	Feasibility & design of prioritized dams for stock watering and humans needs. Construction, with cooperation and input from local communities	Serere	Kateta	Kateta Okodo	Kateta Okodo	Dams	2 dams	1	2	2
2.8.2	Enhancement of rain fed agriculture	Serere	Atiira	Opuure	Abili Akisim	Rain water harvesting structures, cover crops, treadle pumps, mulching for 2 farmers per village	10 farmers	2	4	5
			Kyere	Kamurojo Kyere	Kamurojo Central Obwakol					

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
2.8.3	New irrigation schemes: Undertake feasibility studies of identified areas	Serere	Katete	Ojetyayang	Owiny	Irrigation scheme	1	1	1	1
2.8.4	Construction of new irrigation schemes: Improved (seasonal ) Wetlands Schemes	Serere	Katete	Ojetyayang	Owiny	Irrigation scheme	1	1	1	1
2.8.5	Construction of new irrigation schemes: Low - power pumped schemes that utilize water from nearby rivers, swamps and lakes	Serere	Kyere	Abuket	Abuket	Irrigation scheme	1	1	1	1
2.8.6	Construction of new irrigation schemes: Simple gravity - fed schemes	Serere	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2.8.7	Construction of new irrigation schemes: Type A Formal Irrigation	Serere	Labori	Labori	Labori	Irrigation scheme	1	1	1	1
2.8.8	Construction of new irrigation schemes: Type B Formal Irrigation	Serere	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2.9.1	Water efficiency evaluation and recommendations	Serere	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2.10.1	Investment and implementation in hydropower installations and grid distribution	Serere	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2.11.1	Promote additional and alternative sources of energy including low cost solar panels to be used for LED lighting, radios and cell phones	Serere	Kyere	Kamurojo	Abuket TC (Abuket P/S)	1 solar panel per school	3	3	3	3
			Atiira	Atiira	Odokai (Odokai P /S)					
			Kateta	Kamusala	Kamusala (Kamusala (P / S)					
2.11.2	Promote use of energy efficient woodstoves by making the technology readily available	Serere	Kyere	Kamurojo	Abuket TC (Abuket P/S)	Training in use of energy saving stoves for 10 people per school and 10 people per village	60 people	3	3	3
			Atiira	Atiira	Odokai (Odokai P /S)					
			Kateta	Kamusala	Kamusala (Kamusala (P / S)					
2.12.1	Develop a manual on aquaculture techniques (building on available material)	Serere	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

2.12.2	Assist farmers with rehabilitation of viable aquaculture ponds and in the construction of new ponds - allowance made for a pilot	Sererere	Kateta Kyere	Kamusala Kamulojo	Pokor B Abuket Akoke	Construct new ponds	3 ponds	2	2	3
2.12.3	Train and assist farmers on the appropriate fishing techniques and equipment as well as the protection of breeding grounds	Sererere	Kateta Kyere	Kamusala Orupe Kamulojo	Pokor B Akoke Abuket	Training of 10 farmers per village on appropriate fishing techniques	30 farmers	2	3	3
2.13.1	Create an ecological tourism organisation, train it and provide the necessary starting equipment e.g a boat	Sererere	Kyere Kateta	Abuket Ojetyayang	Abuket around Lake Adois Onyara	Binoculars, awareness creation, set up of a resource centre around tourist site, train 2 staff, 2 boats and train 2 guides	4 binoculars, 2 boats, 1 resource centre	2	2	2
2.13.2	Promote horticulture	Sererere	Kateta Atiira Kyere	Omagara Atiira Kyere	Omagara Apokor Allimo	Promote vegetable growing (tomatoes, cabbage, water melon) for 5 farmers per village	15 farmers	3	3	3
2.13.3	Promote bee keeping	Sererere	Atiira Kyere Kateta	Atiira Kangodo Owiny	Apokor Atiira Ojama Amor Kyamuliki	Modern bee hives, honey harvesting gear, packaging materials, processing plant for 5 farmers per village including training	20 farmers	3	3	4
3.1.1	Demarcate areas considered unsafe for habitation or other use and warn inhabitants	Sererere	Kyere	Omagara Kamurojo Kakuja Kelim	Kakinga Moru Agule Amase Atoi Obare Ojome	Demarcations		1	4	7

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
3.1.2	Develop an early flood warning system	Serere	Kyere	Omagaro Kamurojo	Kakinga Moru Agule Amase Atoi Obare Ojome	Early warning systems	7 villages	1	4	7
3.1.3	Development / compilation of hazard / risk map for landslides / sedimentation / floods	Serere	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
3.3.1	Determine current stocking rates and assess carrying capacity of all districts. Develop a plan to keep the numbers of animals within the theoretical limits of carrying capacity	Serere	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
3.3.2	Livestock improvement programme	Serere	Kyere Atira Kateta	Abutek Opuure Kanyangan	Abutek Opuchet Awoja	Improved breeds through artificial insemination, spraying, cattle dips, fodder, zero grazing	6 farmers per village	3	3	3
3.3.3	Promote dairy farming	Serere	Kyere Atira Kateta	Abutek Opuure Kanyangan	Abutek Opuchet Awoja	Milk processing plants (coolers), diary breeds, spraying for pests and diseases control	6 farmers per village	3	3	3
4.1.1	Monitoring stations must be maintained and regularly calibrated. Gauge readers need to be trained and check mechanisms introduced to ensure stability and consistency in data	Serere	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

4.1.2	Expand, rehabilitate, and improve the water quality, evaporation, rainfall, ground water and streamflow monitoring network systems and lake and wetland water level monitoring gauges. Implement sedimentation monitoring	Sererere	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4.1.3	Monitor surface and ground water use and levels to prevent over - exploitation	Sererere	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	nn
4.2.1	Train a committed cadre of extension service providers to render inter - disciplinary, integrated extension service to include CMCs, CDOs etc.	Sererere	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	n
4.2.2	Develop support materials for use by extension officers (building on currently available materials)	Sererere	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	n
4.3.1	Develop training guidelines and awareness raising materials (building on currently available materials)	Sererere	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	n
4.3.2	Introduction of a community radio programme dedicated to environmental matters	Sererere						Sererere TC				1
4.3.3	Sanitation project. Demonstration of ecosan and other sanitation systems. Provision of appropriate designs and training in construction. Support with provision of materials	Sererere	Atiira	Opuure	Akism / Oukot landing site	10	3 stance ecosan toilets including awareness raising in each village					
			Kyere	Asilang	Okaalen							
				Omagaro	Kakinga							
				Kamurojo	Moru							
					Agule							
					Amase							
				Kakuja	Atoi							
		Obare										
		Kelim										
		Owiny										
		Kateta										
4.3.4	Implement demonstration projects - schools, model farms etc. (capital costed elsewhere)	Sererere		Kangodo	Ojama P / S	3 model farms	1 model farm of approximately 1 ha in each school					3
				Atiira	Atiira P / S							
				Owiny	Ogetenyang P / S							

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
4.3.5	Introduction of awareness raising programmes in schools	Serere	Kyere	Kangodo	Ojama P / S	Awareness creation	3 schools	3	3	3
			Atiira	Atiira	Atiira P / S					
			Kateta	Owiny	Ogetenyang P / S					
4.4.1	Train experts (import expertise) in the development of technology guidelines, training and other approaches	Serere	N / A	N / A	N / A	N / A	N / A	N / A	N / A	N / A
4.4.2	Enhance and strengthen the capacity of BMUs	Serere	Kateta	Ojetenyang	Onyara (Onyara BMU)	Training of BMU executive members on management roles, establishment of shelters	4 BMU shelters	3	4	4
			Atiira	Kanyangan	Olupe (Olupe BMU)					
			Kyere	Opuure	Opuchet (Opuchet BMU)					
				Kamurojo	Moru (Moru BMU)					
4.4.3	Enhance and strengthen the capacity of rice grower associations	Serere	Kyere	Kelim	Omagoro	Create and train rice grower associations, 1 mill per village, 1 storage facility per village	30 farmers per association	3	5	5
			Kateta	Kamurojo	Abuket					
			Atiira	Kamusala	Kamusala					
				Ojetenyang	Onyara					
				Opuure	Opuchet					
4.5.1	Strengthen enforcement bodies with capacity	Serere	N / A	N / A	N / A	N / A	N / A	N / A	N / A	n/a
								83	126	148

### INTERVENTION SITES FOR THE OPTIONS **District: SIRONKO**

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
1.1.1	The preparation and dissemination of comprehensive and sustainable land and environmental management manual providing the technological approaches tailored for the Awoja catchment and Kyoga WMZ	Sironko	N / A	N / A	N / A	N / A	N / A	N / A	N / A	N / A



1.1.2	Design and pilot of individual farms according to sustainable land and environmental management principles. Layout to include contouring, drain and waterway layout and improvements, road design, runoff management, woodlot and agroforestry planning	Sironko	Busulani	Bugube	Kiguli	Contour bands (grass and agroforestry trees planted along contours), drains and water way layout esp. in home-steads and raised roads, woodlots and agroforestry plantations of about 50 ha, road design	At least 5 km length of contour bunds in each parish, about 50 ha of woodlots and agroforestry plantations	2	2	4
			Masaba	Bumuluwe	Bumuluwe A Muluwe B					
1.1.3	Identification and regular (annually) eradication of floating islands / invasive alien plants	Sironko	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1.1.4	Development of a fire risk, fire control and fire protection plan, with controlled burning where required for grazing and biodiversity management and implement it	Sironko	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1.1.5	River bank protection and stabilisation - gabions, management of cattle access points, protection of riparian vegetation	Sironko	Zesui (1. year)			Along River Sironko and its tributaries: protection zone demarcations, grass and trees planted, gabions constructed mostly along roads and at bridges, desilting and recourcing of river water	At least a 30 m protection zone demarcated on River Sironko and a 10 m protection zone on the tributaries (30 km altogether). 5 gabion sections constructed along Budadi-ri-Gombe-Bugiboni road (at bridges and at Budeca where River Sironko runs parallel to the road). 2 sections along river Sironko recoured (to save the road and bridge)	14		
			Masaba (1. year)							
			Bumasifwa (1. year)							
			Busulani (2. year)							
			Bugitimwa (2. year)							
			Buhugu (2. year)							
			Bukyambi (2. year)							
			Bumalimba (3. year)							
			Bukiise (3. year)							
			Sironko TC (3. year)							
Buteza (4. year)										
Buyobo (4. year)										
Nalusala (5. year)										
Bukiyi (5. year)										
1.1.8	Ecological water requirements: Revisiting legislation and catchment assessment	Sironko	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
1.1.8.1	Introduce improved farming practices / climate smart agriculture	Sironko	Zesui	Simuma	Muluti	Water and soil conservation structures: contour bands, agroforestry, compost and manure, cover crops, zero grassing units, zero tillage, improved crop productive and biomass cover	30 villages, training of 5 farmers per village	5	5	30
					Nama-sanzalala					
					Bumazaki					
					Nabukyi					
					Majeraga					
					Nabusofu					
					Muluwe					
					Lusola					
					Masbasi					
					Lugongo					
			Madingo							
			Nalusuba							
			Nashuwu							
			Nambekye							
			Bunasufwa							
			Masubi							
			Bumanza							
			Nakwira							
			Bumasifwa	Bundagala	Birala					
			Nadisi							
Bukagosi										
Bumagombe										
Kitangalile										
Namahalu										
Lugongo										
Kisoyo										
Bugitimwa	Bugitimwa	Namahalu								
Lugongo										



Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
1.2.4	Planting trees in degraded areas	Sironko	Zesui	Simuma	Muluti	Degraded areas restored through tree planting (both indigenous and exotic)	Restore at least 1,000 ha of degraded areas	5	5	29
					Nama-sanzalala					
					Bumazaki					
					Nabukyi					
					Majenga					
					Nabusofu					
					Muluwe					
			Masaba	Bumuluwe	Lusola					
			Masbasi							
			Lugongo							
			Madingo	Busulani	Bumawosa	Nalusuba				
			Nashuwu							
			Nambekye							
			Bunasuf-wa							
			Masubi							
			Bumanza							
			Nakwira							
Bumasifwa	Bundagala	Bundagala	Birala							
Nadisi										
Bukagosi										
Bumag-ombe										
Kitangalile										
Bugitimwa	Bugitimwa	Bugitimwa	Namahalu							
Lugongo										
Kisoyo										



Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
			Sironko TC							
			Buteza							
			Buyobo							
			Nalusala							
			Bukiya							
2.1.1	Improve sanitation technology and building material support and implement them	Sironko	Busulani	Bugube	Kiguli	Public drainable pit latrines	13 pit latrines (3stance, urinar, handwashing) constructed in rural growth and trading centres	6	11	13
				Bumawosa	Nakwira (Mwalo)					
				Namwejje	Namwejje					
				Bundagala	Nadisi					
				Bugimunya	Bumanza					
			Bumasifwa	Bumasifwa	Bu-nasekye					
					Bumasola (Manda)					
				Bunamah- ande	Mahapa					
			Zesui	Simuma	Makyelele					
					Kipande					
			Bugitimwa	Bugiboni	Mayumba (Bugiboni TC)					
			Bukiise	Busate	Sairira					
			Buhugu	Bumatofu	Miwu TC					



Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village	
2.8.3	New irrigation schemes: Undertake feasibility studies of identifies areas	Sironko	Bukiise	Busate	Wasekese	In lowland areas of the district		3	9	29	
					Mayama						
					Busate						
					Mayenze						
				Nandago	Nalusalo						
					Masaba						
					Nalugugu						
				Nalugugu	Kisenyi						
					Bukiende						
					Dorcus						
					Nabirende						
				Busiu	Kibembe						
					Bunambu-tye						
					Busiu						
				Kirimbe	Bukhulo						Bumasikeye
											Bulukyeke
											Busukuya
Bukhulo	Bukuma										
	Bunyakelo										
	Nalukhuba										
Sironko	Mulalu										
	Butson-gola										
	Bumalema										
Nalusala	Namili										
	Napyo										
	Jewa										



																		Kirongo				
																		Namwege	Bumanga-nga			
2.8.4	Construction of new irrigation schemes: Improved (seasonal ) Wetlands Schemes	Sironko	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
2.8.5	Construction of new irrigation schemes: Low - power pumped schemes that utilize water from nearby rivers, swamps and lakes	Sironko	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
2.8.6	Construction of new irrigation schemes: Simple gravity -fed schemes	Sironko	Bukiise	Busate	Salalira Hill	Construction of new production reservoir and tank (using gravity intake)	1 reservoir and tank	1	1	1	1	1	1	1	1	1	1	1	1	1		
2.8.7	Construction of new irrigation schemes: Type A Formal Irrigation	Sironko	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
2.8.8	Construction of new irrigation schemes: Type B Formal Irrigation	Sironko	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
2.9.1	Water efficiency evaluation and recommendations	Sironko	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
2.10.1	Investment and implementation in hydropower installations and grid distribution . Extensions to public institutions and trading centres	Sironko	Bugitimwa	Bugiboni		Hydropower planned on Dirig-ana and Sironko rivers	Already EIAs have been conducted for the two projects	4	6													
			Masaba	Buboolo																		
			Zesui	Simuma	Makyelele																	Extend electricity lines
				Bulujewa	Bugobiro																	
2.11.1	Promote additional and alternative sources of energy including low cost solar panels to be used for LED lighting, radiois and cell phones	Sironko	Zesui	Simuma	Muluti	Construction of biogas units, training of local masons in biogas digester making	At least 10 persons trained (1 in each village)	5	10													
			Bugitimwa	Bugitimwa	Majenga																	
					Kisooyo																	
					Shembe																	

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
			Bumasifwa	Bundagala	Bukagosi					
			Busulani	Bumawosa	Kitangailie					
			Masaba	Bumuluwe	Bunasufwa					
					Masubi					
					Nabusofu					
					Lusola					
2.11.2	Promote use of energy efficient woodstoves by making the technology readily available	Sironko	Zesui	Simuma	Nama-sanzalala	10 households per parish in each of the 5 SCs provided with woodstoves, training local artisans in stove making, sensitisations in each village	10 households per parish provided with woodstoves, at least 10 persons trained (1 in each village), 10 sensitisations	5	5	10
			Masaba	Bumuluwe	Bumazaki					
			Busulani	Bumawosa	Lugongo					
			Bumasifwa	Bundagala	Muluwe					
					Bumanza					
					Nakwira					
					Birala					
					Nadisi					
					Namahalu					
					Lugongo					
2.12.1	Develop a manual on aquaculture techniques (building on available material)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2.12.2	Assist farmers with rehabilitation of viable aquaculture ponds and in the construction of new ponds - allowance made for a pilot	Sironko	Buhugu	Bumatofu	Kabokeni	Fish ponds rehabilitated and restocked in 4 parishes, 1 fish breeding centre established	Fish ponds rehabilitated and restocked in 4 parishes, 1 fish breeding centre established	5	5	5
			Buwasa	Bukimali	Bugashali					
			Bumasifwa	Bulwala	Kidumi					
			Bumalimba	Nandere	Nandere					
			Sironko TC	Central Ward	Kilombe					
2.12.3	Train and assist farmers on the appropriate fishing techniques and equipment as well as the protection of breeding grounds	Sironko	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

2.13.1	Create an ecological tourism organisation, train it and provide the necessary starting equipment e.g a boat	Sironko	Bumasifwa Bugitimwa Butandiga	Bumasifwa Elgon Butandiga	Bu-nasekye Kisawe Miwu	Community tourism: i.e. campsite/cultural centre equipped with necessary facilities	1 central structure in each of the 3 sites managed by 8 trained tour guides in each	3	3	3
2.13.2	Promote horticulture	Sironko	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2.13.3	Promote bee keeping	Sironko	Buwalasi Nasala Bukhulo Bakyiri Bukiise			Supply of bee hives, harvesting kits for 4 groups in each SC, form and train 20 groups in bee keeping, equip the honey processing plant at the district HQ	Supply of bee hives, harvesting kits for 4 groups in each SC, form and train 20 groups in bee keeping, equip the honey processing plant at the district HQ	5		
3.1.1	Demarcate areas considered unsafe for habitation or other use and warn inhabitants	Sironko	Done by IIRR and Red Cross							
3.1.2	Develop an early flood warning system	Sironko	Flood management action plan exists (IIRR)							
3.1.3	Development / compilation of hazard / risk map for landslides / sedimentation / floods	Sironko	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
3.3.1	Determine current stocking rates and assess carrying capacity of all districts. Develop a plan to keep the numbers of animals within the theoretical limits of carrying capacity	Sironko	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village								
3.3.2	Livestock improvement Programme	Sironko	Bukhulo	Bukhulo	Bukhulo	Restock with local breeds for an improved stock over time, cattle dips and crushes, artificial insemination, improved fodder, zero grazing units, improved veterinary services: vaccination, tick control, spraying chemicals	Improved breeds incl. bulls, cattle dips and crushes, artificial insemination, improved fodder, zero grazing units, improved veterinary services: vaccination, tick control, spraying chemicals	4	15	21								
				Mpogo	Mpogo													
				Mafudu	Mafudu													
				Kirombe	Bumasikyeye													
					Bulukyeyeke													
					Busukuya													
				Bukhulo	Bukuma													
					Bunyakelo													
					Nalukhuba													
				Sironko	Mulalu													
					Butsongola													
					Bumalema													
				3.3.3	Promote dairy farming	Sironko					Bukiise	Busate	Busate	Promotion of artificial insemination, train 2 practitioners per village and equip them (kits for transportation and storage, motorcycle)	Promotion of artificial insemination, train 2 practitioners per village and equip them (kits for transportation and storage, motorcycle)	2	7	11
												Nandago	Nalusalo					
Nalugugu	Buliende																	
Busio	Busio																	
Nalusala	Nalusala	Namili																
	Bukumbate	Bukum-bale																
Bukiyi	Nabudisilu	Nabudisilu																
	Bukigalabo	Bukigalabo																
Bukiise	Bukhulo	Nampanga	Nampanga															
		Busate	Busate															
		Nandago	Nalusalo															
Bukhulo	Bukhulo	Busio	Busio															
		Mpogo	Mpogo															
		Mafudu	Mafudu															
Bukhulo	Bukhulo	Kirombe	Bulukyeyeke															



Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
4.3.4	Implement demonstration projects - schools, model farms etc. (capital costed elsewhere)	Sironko	Busulani	Bumansa	Masaba Secondary School	A Standard model farm with all good agronomic practices such as intercropping, crop rotation among others	2 acres of Masaba S.S. earmarked as a model including rehabilitation of school poultry and piggery units	1	1	1
4.3.5	Introduction of awareness raising programmes in schools	Sironko	Buteza	Buteza	Buteza P.S.	1 demo school per zone, training of teachers in 4 zones, awareness raising campaigns for the pupils	4 demo schools, training of TOT (5 people), 4 awareness raising campaigns	1	4	4
			Nampanga	Nampanga	Nampanga/Mafodu P.S.					
			Salalira	Salalira	Butandinga P.S.					
			Nakirungu	Nakirungu	Bugobiro P.S.					
4.4.1	Train experts (import expertise) in the development of technology guidelines, training and other approaches	Sironko	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4.4.2	Enhance and strengthen the capacity of BMUs	Sironko	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4.4.3	Enhance and strengthen the capacity of rice grower associations	Sironko	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4.5.1	Strengthen enforcement bodies with capacity	Sironko	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Promote rainwater harvesting systems	Sironko	Bukhulo	Bukhulo	Bukhulo PS		4 schools	2	4	4
				Mpogo	Mpogo SC HQ					
				Mafudu	Mafudu PS					
			Nampanga	Nampanga	Nampanga PS					
								106	112	197

**INTERVENTION SITES FOR THE OPTIONS District: SOROTI**

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
1.1.1	The preparation and dissemination of comprehensive and sustainable land and environmental management manual providing the technological approaches tailored for the Awoja catchment and Kyoga WMZ	Soroti	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1.1.2	Design and pilot of individual farms according to sustainable land and environmental management principles. Layout to include contouring, drain and waterway layout and improvements, road design, runoff management, woodlot and agroforestry planning	Soroti	Asuret	Adacar	Adacar	Woodlots, agroforestry	9 ha together for all villages	2	4	9
				Mukura	Abango					
					Okunguro					
					Oregia					
					Opalal - Odelal					
					Ofejia - Okunguru					
			Arapai	Mukula	Mukura					
				Dakabela	Opolal - Adala					
					Arabaka					
1.1.3	Identification and regular (annually) eradication of floating islands / invasive alien plants	Soroti	Gweri	Awoja	Awoja	Tractor to remove floating vegetation, boat, construct barriers before the bridge	2 tractors / excavators, 4 engine boats, 6 barriers	1	1	1
1.1.4	Development of a fire risk, fire control and fire protection plan, with controlled burning where required for grazing and biodiversity management and implement it	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
1.1.5	River bank protection and stabilisation - gabions, management of cattle access points, protection of riparian vegetation	Soroti	Gweri	Awoja	Awoja	Riverbank pegging, installation of gabions (180 square km) and construction of cattle access points	12 cattle access points, 36 km of river side pegged and 36 km of riparian vegetation managed	3	5	5
				Omugenya	Mugunya		16 cattle access points, 40 km of river side pegged and 40 km of riparian vegetation managed			
			Arapai	Aukot	Agule	10 cattle access points, 42 km of river side pegged and 42 km of riparian vegetation managed				
				Aloet	Aloet - Akum	8 cattle access points, 26 km or river side pegged and 26 km of riparian vegetation managed				
Asuret	Otatai	Orimai and Omulala	23 cattle access points, 16 km of river side pegged and 16 km of							



1.1.8	Ecological water requirements: Revisiting legislation and catchment assessment	Soroti	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1.1.8.1	Introduce improved farming practices	Soroti	Gweri	Awoja Aukot	Abelet Agule Aukot Ariet	Mukula Dakabella, Aloet	Okunguro Arabaka	60 km x 200 m along the river bank, soil conservation measures	10 underground water tanks constructed in each village, 65 households to practice hedgerow planting in each village, 65 households to plant trees around their boundaries in each village	3	4	6	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1.1.9	Build the capacity on conservation methods, especially for wetlands	Gweri	Gweri	Dokolo Awoja	Ookai Odukurun			Community sensitization meetings, preparation of community wetland action plans (CWAPs)	6 community meetings in each village, 2 CWAPs	1	2	2	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1.1.10	Monitoring the impacts of sustainable land and environmental management in terms of improved farming practices (individual benefits) and downstream water management	Ngora	N/A	N/A	N/A			N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1.2.1	Provide routine training (forestry handbook) to CMCs, forest management, land care and agricultural managers: 1 training in each district @ 2 yrs	Soroti	N/A	N/A	N/A			N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1.2.2	Establish nurseries for provision of seedlings and establish distribution, training and management systems in all districts - pilot projects	Soroti	Gweri Arapai Asuret	Gweri Arapai Mukura	Gweri Amoru Olelebun			Establish 3 nurseries	1 nursery per SC	3	3	3	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
1.2.3	Support the implementation of a reforestation programme aimed at restoring lost woodland and at establishing woodlots to reduce the pressure on natural forest. Link to agroforestry and sustainable land management	Soroti	Gweri	Awoja	Abelet P/S	100,000 seedlings	10,000 seedlings	3	4	6
				Aukot	Agule, Opar P/S		10,000 seedlings			
					Aukot HC II		30,000 seedlings			
					Ariet 80 farmers		20,000 seedlings			
				Arabaka	Arabaka P/S		20,000 seedlings			
				Mukula	Okunguro		10,000 seedlings			
1.2.4	Planting trees in degraded areas	Soroti	Gweri	Awoja	Awoja	100,000 trees	100,000 trees	3	4	6
				Omugenya	Mugenya					
				Aukot	Agule					
				Aloet	Aloet					
				Otatai	Omulala					
				Adacar	Akisim					
1.3.1	Regular updating of district wetland inventories by districts	Soroti	Gweri	Gweri	Angopet	Field visits, data collection equipment	28 wetland inventories, 28 field visits, 1 GPS	3	17	28
					Opucet					
					Arudoima					
					Alere					
					Gweri					
					Olelai					
				Awaliwal	Arubella					
					Damasiko					
				Dokolo	Ooka					
					Abiya					
				Gweri	Ariet					
				Omugenya	Mugenya					
				Aukot	Agule					



Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
1.3.4	Review and update the wetland management / action plans	Soroti	Gweri	Awaliwal Dokolo Gweri Omugunya Awoja Aukot	Arubella Ooka Ariet Mugunya Awoja Agule	Develop wetland action plans for the 3 SCs, 1 stakeholder workshop	3 wetland management plans (1 per SC)	3	10	10
1.3.5	Restoration of vital (unique) critical (subject to on-going degradation) wetlands	Soroti	Arapai Asuret	Dakabella Aloet Mukura Otatai	Arabaka Aloet - Akum Omulala Otatai central	Situation analysis, replant vegetation, peg off open access areas for animals, sensitisations		3	12	12
1.4.1	Mapping, demarcation of riparian and roadside protection zones and identify and implement source protection measures	Soroti	Gweri Arapai	Awaliwal Dokolo Awoja Awoja Omugunya Aukot Dakabella Aloet	Awoja Mugunya Agule Tukum Ajimbalang Akaikai Aloet	Roadside tree planting	3 roads (Gweri - Asuret road, Apujan - Gweri road, Soroti - Mbale road)	3	6	8

2.1.1	Improve sanitation technology and building material support and implement them	Soroti	Asuret	Awoja	Awoja	Awoja	Incinerators for non biodegradable materials, lined VIP latrines in schools, churches, trading centres	3	3	3	3 incinerators, 3 lined VIP latrines of 5 stances each (1 per village)	n/a	n/a
			Gweri	Awoja	Awoja TC								
			Arapai	Aukot	Osimiling TC								
2.1.2	Improve faecal sludge management (collection, transportation, treatment and re-use) through clustering of small towns (Kumi, Sironko, Kapchorwa, Nakapiripit)	Soroti	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Asuret	Asuret	Asuret Omodoi dam	De-siting, construction of embankments, spill ways, remove vegetation growth, set up and train management committees	3	3	3 dams, 3 management committees of 9 members each	3	3		
			Gweri	Dokolo	Dokolo dam								
Arapai	Arabaka	Arabaka dam											
2.3.1	Design and construct River Agu scheme to supply Kumi and surroundings - water and wastewater works	Soroti	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2.3.2	Soroti treatment and distribution - expand in stages (NWSC)	Soroti	Gweri	Awoja	Awoja	Reservoirs, pipeline extension	1	1	1	1	2 reservoirs of 200 cubic meters and approx. 500 km of pipeline extension	N/A	n/a
2.6.1	Feasibility studies and design of prioritised sand dams. Construction, with cooperation and input from local communities	Soroti	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2.7.1	Needs identification for location and type of dams and associated abstraction facilities	Soroti	Gweri	Awaliwal	Okolonga	Feasibility study	1	1	1	1	1 feasibility study	N/A	1
2.7.2	Feasibility & design of prioritized dams for stock watering and human needs. Construction, with cooperation and input from local communities	Soroti	Gweri	Awaliwal	Okolonga	Feasibility study	1	1	1	1	1 feasibility study	N/A	1

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
2.8.2	Enhancement of rain fed agriculture	Soroti	Gweri	Dokolo	Dokolo	Rock harvesting, runoff harvesting into underground tanks, pumps and pipes	2	2	2	2
			Asuret	Otatai	Otatai					
2.8.3	New irrigation schemes: Undertake feasibility studies of identified areas	Soroti	Arapai	Arabaka	Arabaka	Feasibility study for 2 sites	2	2	2	2
			Gweri	Dokolo	Dokolo					
2.8.4	Construction of new irrigation schemes: Improved (seasonal ) Wetlands Schemes	Soroti	Arapai	Arabaka	Arabaka	2 schemes	2	2	2	2
			Gweri	Dokolo	Dokolo					
2.8.5	Construction of new irrigation schemes: Low - power pumped schemes that utilize water from nearby rivers, swamps and lakes	Soroti	Arapai	Arabaka	Arabaka	Reservoirs, pipeline extension	2	2	2	2
			Gweri	Dokolo	Dokolo					
2.8.6	Construction of new irrigation schemes: Simple gravity - fed schemes	Soroti	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2.8.7	Construction of new irrigation schemes: Type A Formal Irrigation	Soroti	N/A	N/A	N/A	N/A	N/A	N/A	N/A	n/a
2.8.8	Construction of new irrigation schemes: Type B Formal Irrigation	Soroti	N/A	N/A	N/A	N/A	N/A	N/A	N/A	n/a
2.9.1	Water efficiency evaluation and recommendations	Soroti	N/A	N/A	N/A	N/A	N/A	N/A	N/A	n/a
2.10.1	Investment and implementation in hydropower installations and grid distribution	Soroti	N/A	N/A	N/A	N/A	N/A	N/A	N/A	n/a
2.11.1	Promote additional and alternative sources of energy including low cost solar panels to be used for LED lighting, radiois and cell phones	Soroti	Gweri	Aukot	Aukot	Solar panels, inverters, batteries, wiring	10 households per village	3	3	3
			Arapai	Arabaka	Arabaka					
			Asuret	Mukura	Okumuro					
2.11.2	Promote use of energy efficient woodstoves by making the technology readily available	Soroti	Gweri	Aukot	Aukot	Demonstrations, capacity building and materials	50 households per village use energy efficient woodstoves	3	3	3
			Arapai	Arabaka	Arabaka					
			Asuret	Mukura	Okunguro					
2.12.1	Develop a manual on aquaculture techniques (building on available material)	Soroti	N/A	N/A	N/A	N/A	N/A	N/A	N/A	n/a

2.12.2	Assist farmers with rehabilitation of viable aquaculture ponds and in the construction of new ponds - allowance made for a pilot	Soroti	Gweri	Dokolo Awoja	Abia Anganya	Construct 1 pond per village	2 ponds	1	2	2
2.12.3	Train and assist farmers on the appropriate fishing techniques and equipment as well as the protection of breeding grounds	Soroti	Gweri	Dokolo Awoja	Abia Anganya	Farmer identification and training	20 farmers per village	1	2	2
2.13.1	Create an ecological tourism organisation, train it and provide the necessary starting equipment e.g a boat	Soroti	Gweri	Awoja	Awoja	Form and train an eco tourism organisation, establish an office, boats, life jackets, adverts	1 office room, 5 boats, 25 life jackets	1	1	1
2.13.2	Promote horticulture	Soroti	Arapai Asuret	Aloet Otatai	Aloet Omulala	Water pumps, train 50 farmers on organic farming, management of agro - chemicals, improved seed varieties	25 farmers per village	2	2	2
2.13.3	Promote bee keeping	Soroti	Gweri Asuret	Dokolo Awoja Awariwari	Dokolo Naberet Awoja Arnesia	Bee hives, harvesting kits, capacity building on improved methods	600 bee hives and kits, train 200 farmers (50 farmers per village)	2	3	4
3.1.1	Demarcate areas considered unsafe for habitation or other use and warn inhabitants	Soroti	Gweri Arapai Asuret	Awoja Omugunya Aukot Aloet Otatai Adacar	Awoja Mugunya Agule Aloet Omulala Akisim		6 areas	3	6	6
3.1.2	Develop an early flood warning system	Soroti	Gweri Arapai Asuret	Awoja Omugunya Aukot Aloet Otatai Adacar	Awoja Mugunya Agule Aloet Omulala Akisim	Community and scientific / telemetry EFWS, communication linkage between Entebbe and Soroti, feedback to radio stations	6	3	6	6

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures	Sub-county	Parish	Village
3.1.3	Development / compilation of hazard / risk map for landslides / sedimentation / floods	Soroti	N/A	N/A	N/A	N/A	N/A	N/A	n/a	n/a
3.3.1	Determine current stocking rates and assess carrying capacity of all districts. Develop a plan to keep the numbers of animals within the theoretical limits of carrying capacity	Soroti	N/A	N/A	N/A	N/A	N/A	N/A	n/a	n/a
3.3.2	Livestock improvement programme	Soroti	Gweri	Aukot	Aukot	Extension service, artificial insemination, construction of cattle crèches, capacity building, improved breeding stock, pest control structures	20 livestock farmers per village	3	3	3
			Arapai	Arabaka	Arabaka					
			Asuret	Mukura	Okunguro					
3.3.3	Promote dairy farming	Soroti	Gweri	Aukot	Aukot	Purchase dairy cows, train farmers on dairy farming practices	20 farmers in each village receive 2 cows including training	3	3	3
			Arapai	Arabaka	Arabaka					
			Asuret	Mukura	Okunguro					
4.1.1	Monitoring stations must be maintained and regularly calibrated. Gauge readers need to be trained and check mechanisms introduced to ensure stability and consistency in data	Soroti	N/A	N/A	N/A	N/A	N/A	N/A	n/a	n/a
4.1.2	Expand, rehabilitate, and improve the water quality, evaporation, rainfall, ground water and streamflow monitoring network systems and lake and wetland water level monitoring gauges. Implement sedimentation monitoring	Soroti	N/A	N/A	N/A	N/A	N/A	N/A	n/a	n/a
4.1.3	Monitor surface and ground water use and levels to prevent over - exploitation.	Soroti	N/A	N/A	N/A	N/A	N/A	N/A	n/a	n/a
4.2.1	Train a committed cadre of extension service providers to render inter - disciplinary, integrated extension service to include CMCs, CDOs etc.	Soroti	N/A	N/A	N/A	N/A	N/A	N/A	n/a	n/a



4.2.2	Develop support materials for use by extension officers (building on currently available materials)	Soroti	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	n/a	n/a
4.3.1	Develop training guidelines and awareness raising materials (building on currently available materials)	Soroti	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	n/a	n/a
4.3.2	Introduction of a community radio programme dedicated to environmental matters	Soroti	Soroti Municipality						1 environmental programme	2 per month	1	1
4.3.3	Sanitation project. Demonstration of ecosan and other sanitation systems. Provision of appropriate designs and training in construction. Support with provision of materials	Soroti	Gweri	Omugonya	Mugonya			Capacity building, construction of demonstration ecosan toilets	2 stance ecosan per village, selection and training of one committee and one community awareness meeting per village	3	3	3
			Arapai	Aloet	Aloet							
			Gweri	Dokolo	Amusia							
4.3.4	Implement demonstration projects - schools, model farms etc. (capital costed elsewhere)	Soroti	Gweri	Awoja	Awoja P/S		Woodlots		2 acres per school	2	3	4
						Awoja Bridge P/S						
			Arapai	Dokolo	Dokolo P/S							
4.3.5	Introduction of awareness raising programmes in schools	Soroti	Gweri	Awoja	Awoja P/S		Awareness creation		3 schools	1	2	3
						Awoja Bridge P/S						
				Dokolo	Dokolo P/S							
4.4.1	Train experts (import expertise) in the development of technology guidelines, training and other approaches	Soroti	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	n/a	n/a
4.4.2	Enhance and strengthen the capacity of BMUs	Soroti	Gweri	Awoja	Awoja		Sensitization meetings, select and train BMU management committees		1 BMU in each village	1	3	3
				Omugonya	Mugonya							
				Awaliwal	Takaramiem							
4.4.3	Enhance and strengthen the capacity of rice grower associations	Soroti	Gweri	Dokolo	Amodoima		Create and train associations		1 association per village	1	2	3
					Acuma							
				Awoja	Awoja							
4.5.1	Strengthen enforcement bodies with capacity	Soroti	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	n/a	175
										85	142	175

## ANNEX 3 – Detailed Implementation Plan

Ref. No.	Options	Districts concerned	Type and No. of structure	Indicator	Responsibility	Period of Intervention					Costs in US\$
						2015 / 2016	2017	2018	2019	2020	
<b>Catchment Protection and Conservation</b>											
<b>Sustainable Land and Environmental Management</b>											
1.1.8.1	Introduce improved farming practices	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Naka-piripirit, Amudat, Kumi, Ngora	Construct 40 cyles, 60 underground water tanks, 2 irrigation layouts, provide 80 ox-ploughs, 2 tractors, 50 fresian cattle, 26 treadle pumps, tree seedlings, seeds, woodlots: 10 ha, agroforestry: 53 ha, contour bunds: 400 km, trenches: 50 km, cattle tracks: 5, grass planting, train and equip 1.227 farmers	The income of farmers has increased by 20%	Kyoga WMZ, CMC, DNRO, DEO, DAO	804,307	402,154	402,154			1,608,614
1.1.3	Identification and regular (annually) eradication of floating islands / invasive alien plants	Soroti, Serere, Ngora, Kumi, Katakwi	3 tractors, 9 motor boats, 18 wheelbarrows, hoes and other harvesting equipment, construction of 6 barriers before Awoja bridge, eradication of plants twice yearly on Awoja River and Lake Bisina	The area invaded by invasive plants has been reduced to 0	Kyoga WMZ, CMC, DNRO, DEO	320,264	256,211	64,053			640,529
1.1.8	Ecological water requirements: Revisiting legislation and catchment assessment	Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Naka-piripirit, Amudat, Kumi, Ngora	Ecological water requirements: legislation and catchment assessment	Legislation providing for ecological water requirements is in place. Requirements assessed for 8 streams	Kyoga WMZ, CMC, Consultant		117,857				117,857

1.1.1	The preparation and dissemination of comprehensive and sustainable land and environmental management manual providing the technological approaches tailored for the Awoja catchment and Kyoga WMZ	Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Develop a comprehensive and sustainable land and environmental management manual and disseminate it	All districts are in the possession of a comprehensive and sustainable land and environmental management manual	Kyoga WMZ, CMC, Consultant	98,571					98,571
1.1.2	Design and pilot of individual farms according to sustainable land and environmental management principles. Layout to include contouring, drain and waterway layout and improvements, road design, runoff management, woodlot and agroforestry planning	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Establish 8 runoff management structures, 14 ha of agroforestry, 344 ha of woodlots / agroforestry, 190 km of contour bunds, 128 km of road design, 3 bridges, 7 small - drip irrigations, 14 nurseries, carry out 14 sensitisations	Each farm is equipped with x conservation structures. Baseline: 0. The productivity of each farm has increased by 20 %	Kyoga WMZ, CMC, DNRO, DEO, DAO	1,478,867	1,478,867	739,433	246,478	4,929,555	
1.1.4	Development of a fire risk, fire control and fire protection plan, with controlled burning where required for grazing and biodiversity management and implement it	Amudat, Napak, Nakapiripirit, Bukwo, Katakwi, Kween	6 x fire fighting equipment, training of fire fighters (24), training of fire fighting committees (58), development of 6 fire management plans, quarterly public awareness raising (113 communities), 41 community trainings, establish fire lines of 40 km, ordinance and by-laws <sup>1</sup>	management plans in each district, number of sensitised communities, number of committees and members trained, number of ha of uncontrolled burning is reduced by 60 %	Kyoga WMZ, CMC, DNRO, DEO, DAO, DFO, CDO	658,343	493,757	493,757		1,645,857	

Ref. No.	Options	Districts concerned	Type and No. of structure	Indicator	Responsibility	Period of Intervention					Costs in US\$
						2015 / 2016	2017	2018	2019	2020	
1.1.5	River bank protection and stabilisation - gabiions, management of cattle access points, protection of riparian vegetation	Bulambuli, Sironko, Amudat, Napak, Kapchorwa, Nakapiripirit, Soroti, Serere, Ngora, Bukwo, Katakwi, Bukede, Kween	rivers: 230 km, re-course of river: 10km, river pegging: 260 km, weirs: 15, bridges: 15, stone pitching of cattle access points: 7 km <sup>2</sup> , cattle access points: 218, woodlots: 15 ha, riparian vegetation (trees, grass): 323 km, seedlings: 50.000+, de-silting	Number of ha of areas demarcated and restored, number of cattle access points	Kyoga WMZ, CMC, DNRO, DEO, DFO	4,119,189	4,119,189	2,353,822	1,176,911		11,769,110
1.1.9	Build the capacity on conservation methods, especially for wetlands	Bulambuli, Amudat, Napak, Kapchorwa, Nakapiripirit, Soroti, Serere, Ngora, Kumi, Katakwi, Bukede, Kween	Form and train 56 environmental committees, form and train 15 wetland user committees, train community members in 10 villages, carry out sensitisations in 68 villages, develop training manuals (160 copies)	Number and type of activities carried out by the trained committees	Kyoga WMZ, CMC, DNRO, DEO	328,143	328,143	328,143	164,071		820,357
1.1.10	Monitoring the impacts of sustainable land and environmental management in terms of improved farming practices (individual benefits) and downstream water management	Bulambuli, Kapchorwa, Sironko, Bukede, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Develop monitoring programmes for all 14 districts	Monitoring programme implemented	Kyoga WMZ, CMC, DNRO, DEO, DAO, DCO				66,786	66,786	133,571
<b>Reforestation</b>											

<b>1.2.2</b>	Establish nurseries for provision of seedling and establish distribution, training and management systems in all districts - pilot projects	Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakiipirit, Amudat, Kumi, Ngora	36 nurseries, 9 tree nurseries, 1 greenhouse, 1 training of farmers, 5 trainings for nursery managers <sup>2</sup>	Existence of x newly established nurseries, number of seedlings produced, number of seedlings sold Baseline: 0	Kyoga WMZ, CMC, DNRO, DEO, DAO	87,620	87,620	87,620				175,240
<b>1.2.3</b>	Support the implementation of a reforestation programme aimed at restoring lost woodland and at establishing woodlots to reduce the pressure on natural forest. Link to agroforestry and sustainable land management	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakiipirit, Amudat, Kumi, Ngora	Agroforestry for 157 ha plus trees for 12 km boundary, woodlots for 239 ha, seedlings 650.000 plus for 20 ha, 18 tree nurseries, 12 nurseries, 18 sensitizations, training of 40 farmers, training of 10 management committees, development of a reforestation programme	Number of ha under agroforestry, number of ha of newly planted woodlots, number of seedlings produced and sold in x nurseries Baseline: 0	Kyoga WMZ, CMC, DNRO, DEO, DFO, CDO	886,886	221,721	221,721				2,217,215
<b>1.2.4</b>	Planting of trees in degraded areas	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Amudat, Kumi, Ngora	Planting trees: 1.155 ha, seedlings: 630.500, tree nurseries: 6	Number of ha with newly planted trees that survived, number of seedlings planted, number of seedlings produced and sold in x nurseries Baseline: 0	Kyoga WMZ, CMC, DNRO, DEO, DFO, CDO	81,995	49,197	16,399	16,399	16,399		163,989
<b>1.3.1</b>	Regular updating of district wetland inventories by districts	Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakiipirit, Amudat, Kumi, Ngora	Develop 8 wetland inventories, update 13 wetland inventories regularly, GIS equipment	Availability of wetland inventories in each district, yearly update of wetland inventories	Kyoga WMZ, CMC, DNRO, DEO	83,482	33,393	16,696	16,696	16,696		166,964

**Period of Intervention**

Ref. No.	Options	Districts concerned	Type and No. of structure	Indicator	Responsibility	Period of Intervention					Costs in US\$
						2015 / 2016	2017	2018	2019	2020	
<b>Lakes and Wetlands Management</b>											
1.3.1	Regular updating of district wetland inventories by districts	Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Develop 8 wetland inventories, update 13 wetland inventories regularly, GIS equipment	Availability of wetland inventories in each district, yearly update of wetland inventories	Kyoga WMZ, CMC, DNRO, DEO	83,482	33,393	16,696	16,696	16,696	166,964
1.3.3	Study for economic valuation of wetland resources and disseminate the results	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Economic valuation of wetland resources and its dissemination	Each district is in the possession of the study reports	Kyoga WMZ, CMC, DNRO, DEO, consultant		62,857				62,857
1.3.2	Updating of demarcated protection zones and acceptable utilization of wetlands, producing GIS maps of wetlands at various levels	Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Demarcation of 134 protection zones, update of 49 protection zones, produce GIS maps for all wetlands, establish 1 protection zone with suitable vegetation, GPS and GIS equipment	Availability of GIS maps for x wetlands, number and ha of demarcated protection zones	Kyoga WMZ, CMC, DNRO, DEO		1,402,281				1,402,281
1.3.4	Develop or review and update the wetland management / action plans	Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Develop 94 wetland management action plans, review and update 126 wetland management action plans	Availability of wetland management action plans (new and updated) in all districts	Kyoga WMZ, CMC, DNRO, DEO		94,286	31,429	15,714	15,714	157,143

1.3.5	Restoration of vital (unique) critical (subject to on-going degradation) wetlands	Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Desilt 3 rivers, restoration / tree planting in 63 wetlands, develop woodlots of 5 ha, fence 1 acre with live hedges, peg off 12 open access areas for animals, restore the fish population in 16 areas, awareness creation in 40 villages, train 2 wetland management committees, law enforcement and by - laws	Number of ha of wetlands restored, number of open access areas for animals, activities undertaken by wetlands management committees	Kyoga WMZ, CMC, DNRO, DEO			368,085	064	276,064	920,212
<b>Refurbishment of infrastructure</b>											
1.4.1	Mapping, demarcation of riparian and roadside protection zones and identify and implement source protection measures	Bukwo, Kween, Bukambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Desilt 15 rivers, establish a riparian buffer zone of 200 ha, 30 m buffer zone along River Sironko and its tributaries, demarcation zones along Rivers Siit, Nyalit, Chepkwir, Kapteret, River Sipi and its tributaries, protection zones along 16 rivers, demarcation pillars in 6 areas, 15 km river pegging of River Sironko, tree planting on 114 ha, fodder grass planting for 36 ha, woodlots: 15 ha, seedlings: 50,000, roadside tree planting for 453 km, 16 cattle rams, construction of 15 bridges, gabions, mapping of rivers and road sides, 15 sensitisations, GPS, GIS.	Number of km and size of riparian and roadside protection zones established, number of ha restored, availability of maps of riparian and roadside protection zones	Kyoga WMZ, CMC, DNRO, DEO, CDO			1,717,478	1,717,478		3,434,956

Ref. No.	Options	Districts concerned	Type and No. of structure	Indicator	Responsibility	Period of Intervention					Costs in US\$	
						2015 / 2016	2017	2018	2019	2020		
			... systems, train an interdistrict committee between Ngora and Serere									
<b>Development for socio-economic growth</b>												
<b>Sanitations Systems</b>												
2.1.1	Improve sanitation technology and building material support and implement them	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	4 water-borne toilets 10 stance, 35 lined pit latrines 3 stance, 24 lined pit latrines 4 stance, 40 VIP latrines 5 stance, 10 VIP latrines 2 stance, 57 ecosan toilets, awareness creation in 45 villages, 3 incinerators. All toilets shall be equipped with a urinal and hand-washing facilities.	Number of toilets according to the type of improved technology constructed and used	Kyoga WMZ, CMC, DNRO, DEO, DWO	633,360	633,360	633,360			1,266,720	
2.1.2	Improve faecal sludge management (collection, transportation, treatment and re-use) through clustering of small towns (Kumi, Sironko, Kapchorwa, Nakapiripirit)	Sironko, Napak, Kapchorwa, Nakapiripirit, Kumi	1 central faecal sludge treatment site for public institutions, 1 treatment facility for waste for Ongino hospital, 3 cesspools, 4 cesspool emptiers, 2 sewage systems, establish and protect 2 lagoons, promote use of effective micro organism (EMO) for sludge reduction	Availability and usage of sludge treatment facilities	Kyoga WMZ, CMC, DNRO, DEO, DWO			745,000			745,000	
<b>Refurbishment of infrastructure</b>												



2.2.2	Refurbish valley dams and tanks	Sironko, Amudat, Napak, Nakapiripirit, Soroti, Serere, Ngora, Kumi, Katakwi, Bukedea	19 valley dams, 20 valley tanks	Number of x valley dams and x valley tanks refurbished and used	Kyoga WMZ, CMC, DNRO, DEO, DAO	1,786,714	1,461,857				3,248,571
<b>Piped Water Schemes (Surface Water)</b>											
2.3.2	Soroti treatment and distribution - expand in stages (NWSC)	Soroti	2 reservoirs of 200 cubic metres and approx. 500 km of pipeline extension	Availability of 2 reservoirs and x new pipelines, number of people served with clean safe water from the extensions	Kyoga WMZ, NWSC, CMC, DWO			141,143		141,143	282,286
<b>Sand Dams</b>											
2.6.1	Feasibility studies and design of prioritised sand dams. Construction, with cooperation and input from local communities	Amudat, Napak, Nakapiripirit	10 sand dams, train 10 sand dam management committees	Availability of 10 sand dams, number and type of activities carried out by the trained committees, number of people served from the new sand dams	Kyoga WMZ, CMC, DWO, DNRO, DEO	890,357	890,357				1,780,714
<b>Dams</b>											
2.7.2	Feasibility & design of prioritized dams for stock watering and humans needs. Construction, with cooperation and input from local communities	Amudat, Napak, Nakapiripirit, Soroti, Serere, Ngora, Kumi, Bukwo, Katakwi, Bukedea, Kween	19 dams, 14 valley dams, 4 abstraction facilities for livestock watering and 4 for irrigation with treadle pumps	Availability of x valley dams and x dams, number of people and animals served	Kyoga WMZ, CMC, DNRO, DEO, DAO, DWO	1,300,014	2,166,690	866,676			4,333,379

Ref. No.	Options	Districts concerned	Type and No. of structure	Indicator	Responsibility	Period of Intervention					Costs in US\$
						2015 / 2016	2017	2018	2019	2020	
	<b>Enhancement of Irrigation</b>										
<b>2.8.2</b>	Enhancement of rain fed agriculture	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiririt, Amudat, Kumi, Ngora	Establish 288 rain water harvesting technologies for irrigation, provide 150 treadle pumps, 80 sprinkler irrigations, establish 2 valley tanks with irrigation equipment, 90 underground tanks with pipes and pumps, 2 rock and runoff harvesting facilities into underground tanks with pumps and pipes, 2 GFS with equipment, provide short-term and drought resistant crops for 18 villages, mulching for 5 villages, 6 demonstrations, 6 sensitisations, train 550 farmers on irrigation and soil / water conservation	Availability of x new irrigation schemes, number of ha additionally irrigated, number of farmers who carry out soil / water conservation methods	Kyoga WMZ, CMC, DNRO, DEO, DAO, DWO	1,282,043	1,098,894	549,447	366,298	366,298	3,662,980
<b>2.8.5</b>	Construction of new irrigation schemes: Low - power pumped schemes that utilize water from nearby rivers, swamps and lakes	Bulambuli, Amudat, Kapchorwa, Nakpiririt, Soroti, Serere, Ngora, Kumi, Katakwi, Bukedea	29 schemes	Availability of 29 new irrigation schemes, number of farmers profiting from the new schemes, number of ha irrigated	Kyoga WMZ, CMC, DNRO, DEO, DAO, DWO		#####	163,169.86			326,340

<b>2.8.6</b>	Construction of new irrigation schemes: Simple gravity - fed schemes	Bulambuli, Sironko, Napak, Kapchorwa, Nakapiripirit, Bukwo, Katakwi, Bukedea, Kween	24 GFS, 2 sprinkler irrigation schemes, 2 rock catchment based schemes	Availability of 24 GFS irrigation schemes, number of farmers profiting from the new schemes, number of ha irrigated	Kyoga WMZ, CMC, DNRO, DEO, DAO, DWO	548,058	548,058	1,096,116
<b>2.8.3</b>	New irrigation schemes: Undertake feasibility studies of identifies areas	Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Feasibility studies for 82 irrigation schemes	Number and type of schemes proposed in the feasibility studies	Kyoga WMZ, CMC, DNRO, DEO, DAO, DWO	98,571	98,571	98,571
<b>2.8.7</b>	Construction of new irrigation schemes: Type A Formal Irrigation	Serere, Bukwo	3 irrigation schemes	Availability of 3 Type A irrigation schemes, number of farmers profiting from the new schemes, number of ha irrigated	Kyoga WMZ, CMC, DNRO, DEO, DAO, DWO	251,565	167,710	419,274
<b>2.8.4</b>	Construction of new irrigation schemes: Improved (seasonal) wetlands schemes	Bulambuli, Amudat, Kapchorwa, Nakapiripirit, Soroti, Serere, Ngora, Kumi, Katakwi, Bukedea, Kween	36 irrigation schemes, 1 GFS, 4 valley dams, irrigation channels for 6 km	Availability of x irrigation schemes, number of farmers profiting from the new schemes, number of ha irrigated	Kyoga WMZ, CMC, DNRO, DEO, DAO, DWO	2,782,287	1,854,858	4,637,145
<b>Water Use Efficiency</b>								
<b>2.9.1</b>	Water efficiency evaluation and recommendations	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Water efficiency evaluation and recommendations	Evaluation report	Kyoga WMZ, CMC, consultant	62,857	62,857	62,857

Ref. No.	Options	Districts concerned	Type and No. of structure	Indicator	Responsibility	Period of Intervention					Costs in US\$
						2015 / 2016	2017	2018	2019	2020	
<b>Small Hydropower</b>											
2.10.1	Investment and implementation in hydropower installations and grid distribution	Bulambuli, Sironko, Kapchorwa, Naka-piripirit, Ngora, Kumi, Katakwi, Kween	8 dams, extensions of electricity lines for 149 km	Availability of x new power supply lines, number of people connected to the new grid lines	Kyoga WMZ, CMC			16,857,857	#####		33,715,714
<b>Alternative Energy Supply</b>											
2.11.2	Promote use of energy efficient woodstoves by making the technology readily available	Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Naka-piripirit, Amudat, Kumi, Ngora	Train 1,430 persons on woodstove making and equip them, construct 21 woodstoves, carry out 29 sensitisations and 17 village demonstrations	Number of people using the new woodstoves	Kyoga WMZ, CMC, DNRO, DEO, DFO	502,179	167,393	167,393			836,964
2.11.1	Promote additional and alternative sources of energy including low cost solar panels to be used for LED lighting, radiois and cell phones	Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Naka-piripirit, Amudat, Kumi, Ngora	392 solar panels, 26 windturbins, 40 radios, 40 cellphones, construction of 42 biogas units, train 42 persons in biogas digester making, 4 sensitisations	Number of people using the new energy sources according to type	Kyoga WMZ, CMC, DNRO, DEO, DFO	165,069	55,023	55,023			275,114
<b>Aquaculture</b>											
2.12.1	Develop a manual on aquaculture techniques (building on available material)	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Naka-piripirit, Amudat, Kumi, Ngora	Develop a manual on aquaculture techniques	Availability and use of manual in each district	Kyoga WMZ, CMC, Consultant	21,429					21,429

2.12.2	Assist farmers with rehabilitation of viable aquaculture ponds and in the construction of new ponds - allowance made for a pilot	Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Construct 39 new fish ponds, rehabilitate 27 fish ponds, establish 1 fish breeding centre, pilot 1 fish cage farming, train 66 farmers on the management of fish ponds <sup>4</sup>	Availability of x numbers of fish ponds, number of beneficiaries from the fish ponds	Kyoga WMZ, CMC, DNRO, DEO, DAO	104,116	62,470	41,646	208,232
2.12.3	Train and assist farmers on the appropriate fishing techniques and equipment as well as the protection of breeding grounds	Bulambuli, Napak, Soroti, Serere, Ngora, Kumi, Bukedea, Kween	Train 370 fishermen on appropriate fishing techniques and equip them	Number of fishermen trained, number of fishing grounds protected	Kyoga WMZ, CMC, DNRO, DEO, DAO	54,464.29			108,929
<b>Socio-economic Strengthening</b>									
2.13.1	Create an ecological tourism organisation, train it and provide the necessary starting equipment e.g a boat	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	organisations, establish an office/information centre for each organisation, train 39 guides, construct 9 bandas, establish 17 campsites with the necessary equipment, establish 7 restaurants with equipment, establish 3 art and craft centres, provide 31 binoculars, 53 life jackets, 7 cameras, 4 guide books, 15 boats, 1 abseiling equipment	Number of ecological tourism organisations trained, number of tourists visiting the sites Baseline: 0	Kyoga WMZ, CMC, DNRO, DEO, CDO	614,391	614,391	153,598	1,535,977
2.13.2	Promote horticulture	Napak, Kapchorwa, Nakapiripirit, Soroti, Serere, Ngora, Kumi, Bukwo, Katakwi, Bukedea, Kween	Train 778 farmers and equip them with the necessary tools incl. seeds, establish 10 demonstration plots, 12 greenhouses, irrigation pumps, treadle pumps, pipes, fencing	Number of acres under horticulture Baseline 0, number and type of products harvested	Kyoga WMZ, CMC, DAO	139,571	104,679	69,786	348,929

Ref. No.	Options	Districts concerned	Type and No. of structure	Indicator	Responsibility	Period of Intervention					Costs in US\$
						2015 / 2016	2017	2018	2019	2020	
2.13.3	Promote bee keeping	Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Train 1,054 farmers on modern bee keeping, 6,490 beehives, 864 harvesting gear, provide processing, packaging and marketing equipment for all, set up 2 honey collection centres and 33 honey processing plants	Number of farmers trained in bee keeping, amount of income from bee keeping per farmer Baseline: 0	Kyoga WMZ, CMC, DAO		449,493	337,120	337,120	1,123,732	
<b>Mitigation and Adaptation</b>											
<b>Flood and Landslide Management and Preparedness for Floods and Landslides</b>											
3.1.1	Demarcate areas considered unsafe for habitation or other use and warn inhabitants	Bulambuli, Kapchorwa, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Demarcate 104 areas unsafe for habitation and 5 settlements in game reserves	Number of demarcated unsafe areas for habitation	Kyoga WMZ, CMC, DNRO, DEO, DAO, DRMC	63,750	63,750			127,500	
3.1.3	Development / Compilation of hazard / risk map for landslides / sedimentation / floods	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Develop / compile hazard / risk maps for landslides / sedimentation / floods	Availability of risk maps for landslides, floods and sedimentation	Kyoga WMZ, CMC, Consultant	48,571				48,571	
3.1.2	Develop an early flood warning system	Bulambuli, Kapchorwa, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Establish 144 early warning systems for floods and landslides, install 40 traditional early warning systems, form and train 34 early warning committees	Availability of early warning systems	Kyoga WMZ, CMC, DNRO, DEO, DRMC		103,036	103,036		206,071	

Cattle Keeping Practices										
3.3.1	Determine current stocking rates and assess carrying capacity of all districts. Develop a plan to keep the numbers of animals within the theoretical limits of carrying capacity	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Determine current stocking rates and assess carrying capacity. Develop a plan to keep the numbers of animals within the theoretical limits of carrying capacity	Numbers of the current stocking rates, assessment of the carrying capacity with a plan to keep the number of animals in the limit	Kyoga WMZ, CMC, consultant	65,000				65,000
3.3.2	Livestock improvement programme	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Establish 42 artificial insemination services, 47 cattle dips and crushes, 62 zero grazing units, 2 demo sites for tsetse and tick control, 7 fodder banks, 46 watering points, 6 animal drug stores, 6 demonstration ranches, provide 730 high cross breed cattle, 124 goats, 124 sheep, ...	Number of vaccinations and spraying in the districts compared to the previous year, availability of x animal drug stores, number of people frequenting the drug stores, number of artificial inseminations...	Kyoga WMZ, CMC, DNRO, DEO, Dvet	1,171,416	1,004,071	836,726	334,690	3,346,903
			... improved veterinary services in 45 locations including vaccinations, tsetse fly and tick control and spraying, carry out 25 awareness raising campaigns on good livestock practices, build capacity for veterinary staff and health workers, train 668 farmers on improved modern management of livestock	... carried out in comparison to the previous year						

Ref. No.	Options	Districts concerned	Type and No. of structure	Indicator	Responsibility	Period of Intervention					Costs in US\$
						2015 / 2016	2017	2018	2019	2020	
3.3.3	Promote dairy farming	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripit, Amudat, Kumi, Ngora	Provide 505 high breed dairy cattle, establish 4 milk cooling plants, establish 34 zero grazing units, establish 9 fodder banks, provide 60 milk coolers, 6 milking machines, minicoolers, transportation cans, form and train 34 dairy farmers associations, train and equip 512 farmers, train and equip 20 practitioners in artificial insemination, train 16 people on management of zero grazing, pasture, production and management, train 16 people on...	Number of farmers engaging in dairy farming Baseline: 0; amount of income from dairy farming Baseline: 0	Kyoga WMZ, CMC, DNRO, DEO, Dvet			602,479	602,479	301,239	1,506,197
			... making yoghurt, ghee etc., plant 2 ha of fodder grass, improve veterinary services, carry out 2 vaccination campaigns, carry out tik, tsetse and worm controls, tagging of animals								
<b>Social and Institutional Development</b>											
<b>Monitoring</b>											



4.1.1	Monitoring stations must be maintained and regularly calibrated. Gauge readers need to be trained and check mechanisms introduced to ensure stability and consistency in data	Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Assessment of the monitoring stations, rehabilitation of the stations if necessary, training of gauge readers, regular data collection/monitoring, data analysis and appropriate data storage	Number of monitoring stations regularly rehabilitated and calibrated, data bases regularly updated	Kyoga WMZ, DWRM, CMC	25,893	19,420	6,473	6,473	6,473	6,473	64,732
4.1.2	Expand, rehabilitate, and improve the water quality, evaporation, rainfall, ground water and streamflow monitoring network systems and lake and wetland water level monitoring gauges. Implement sedimentation monitoring	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	evaporation, rainfall, groundwater and streamflow monitoring network and water level monitoring gauges, rehabilitation or expansion of stations if necessary, regular data collection/monitoring, data analysis and appropriate data storage, set up a sedimentation monitoring network	Reviewed and expanded monitoring network is in place	Kyoga WMZ, DWRM, CMC	25,893	19,420	6,473	6,473	6,473	6,473	64,732
4.1.3	Monitor surface and ground water use and levels to prevent over-exploitation	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Regular surface and groundwater monitoring, inventory of water users, monitoring and follow up of water abstraction permits	Number and type of water resources investments using data from the monitoring networks	Kyoga WMZ, DWRM, CMC	12,946	12,946	12,946	12,946	12,946	12,946	64,732
<b>Extension Services</b>												
4.2.1	Train a committed cadre of extension service providers to render interdisciplinary, integrated extension service to include CMCs, CDOs etc.	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Train extension service providers to render interdisciplinary, integrated services	Number of persons trained, number and type of activities carried out by the persons trained	Kyoga WMZ, CMC, consultant			27,232	27,232	27,232	27,232	54,464

Ref. No.	Options	Districts concerned	Type and No. of structure	Indicator	Responsibility	Period of Intervention					Costs in US\$
						2015 / 2016	2017	2018	2019	2020	
4.2.2	Develop support materials for use by extension officers (building on currently available materials)	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Naka-piripirit, Amudat, Kumi, Ngora	Develop support materials for the extension officers	Number and kind of support materials developed and disseminated to each district	Kyoga WMZ, CMC, consultant	30,112					30,112
<b>Awareness Raising</b>											
4.3.5	Introduction of awareness raising programmes in schools	Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Naka-piripirit, Amudat, Kumi, Ngora	Establish 121 environmental clubs, establish 50 drama clubs, establish 4 demo schools, carry out 58 awareness raising campaigns, train teachers in 75 schools, provide IEC material for 38 schools	Number and type of activities carried out in x schools	Kyoga WMZ, CMC, DNRO, DEO, DEdO	339,643	169,821	169,821	169,821	169,821	849,107
4.3.1	Develop training guidelines and awareness raising materials (building on currently available materials)	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Naka-piripirit, Amudat, Kumi, Ngora	Develop training guidelines and awareness raising materials	Number and type of training guidelines and awareness raising materials available in all districts	Kyoga WMZ, CMC, consultant	80,714					80,714
4.3.2	Introduction of a community radio programme dedicated to environmental matters	Bukwo, Kween, Bulambuli, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Naka-piripirit, Amudat, Kumi, Ngora	Establish 4 radio stations, establish environmental programmes: 5 x general, 1 x per month: 2 x, 2 x per month: 1 x, 1 x per week: 2 x, 3 x per week: 2 x, radio talk shows and spot...	Availability of x radio stations, number and type of environmental radio programmes aired out	Kyoga WMZ, CMC, DNRO, DEO, DCO	237,723	95,089	47,545	47,545	47,545	475,446

4.3.4	Implement demonstration projects - schools, model farms etc. (capital costed elsewhere)	Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	... messages: quarterly: 2 x, weekly: 1 x, establish 3 radio listening clubs, provision of IEC material for dissemination Establish 84 model farms; woodlots in 16 schools; agroforestry, woodlots and nurseries in 22 schools, rehabilitate a poultry and piggery in 1 school, form and train 43 young farmers associations	Availability of x model farms, ratio of number of products planted to harvested	Kyoga WMZ, CMC, DNRO, DEO, DAO, DEEdO			501,417	300,850	200,567	1,002,835
4.3.3	Sanitation project. Demonstration of ecosan and other sanitation systems. Provision of appropriate designs and training in construction. Support with provision of materials	Bukwo, Kween, Bulambuli, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Construct 61 5stance VIP latrines, 34 ecosan toilets, 16 rubbish skips, carry out 44 awareness raising campaigns, train households on waste management and disposal in 8 villages, form and train 16 sanitation groups, form and train 24 committees on ecosan toilets, form and train 23 committees on management, operation and maintenance of latrines, carry out 1 study on collapsible soil to find the most appropriate toilet systems	Number and type of demonstration toilets constructed, number of well maintained clean toilets	Kyoga WMZ, CMC, DNRO, DEO, DWO			564,967	564,967	282,484	1,412,418

Ref. No.	Options	Districts concerned	Type and No. of structure	Indicator	Responsibility	Period of Intervention					Costs in US\$
						2015 / 2016	2017	2018	2019	2020	
<b>Institutional Capacity Building</b>											
4.4.1	Train experts (import expertise) in the development of technology guidelines, training and other approaches	Bukwo, Kween, Bulambuli, Kaporwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Train experts in the development of technology guidelines, training and other approaches	Availability of technology guidelines in each district	Kyoga WMZ, CMC, consultant		28,571				28,571
4.4.2	Enhance and strengthen the capacity of BMUs	Serere, Soroti, Ngora, Kumi, Katakwi, Bukedea	Form or reactivate 23 BMUs, train 227 BMU members, sensitise 23 communities, establish 4 BMU shelters	Number of BMU members trained, number and type of activities carried out by the BMUs	Kyoga WMZ, CMC, DNRO, DEO, DAO	197,232	197,232				394,464
4.4.3	Enhance and strengthen the capacity of rice grower associations	Bulambuli, Nakapiripirit, Soroti, Serere, Ngora, Kumi, Katakwi, Bukedea, Kween	500 rice grower association members, carry out 12 awareness raising campaigns and 2 exchange visits to established associations, construct 14 rice mills, 5 storage facilities and 1 rice store, rice haulers, provide seeds, develop training material	Number of persons trained, number and type of activities carried out by the rice grower associations	Kyoga WMZ, CMC, DNRO, DEO, DAO	440,214	440,214	440,214	220,107		1,100,536
<b>Legislation and Enforcement</b>											
4.5.1	Strengthen enforcement bodies with capacity	Amudat, Napak	Train and enforce environmental committees (3), law enforcement bodies (3) (police, UWA, LDUs) and community LCs on environmental law enforcement, train...	Number of persons trained, number of law enforcement activities carried out	Kyoga WMZ, CMC, DNRO, DEO, Env. police	27,857	18,571				46,429



4.5.2	Develop by - laws and ordinances on water and environmental management and protection	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Develop by - laws and ordinances on water and environmental management and protection	Newly added
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- 1 Fire equipment and fire fighting plans have been increased to 6 as they concern all districts, Napak communities assumed to be 100. 2 The trainings for nursery managers has been increased to 36 as it should be done for all nurseries.
- 2 The number of committees has been increased as all sand dams should have a committee.
- 3 The number of trainings has been increased as all fish ponds have to be accompanied by a training..

It is assumed that a committee consists of 10 members.



## ANNEX 4 – Detailed Investment Plan

Ref. No.	Options	Districts concerned	Description of Intervention	Qty	Unit	Rate	ACTIVITY REQUIREMENTS					COSTS					Yearly Cost Allocation (in % of total cost)					Indicator	Responsibility	Assumptions																					
							INFRA-STRUCTURE	PERSONNEL	CONSULTANTS	TRAVEL	STAKEHOLDERS	Equipment	Personnel	Consultants	Travel	Stakeholders	Total Cost (US\$)	2015 / 16	2017	2018	2019			2020	PD	TSI	CI	TI																	
							Equipments/Infra-structure procured	Technical employee (person months) incl field missions	(person months)	Vehicle 4x4 (months)	No of meetings/conferences/workshops/ Trainings																																		
Catchment Protection and Conservation																																													
Sustainable Land and Environmental Mangement																																													
1.1.8.1	Introduce improved farming practices	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Construct 40 silos (Ksh20,000/1.8ton)	40	Nos	321	12,857																	The income of farmers has increased by 20%	Kyoga WMZ, CMC, DNRO, DEO, DAO	36	1.00	0.25	0.5																
			Construct 60 underground water tanks (6000 L)	60	Nos	1,786	107,143																																						
			Design and construct 2 irrigation systems (10 ha per layout)	20	Ha	9,426	188,520																																						
			Provide 40 ox-ploughs	80	Nos	1,071	85,714																																						
			Procure 2 tractors	2	Nos	89,286	178,571																																						
			Procure 50 fresian cattle	50	Nos	714	35,714																																						
			Procure 26 treadle pumps	26	Nos	429	11,143																																						
			Provide for 10 ha of woodlots	10	Ha	3,372	33,715																																						
			Put 53 ha under agroforestry	53	Ha	6,743	357,379																																						
			Construct 400 km contour bunds	400	Km	500	200,000																																						
Excavate 50 km trenches	50	Km	500	25,000																																									
Construct 5 cattle tracks	5	Nos	536	2,679																																									
Train and equip 1227 farmers	1227	Nos																																											
1.1.3	Identification and regular (annual-ly) eradication of floating islands / invasive alien plants	Soroti, Serere, Ngora, Kumi, Katakwi	Procure 3 tractors	3	Nos	89,286	267,857																	The area invaded by invasive plants has been reduced to 0	Kyoga WMZ, CMC, DNRO, DEO	36	1.00	0.25	0.4																
			Procure 9 motor boats	9	Nos	17,857	160,714																																						
			Procure 18 wheelbarrows, hoes and other harvesting equipment	18	Unit	129	2,314																																						
			Construction of 6 barriers before Awoja bridge	6	Nos	8,929	53,571																																						
1.1.8	Ecological water requirements: Revisiting legislation and catchment assessment	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Put in place legislation	1	Ls																		Legislation providing for ecological water requirements is in place. Requirements assessed for 8 streams	Kyoga WMZ, CMC, Consultant	6	0.25	1	0.2																	
			Improve catchment assessment	1	Ls																																								
1.1.1	The preparation and dissemination of comprehensive and sustainable land and environmental management manual providing the technological approaches tailored for the Awoja catchment and Kyoga WMZ	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Develop a comprehensive and sustainable land and environmental management manual and disseminate it	1	Ls																		All districts are in the possession of a comprehensive and sustainable land and environmental management manual	Kyoga WMZ, CMC, Consultant	12	0.50	1	0.3																	
1.1.2	Design and pilot of individual farms according to sustainable land and environmental management principles. Layout to include contouring, drain and waterway layout and improvements, road design, runoff management, woodlot and agroforestry planning	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Establish 8 runoff management structures (contours, bunds, terraces)	8	Nos	3,571	28,571																Each farm is equipped with x conservation structures. Baseline: 0. The productivity of each farm has increased by 20 %	Kyoga WMZ, CMC, DNRO, DEO, DAO	60	0.50	0.5	0.4																	
			Practice agroforestry on 40ha, half woodlots	40	Ha	6,743	269,720																																						
			Put in place woodlots / agroforestry of 344 ha	344	Ha	6,743	2,319,592																																						
			Construct contour bunds of 190 km	190	Km	500	95,000																																						
			Road design / construction for 128 km	128	Km	3,571	457,143																																						
			Construct 3 bridges	3	Nos	375,000	1,125,000																																						
			Install 7 small - drip irrigations (5 ha each)	35	Ha	9,426	329,910																																						
			Put in place 14ha Nurseries	14	Ha	1,733	24,262																																						
1.1.4	Development of a fire risk, fire control and fire protection plan, with controlled burning where required for grazing and biodiversity management and implement it	Amudat, Napak, Nakapiripirit, Bukwo, Katakwi, Kween	Procure 6 fire fighting equipment	6	Nos	321	1,929																Availability of fire management plans in each district, number of sensitised communities, number of committees and members trained, number of ha of uncontrolled burning is reduced by 60 %	Kyoga WMZ, CMC, DNRO, DEO, DAO, DFO, CDO	36	0.75	0.5	0.4																	
			Training of fire fighters (24)	24	Pple																																								
			Carry out training of fire fighting 58 committees (10 people per committee)	580	Pple																																								
			Development of fire management plans	6	Nos																																								
			Carry out quarterly public awareness raising (113 communities, 50 people ea)	5650	Pple																																								
			Carry out community 41 trainings (50 people per training)	2050	Pple																																								
			Establish fire lines	40	Km	500	20,000																																						
Put in place ordinance and by-laws	1	Ls																																											



1.1.5	River bank protection and stabilisation - gabions, management of cattle access points, protection of riparian vegetation	Bulambuli, Sironko, Amudat, Napak, Kapchorwa, Nakapiripirit, Soroti, Serere, Ngora, Bukwo, Katakwi, Bukedea, Kween	Construct gabions	276	Km	17,857	4,928,571	36	18	14.4	3	\$11,529,110	\$38,571	\$96,429	\$51,429	\$53,571	\$11,769,110	\$4,119,189	\$4,119,189	\$2,353,822	\$1,176,911	Number of ha of areas demarcated and restored, number of cattle access points	Kyoga WMZ, CMC, DNRO, DEO, DFO	48	0.75	0.5	0.4	
			Demarcations on rivers	230	Km	510	117,300																					
			Recourse of river	10	Km	35,714	357,143																					
			River pegging	260	Km	250	65,000																					
			Construct weirs	15	Nos	1,786	26,786																					
			Construct bridges	15	Nos	375,000	5,625,000																					
			Stone pitching of cattle access points	0.015	Km <sup>2</sup>	3,571,429	53,571																					
			Construct cattle access points	218	Nos	536	116,786																					
			Put in place woodlots	15	Ha	3,372	50,573																					
			Plant riparian vegetation, 323km (4 m wide)	129.2	Ha	867	111,952																					
			Procure seedlings	50000	seedlings	0.1	5,000																					
De-silting (activity)	1	Nos	71,429	71,429																								
1.1.9	Build the capacity on conservation methods, especially for wetlands	Bulambuli, Amudat, Napak, Kapchorwa, Nakapiripirit, Soroti, Serere, Ngora, Kumi, Katakwi, Bukedea, Kween	Form and train 15 environmental committees (10 people per committee)	150	Pple			9	9	2.7	42	\$2,857	\$9,643	\$48,214	\$9,643	\$750,000	\$820,357		\$328,143	\$328,143	\$164,071	Number and type of activities carried out by the trained committees	Kyoga WMZ, CMC, DNRO, DEO	36	0.25	1	0.3	
			Form and train 15 wetland user committees (10 people per committee)	150	Pple																							
			Train community members in 10 villages (50 people per village)	500	Pple																							
			Carry out sensitisations in 68 villages (50 people per village)	3400	Pple																							
			Develop training manuals (160 copies)	160	Copies	18	2,857																					
1.1.10	Monitoring the impacts of sustainable land and environmental management in terms of improved farming practices (individual benefits) and downstream water management	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Develop monitoring programmes for all 14 districts	14	Nos			12	6	4.8	4	\$0	\$12,857	\$32,143	\$17,143	\$71,429	\$133,571			\$66,786	\$66,786	Monitoring programme implemented	Kyoga WMZ, CMC, DNRO, DEO, DAO, DCO	24	0.50	0.5	0.4	
<b>Reforestation</b>																												
1.2.2	Establish nurseries for provision of seedling and establish distribution, training and management systems in all districts - pilot projects	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Plant 36 nurseries (0.2 ha per nursery)	7.2	Ha	1,733	12,478	12	3	3.6	6	\$26,311	\$12,857	\$16,071	\$12,857	\$107,143	\$175,240	\$87,620	\$87,620			Existence of x newly established nurseries, number of seedlings produced, number of seedlings sold Baseline: 0	Kyoga WMZ, CMC, DNRO, DEO, DAO	24	0.50	0.25	0.30	
			Plant tree 9 nurseries (0.2 ha per nursery)	1.8	Ha	1,733	3,119																					
			Construct a greenhouse	1	Nos	10,714	10,714																					
			One training of farmers	1	Nos																							
			5 trainings for nursery managers	5	Nos																							
1.2.3	Support the implementation of a reforestation programme aimed at restoring lost woodland and at establishing woodlots to reduce the pressure on natural forest.  Link to agroforestry and sustainable land management	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Agroforestry for 157 ha	157	Ha	6,743	1,058,651	24	6	7.2	10.4	\$1,947,929	\$25,714	\$32,143	\$25,714	\$185,714	\$2,217,215	\$886,886	\$886,886	\$221,721	\$221,721	Number of ha under agroforestry, number of ha of newly planted woodlots, number of seedlings produced and sold in x nurseries Baseline: 0	Kyoga WMZ, CMC, DNRO, DEO, DFO, CDO	48	0.50	0.25	0.3	
			Plant trees for 12 km boundary (1m wide stretch)	1.2	Ha	6,743	8,092																					
			Plant woodlots for 239 ha	239	Ha	3,372	805,789																					
			Procure seedlings 650,000 for 20 ha	650000	Seedlings	0.1	65,000																					
			Plant 18 tree nurseries (0.2 ha each)	3.6	Ha	1,733	6,239																					
			Plant 12 nurseries (0.2 ha each)	2.4	Ha	1,733	4,159																					
			Carry out 18 sensitisations (50 people per sensitization)	900	Pple																							
			Carry out training of 40 farmers	40	Pple																							
Carry out training of 10 management committees (10 people per committee)	100	Pple																										
Development of a reforestation programme	1	Ls																										
1.2.4	Planting of trees in degraded areas	Bukwo, Kween, Bukambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Amudat, Kumi, Ngora	Planting 1.155 ha of trees	1.155	Ha	6,743	7,788	12	3	2.4	3	\$72,918	\$12,857	\$16,071	\$8,571	\$53,571	\$163,989		\$81,995	\$49,197	\$16,399	\$16,399	Number of ha with newly planted trees that survived, number of seedlings planted, number of seedlings produced and	Kyoga WMZ, CMC, DNRO, DEO, DFO, CDO	48	0.25	0.25	0.2
			Procure 630,500 seedlings	630500	Seedlings	0.1	63,050																					
			Plant 6 tree nurseries (0.2 ha each)	1.2	Ha	1,733	2,080																					
1.2.1	Provide routine training (forestry handbook) to CMCs, forest management, land care and agricultural managers: 1 training in each district @ 2 yrs	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Train CMCs, forest management, land care and agricultural managers	14	Nos			5	1.125	0.9	3	\$0	\$4,821	\$6,027	\$3,214	\$53,571	\$67,634	\$22,545	\$22,545	\$22,545	Number and type of activities carried out by the persons trained	Kyoga WMZ, CMC, DNRO, DEO, DAO, DFO, consultant	18	0.25	0.25	0.2		
<b>Lakes and Wetlands Management</b>																												
1.3.1	Regular updating of district wetland inventories by districts	Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Develop 8 wetland inventories	8	Nos			15	7.5	3	5	\$10,714	\$16,071	\$40,179	\$10,714	\$89,286	\$166,964	\$83,482	\$33,393	\$16,696	\$16,696	\$16,696	Availability of wetland inventories in each district, yearly update of wetland inventories	Kyoga WMZ, CMC, DNRO, DEO	60	0.25	0.5	0.2
			Update 13 wetland inventories regularly	13	Nos																							
			Procure GIS equipment	1	Lot	10,714	10,714																					
1.3.3	Study for economic valuation of wetland resources and disseminate the results	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Economic valuation of wetland resources and its dissemination	1	Ls		0	6	6	1.8	1	\$0	\$6,429	\$32,143	\$6,429	\$17,857	\$62,857			\$62,857		Each district is in the possession of the study reports	Kyoga WMZ, CMC, DNRO, DEO, consultant	12	0.50	1	0.3	

1.3.2	Updating of demarcated protection zones and acceptable utilization of wetlands, producing GIS maps of wetlands at various levels	Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Demarcation of 134 protection zones	134	Nos	7,143	957,143	9	6.75	3.6	1	\$1,325,764	\$9,643	\$36,161	\$12,857	\$17,857	\$1,402,281	\$1,402,281			Availability of GIS maps for x wetlands, number and ha of demarcated protection zones	Kyoga WMZ, CMC, DNRO, DEO	12	0.75	0.75	0.4	
			Update of 49 protection zones	49	Nos	7,143	350,000																				
			Produce GIS maps for all wetlands	1	Ls	3,571	3,571																				
			Establish 1 protection zone with suitable vegetation (plant riparian vegetation)	5	Ha	867	4,335																				
1.3.4	Develop or review and update the wetland management / action plans	Kween, Bukambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Develop 94 wetland management action plans	94	Nos			12	12	2.4	4	\$0	\$12,857	\$64,286	\$8,571	\$71,429	\$157,143	\$94,286	\$31,429	\$15,714	\$15,714	Availability of wetland management action plans (new and updated) in all districts	Kyoga WMZ, CMC, DNRO, DEO	48	0.25	1	0.2
			Review and update 126 wetland management action plans	126	Nos																						
1.3.5	Restoration of vital (unique) critical (subject to on-going degradation) wetlands	Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Desilt 3 rivers	3	Nos	71,429	214,286	9	4.5	4.5	20.2	\$509,676	\$9,643	\$24,107	\$16,071	\$360,714	\$920,212					Number of ha of wetlands restored, number of open access areas for animals, activities undertaken by x wetlands management committees	Kyoga WMZ, CMC, DNRO, DEO	36	0.25	0.5	0.5
			Restoration / tree planting in 63 wetlands (0.5 ha each)	31.5	Ha	6,743	212,405																				
			Develop woodlots of 5 ha	5	Ha	3,372	16,858																				
			Fence 1 acre with live hedges (0.254 km by 1 m wide)	0.0254	Ha	13,486	343																				
			Peg off 12 open access areas for animals (each 0.5 km)	6	Km	250	1,500																				
			Restore the fish population in 16 areas	16	Nos	3,571	57,143																				
			Awareness creation in 40 villages (50 people per village)	2000	Nos																						
			Train 2 wetland management committees (10 people per committee)	20	Nos																						
Law enforcement and by-laws	1	Ls	7,143	7,143																							
<b>Buffer Zone Set - asides</b>																											
1.4.1	Mapping, demarcation of riparian and roadside protection zones and identify and implement source protection measures	Bukwo, Kween, Bukambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Desilt 15 rivers	15	Nos	71,429	1,071,429	24	18	12	7.7	\$3,132,456	\$25,714	\$96,429	\$42,857	\$137,500	\$3,434,956					Number of km and size of riparian and roadside protection zones established, number of ha restored, availability of maps of riparian and roadside protection zones	Kyoga WMZ, CMC, DNRO, DEO, CDO	24	1.00	0.75	0.5
			Establish a riparian buffer zone of 200 ha	200	Ha	867	173,300																				
			30 m buffer zone along River Sironko and its tributaries (30 km)	3.3	Ha	6,743	22,477																				
			Demarcation zones along Rivers Siit, Nyalit, Chepkwir, Kapteret, River Sipi and its tributaries (100 km)	10	Ha	6,743	67,430																				
			Protection zones along 16 rivers (100 km)	10	Ha	6,743	67,430																				
			Demarcation pillars in 6 areas	6	Nos	1,071	6,429																				
			15 km river pegging of River Sironko	15	Km	250	3,750																				
			Tree planting on 114 ha	114	Ha	6,743	768,702																				
			Fodder grass planting for 36 ha	36	Ha	867	31,194																				
			Woodlots: 15 ha	15	Ha	3,372	50,573																				
			Seedlings: 50,000	500000	Seedlings	0.1	50,000																				
			Road side tree planting for 453 km (1 m wide)	45.3	Ha	6,743	305,458																				
			16 cattle rams	16	Nos	7,143	114,286																				
			Construction of 15 bridges	1	Lot	375,000	375,000																				
			Construction of gabions	1	Lot	10,714	10,714																				
			Mapping of rivers and road sides	1	Lot	3,571	3,571																				
15 sensitisations (50 people per sensitisation)	750	Pple																									
GPS, GIS systems	1	Lot	10,714	10,714																							
Train an interdistrict committee between Ngora and Serere (20 people)	20	Pple																									
<b>Development for socio-economic growth</b>																											
<b>Sanitations Systems</b>																											
2.1.1	Improve sanitation technology and building material support and implement them	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Construct 4 water-borne toilets (10stance)	4	Nos	18,000	72,000	12	9	4.8	22.5	\$786,720	\$12,857	\$48,214	\$17,143	\$401,786	\$1,266,720					Number of toilets according to the type of improved technology constructed and used	Kyoga WMZ, CMC, DNRO, DEO, DWO	24	0.50	0.75	0.4
			Construct 35 lined pit latrines (3stance incl. handwashing facility)	35	Nos	3,600	126,000																				
			Construct 24 lined pit latrines (4 stance incl. handwashing facility)	24	Nos	4,800	115,200																				
			Construct 40 VIP latrines (5stance incl. handwashing facility)	40	Nos	6,000	240,000																				
			Construct 10 VIP latrines (2stance incl. handwashing facility)	10	Nos	2,400	24,000																				
			Construct 57 ecosan toilets (4stance incl. handwashing facility)	57	Nos	3,600	205,200																				
			Carry out awareness creation in 45 villages	2250	Nos																						
Construct 3 incinerators	3	Nos	1,440	4,320																							

2.1.2	Improve faecal sludge management (collection, transportation, treatment and re-use) through clustering of small towns (Kumi, Sironko, Kapchorwa, Nakapiripirit)	Sironko, Napak, Kapchorwa, Nakapiripirit, Kumi	Put in place 1 central faecal sludge treatment site for public institutions	1	Nos	53,571	53,571	12	9	6	2	\$626,786	\$12,857	\$48,214	\$21,429	\$35,714	\$745,000	\$745,000	Availability and usage of sludge treatment facilities	Kyoga WMZ, CMC, DNRO, DEO, DWO	12	1.00	0.75	0.5				
			1 treatment facility for waste for Ongino hospital	1	Nos	53,571	53,571																					
			Put in place 3 cesspools	3	Nos	26,786	80,357																					
			Procure 4 cesspool emptiers	4	Nos	53,571	214,286																					
			Construct 2 sewage systems	2	Nos	53,571	107,143																					
			Establish and protect 2 lagoons	2	Lots	53,571	107,143																					
Promote use of effective micro organism (EMO) for sludge reduction	1	Ls	10,714	10,714																								
<b>Refurbishment of infrastructure</b>																												
2.2.2	Refurbish valley dams and tanks	Sironko, Amudat, Napak, Nakapiripirit, Soroti, Serere, Ngora, Kumi, Katakwi, Bukedea	Refurbish 19 valley dams	190000	m <sup>3</sup>	\$5	855,000	12	6	3.6	2	\$3,155,000	\$12,857	\$32,143	\$12,857	\$35,714	\$3,248,571	\$1,786,714	\$1,461,857	Number of x valley dams and x valley tanks refurbished and used	Kyoga WMZ, CMC, DNRO, DEO, DAO	24	0.50	0.5	0.3			
			Refurbish 20 valley tanks	200000	m <sup>3</sup>	\$12	2,300,000																					
<b>Piped Water Schemes (Surface Water)</b>																												
2.3.2	Soroti treatment and distribution - expand in stages (NWSC)	Soroti	Construct 2 reservoirs of 200 cubic metres	1000	New Users	\$188	188,000	12	12	4.8	0	\$188,000	\$12,857	\$64,286	\$17,143	\$0	\$282,286	\$141,143	\$141,143	Availability of 2 reservoirs and x new pipelines, number of people served	Kyoga WMZ, NWSC, CMC, DWO	24	0.50	1	0.4			
			Lay 500 km of pipeline extension																									
<b>Sand Dams</b>																												
2.6.1	Feasibility studies and design of prioritised sand dams. Construction, with cooperation and input from local communities	Amudat, Napak, Nakapiripirit	Construct 10 sand dams	100000	m <sup>3</sup>	\$17	1,720,000	6	6	1.2	1	\$1,720,000	\$6,429	\$32,143	\$4,286	\$17,857	\$1,780,714	\$890,357	\$890,357	Availability of 9 sand dams, number and type of activities carried out by the trained committees, number	Kyoga WMZ, CMC, DWO, DNRO, DEO	24	0.25	1	0.2			
			Train 10 sand dam management committees (10 people per committee)	100	Nos																							
<b>Dams</b>																												
2.7.2	Feasibility & design of prioritized dams for stock watering and humans needs. Construction, with cooperation and input from local communities	Amudat, Napak, Nakapiripirit, Soroti, Serere, Ngora, Kumi, Bukwo, Katakwi, Bukedea, Kween	Construct 19 dams	190000	m <sup>3</sup>	17	3,268,000	27	13.5	8.1	4	\$4,131,772	\$28,929	\$72,321	\$28,929	\$71,429	\$4,333,379	\$1,300,014	\$2,166,690	\$866,676	Availability of x valley dams and x dams, number of people and animals served	Kyoga WMZ, CMC, DNRO, DEO, DAO, DWO	36	0.75	0.5	0.3		
			Construct 14 valley dams	190000	m <sup>3</sup>	5	855,000																					
			Install 4 abstraction facilities for livestock watering	4	Nos	1,335	5,340																					
			Install 4 irrigation facilities with treadle pumps	4	Nos	858	3,432																					
<b>Enhancement of Irrigation</b>																												
2.8.2	Enhancement of rain fed agriculture	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Establish 288 rain water harvesting technologies for irrigation	288	Nos	3,571	1,028,571	15	15	3	11.5	\$3,350,480	\$16,071	\$80,357	\$10,714	\$205,357	\$3,662,980	\$1,282,043	\$1,098,894	\$549,447	\$366,298	\$366,298	Availability of x new irrigation schemes, number of ha additionally irrigated, number of farmers who carry out soil / water conservation methods	Kyoga WMZ, CMC, DNRO, DEO, DAO, DWO	60	0.25	1	0.2
			Provide 150 treadle pumps	150	Nos	429	64,286																					
			80 sprinkler irrigations	80	Nos	9,426	754,080																					
			Establish 2 valley tanks with irrigation equipment	2	Nos	35,714	71,429																					
			90 underground tanks with pipes and pumps,	90	Ls	10,714	964,286																					
			2 rock and runoff harvesting facilities into underground tanks with pumps and	2	Ls	12,857	25,714																					
			2 GFS with equipment (20 ha per system)	40	Ha	5,785	231,400																					
			Provide short-term and drought resistant crops for 18 villages	18	Nos	7,143	128,571																					
			Mulching for 5 villages	5	Nos	3,571	17,857																					
			6 demonstrations	6	Nos	10,714	64,286																					
			6 sensitisations (100 people per sensitisation)	600	Pple																							
Train 550 farmers on irrigation and soil / water conservation	550	Pple																										
2.8.5	Construction of new irrigation schemes: Low - power pumped schemes that utilize water from nearby rivers, swamps and lakes	Bulambuli, Amudat, Kapchorwa, Nakapiripirit, Soroti, Serere, Ngora, Kumi, Katakwi, Bukedea	Construct 29 schemes (1 ha per scheme)	29	Ha	5,976	173,304	18	13.5	7.2	2	\$173,304	\$19,286	\$72,321	\$25,714	\$35,714	\$326,340	\$163,169.86	\$163,169.86	Availability of 29 new irrigation schemes, number of farmers profiting from the new schemes, number of ha irrigated	Kyoga WMZ, CMC, DNRO, DEO, DAO, DWO	24	0.75	0.75	0.4			
			Construct 24 GFS (5 ha per scheme)	120	Ha	5,785	694,200																					
2.8.6	Construction of new irrigation schemes: Simple gravity - fed schemes	Bulambuli, Sironko, Napak, Kapchorwa, Nakapiripirit, Bukwo, Katakwi, Bukedea, Kween	Construct 2 sprinkler irrigation schemes (10 ha per scheme)	20	Ha	8,296	165,920	18	13.5	7.2	2	\$943,080	\$19,286	\$72,321	\$25,714	\$35,714	\$1,096,116	\$548,058	\$548,058	Availability of 24 GFS irrigation schemes, number of farmers profiting from the new schemes, number of ha irrigated	Kyoga WMZ, CMC, DNRO, DEO, DAO, DWO	24	0.75	0.75	0.4			
			Construct 2 rock catchment based schemes (5 ha per scheme)	10	Ha	8,296	82,960																					
			Carry out feasibility studies for 82 irrigation schemes	82	Nos																							
2.8.3	New irrigation schemes: Undertake feasibility studies of identifies areas	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora					12	12	6	0	\$0	\$12,857	\$64,286	\$21,429	\$0	\$98,571	\$98,571			Number and type of schemes proposed in the feasibility studies	Kyoga WMZ, CMC, DNRO, DEO, DAO, DWO	12	1.00	1	0.5			
2.8.7	Construction of new irrigation schemes: Type A Formal Irrigation	Serere, Bukwo	Construct 3 irrigation schemes	60	Ha	5,976	358,560	6	6	1.2	1	\$358,560	\$6,429	\$32,143	\$4,286	\$17,857	\$419,274		\$251,565	\$167,710	Availability of 3 Type A irrigation schemes, number of farmers profiting from the new schemes, number of ha irrigated	Kyoga WMZ, CMC, DNRO, DEO, DAO, DWO	24	0.25	1	0.2		

2.8.4	Construction of new irrigation schemes: Improved (seasonal) wetlands schemes	Bulambuli, Amudat, Kapchorwa, Nakapiripirit, Soroti, Serere, Ngora, Kumi, Katakwi, Bukedea,	Construct 36 irrigation schemes	720	Ha	5,976	4,302,720	18	9	5.4	2	\$4,514,645	\$19,286	\$48,214	\$19,286	\$35,714	\$4,637,145			\$2,782,287	\$1,854,858	Availability of x irrigation schemes, number of farmers profiting from the new schemes, number of ha irrigated	Kyoga WMZ, CMC, DNRO, DEO, DAO, DWO	24	0.75	0.5	0.3			
			Construct 1 GFS	5	Ha	5,785	28,925																							
			Construct 4 valley dams	40000	m <sup>3</sup>	5	180,000																							
			Construct irrigation channels for 6 km	6	Km	500	3,000																							
<b>Water Use Efficiency</b>																														
2.9.1	Water efficiency evaluation and recommendations	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Water efficiency evaluation and recommendations	1	Ls			6	6	1.8	1	\$0	\$6,429	\$32,143	\$6,429	\$17,857	\$62,857				\$62,857		Evaluation report	Kyoga WMZ, CMC, consultant	12	0.50	1	0.3		
<b>Small Hydropower</b>																														
2.10.1	Investment and implementation in hydropower installations and grid distribution	Bulambuli, Sironko, Kapchorwa, Nakapiripirit, Ngora, Kumi, Katakwi, Kween	Construction of 8 dams	8000	Kw	\$4,200	\$33,600,000	24	12	7.2	0	\$33,600,000	\$25,714	\$64,286	\$25,714	\$0	\$33,715,714				\$16,857,857	\$16,857,857	Availability of x new power supply lines, number of people connected to the new grid lines	Kyoga WMZ, CMC	24	1.00	0.5	0.3		
			Extensions of electricity lines for 149 km																											
<b>Alternative Energy Supply</b>																														
2.11.2	Promote use of energy efficient woodstoves by making the technology readily available	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Train 1,430 persons on woodstove making and equip them	1430	Pple		0	18	4.5	3.6		\$7,500	\$19,286	\$24,107	\$12,857	\$773,214	\$836,964	\$502,179	\$167,393	\$167,393		Number of people using the new woodstoves	Kyoga WMZ, CMC, DNRO, DEO, DFO	36	0.50	0.25	0.2			
			Construct 21 woodstoves	21	Nos	357	7,500																							
			Carry out 29 sensitisations / demonstrations (100 people per sensitisation)	2900	Pple																									
2.11.1	Promote additional and alternative sources of energy including low cost solar panels to be used for LED lighting, radios and cell phones	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	392 solar panels, incl distribution	392	Units	150	58,800	18	9	5.4	4.42	\$109,400	\$19,286	\$48,214	\$19,286	\$78,929	\$275,114				\$165,069	\$55,023	\$55,023	Number of people using the new energy sources according to type	Kyoga WMZ, CMC, DNRO, DEO, DFO	36	0.50	0.5	0.3	
			26 windturbins	26	Units	600	15,600																							
			40 radios	40	Nos	321	12,857																							
			40 cellphones	40	Nos	179	7,143																							
			Train 42 persons in biogas digester making	42	Pple																									
			Construction of 42 biogas units	42	Units	357	15,000																							
<b>Aquaculture</b>																														
2.12.1	Develop a manual on aquaculture techniques (building on available material)	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Develop a manual on aquaculture techniques	1	Ls			3	3	0.6	0	\$0	\$3,214	\$16,071	\$2,143	\$0	\$21,429	\$21,429					Availability and use of manual in each district	Kyoga WMZ, CMC, Consultant	12	0.25	1	0.2		
2.12.2	Assist farmers with rehabilitation of viable aquaculture ponds and in the construction of new ponds - allowance made for a pilot	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Construct 39 new fish ponds (5 x 5 x 2 m)	3900	m <sup>3</sup>	12	44,850	18	9	7.2	0.66	\$103,232	\$19,286	\$48,214	\$25,714	\$11,786	\$208,232				\$104,116	\$62,470	\$41,646	Availability of x numbers of fish ponds, number of beneficiaries from the fish ponds	Kyoga WMZ, CMC, DNRO, DEO, DAO	36	0.50	0.5	0.4	
			Rehabilitate 27 fish ponds	2700	m <sup>3</sup>	6	15,525																							
			Establish 1 fish breeding centre	1	Nos	17,857	17,857																							
			Pilot 1 fish cage farming	1	Nos	25,000	25,000																							
			Train 66 farmers on the management of fish ponds	66	Nos																									
2.12.3	Train and assist farmers on the appropriate fishing techniques and equipment as well as the protection of breeding grounds	Bulambuli, Napak, Soroti, Serere, Ngora, Kumi, Bukedea, Kween	Train 370 fishermen on appropriate fishing techniques and equip them	370	Nos			6	6	1.2	3.7	\$0	\$6,429	\$32,143	\$4,286	\$66,071	\$108,929	\$54,464.29	\$54,464.29				Number of fishermen trained, number of fishing grounds protected	Kyoga WMZ, CMC, DNRO, DEO, DAO	24	0.25	1	0.2		
<b>Socio-economic Strengthening</b>																														
2.13.1	Create an ecological tourism organisation, train it and provide the necessary starting equipment e.g a boat	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Form and train 23 ecological tourism organisations (10 people per organisation)	230	Nos			24	12	7.2	2.69	\$1,372,227	\$25,714	\$64,286	\$25,714	\$48,036	\$1,535,977				\$614,391	\$614,391	\$153,598	\$153,598	Number of ecological tourism organisations trained, number of tourists visiting the sites Baseline: 0	Kyoga WMZ, CMC, DNRO, DEO, CDO	48	0.50	0.5	0.3
			Establish an office / information centre for each organisation	23	Nos	10,714	246,429																							
			Train 39 guides	39	Nos																									
			Construct 9 bandas	9	Nos	7,143	64,286																							
			Establish 17 campsites with the necessary equipment	17	Nos	28,571	485,714																							
			Establish 7 restaurants with equipment	7	Lots	28,571	200,000																							
			Establish 3 art and craft centres	3	Lots	21,429	64,286																							
			Provide 31 binoculars	31	Nos	170	5,270																							
			Procure 53 life jackets	53	Nos	357	18,929																							
			Procure 7 cameras	7	Nos	200	1,400																							
			Procure 4 guide books	4	Nos	50	200																							
			Procure 15 boats	15	Nos	17,857	267,857																							
			Procure 1 abseiling equipment	1	Nos	17,857	17,857																							
2.13.2	Promote horticulture	Bulambuli, Amudat, Napak, Kapchorwa, Nakapiripirit, Soroti, Serere, Ngora, Kumi, Bukwo, Katakwi, Bukedea, Kween	Train 778 farmers and equip them with the necessary tools incl. seeds	1	Lot	17,857	17,857	24	18	9.6	7.78	\$53,571	\$25,714	\$96,429	\$34,286	\$138,929	\$348,929				\$139,571	\$104,679	\$69,786	\$34,893	Number of acres under horticulture Baseline 0, number and type of products harvested	Kyoga WMZ, CMC, DAO	48	0.50	0.75	0.4
Establish 10 demonstration plots, 12 greenhouses, irrigation pumps, treadle pumps, pipes, fencing	1	Lot	35,714	35,714																										



Social and Institutional Development																																	
Monitoring																																	
4.1.1	Monitoring stations must be maintained and regularly calibrated. Gauge readers need to be trained and check mechanisms introduced to ensure stability and consistency in data	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Assessment of the monitoring stations, rehabilitation of the stations if necessary, training of gauge readers, regular data collection / monitoring, data analysis and appropriate data storage	1	Lot				15	3.75	3	1	\$0	\$16,071	\$20,089	\$10,714	\$17,857	\$64,732	\$25,893	\$19,420	\$6,473	\$6,473	\$6,473	Number of monitoring stations regularly rehabilitated and calibrated, data bases regularly updated	Kyoga WMZ, DWRM, CMC	60	0.25	0.25	0.2				
4.1.2	Expand, rehabilitate, and improve the water quality, evaporation, rainfall, ground water and stream-flow monitoring network systems and lake and wetland water level monitoring gauges. Implement sedimentation monitoring	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Assessment of the water quality, evaporation, rainfall, groundwater and streamflow monitoring network and water level monitoring gauges, rehabilitation or expansion of stations if necessary, regular data collection / monitoring, data analysis and appropriate data storage, set up a sedimentation monitoring network	1	Lot				15	3.75	3	1	\$0	\$16,071	\$20,089	\$10,714	\$17,857	\$64,732	\$25,893	\$19,420	\$6,473	\$6,473	\$6,473	Reviewed and expanded monitoring network is in place	Kyoga WMZ, DWRM, CMC	60	0.25	0.25	0.2				
4.1.3	Monitor surface and ground water use and levels to prevent over-exploitation	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Regular surface and groundwater monitoring, inventory of water users, monitoring and follow up of water abstraction permits	1	Lot				15	3.75	3	1	\$0	\$16,071	\$20,089	\$10,714	\$17,857	\$64,732	\$12,946	\$12,946	\$12,946	\$12,946	\$12,946	Number and type of water resources investments using data from the monitoring networks	Kyoga WMZ, DWRM, CMC	60	0.25	0.25	0.2				
Extension Services																																	
4.2.1	Train a committed cadre of extension service providers to render inter-disciplinary, integrated extension service to include CMCs, CDOs etc.	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Train extension service providers to render inter-disciplinary, integrated services	100	Pple				6	1.5	1.2	2	\$0	\$6,429	\$8,036	\$4,286	\$35,714	\$54,464				\$27,232	\$27,232	Number of persons trained, number and type of activities carried out by the persons trained	Kyoga WMZ, CMC, consultant	24	0.25	0.25	0.2				
4.2.2	Develop support materials for use by extension officers (building on currently available materials)	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Develop support materials for the extension officers	160	Copies	18	2,880		3	0.75	0.6	1	\$2,880	\$3,214	\$4,018	\$2,143	\$17,857	\$30,112			\$30,112			Number and kind of support materials readily developed and disseminated to each district	Kyoga WMZ, CMC, consultant	12	0.25	0.25	0.2				
Awareness Raising																																	
4.3.5	Introduction of awareness raising programmes in schools	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Establish 121 environmental clubs (15 people per club)	1815	Nos				12	12	2.4	38.95	\$67,857	\$12,857	\$64,286	\$8,571	\$695,536	\$849,107		\$339,643	\$169,821	\$169,821	\$169,821	Number and type of activities carried out in x schools	Kyoga WMZ, CMC, DNRO, DEO, DEdO	48	0.25	1	0.2				
			Establish 50 drama clubs (15 people per club)	750	Nos																												
			Establish 4 demo schools	200	Nos																												
			Carry out 58 awareness raising campaigns (50 people per campaign)	580	Nos																												
			Train teachers in 75 schools (10 people per school)	750	Nos																												
			Provide IEC material for 38 schools	38	Lot	1,786	67,857																										
4.3.1	Develop training guidelines and awareness raising materials (building on currently available materials)	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Develop training guidelines and awareness raising materials	1	Lot				6	6	1.8	2	\$0	\$6,429	\$32,143	\$6,429	\$35,714	\$80,714	\$80,714						Number and type of training guidelines and awareness raising materials available in all districts	Kyoga WMZ, CMC, consultant	12	0.50	1	0.3			
4.3.2	Introduction of a community radio programme dedicated to environmental matters	Bukwo, Kween, Bulambuli, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Establish 4 radio stations						1	Lot	357,143	357,143	15	3.75	3	4	\$357,143	\$16,071	\$20,089	\$10,714	\$71,429	\$475,446	\$237,723	\$95,089	\$47,545	\$47,545	\$47,545	Availability of x radio stations, number and type of environmental radio programmes aired out	Kyoga WMZ, CMC, DNRO, DEO, DCO	60	0.25	0.25	0.2
			Establish environmental programmes: 5 x general, 1 x per month: 2 x, 2 x per month: 1 x, 1 x per week: 2 x, 3 x per week: 2 x, radio talk shows and spot messages: quarterly: 2 x, weekly:																														
			Establish 3 radio listening clubs																														
			Provision of IEC material for dissemination																														
4.3.4	Implement demonstration projects - schools, model farms etc.	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Establish 84 model farms	84	Nos	7,143	600,000	27	13.5	8.1	8.6	\$719,085	\$28,929	\$72,321	\$28,929	\$153,571	\$1,002,835										Availability of x model farms, ratio of number of products planted to harvested	Kyoga WMZ, CMC, DNRO, DEO, DAO, DEdO	36	0.75	0.5	0.3	
			Establish woodlots in 16 schools (2 ha per woodlot)	32	Ha	3,372	107,888																										
			Nurseries in 22 schools (0.2 ha per nursery)	4.4	Ha	1,733	7,625																										
			Rehabilitate a poultry and piggery in 1 school	1	Ls	3,571	3,571																										
	Form and train 43 young farmers associations (20 people per association)	860	Pple																														

4.3.3	Sanitation project. Demonstration of ecosan and other sanitation systems. Provision of appropriate designs and training in construction. Support with provision of materials	Bukwo, Kween, Bulambuli, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Construct 61 5stance VIP latrines	61	Nos	6,000	366,000	27	20.25	10.8	40.25	\$517,686	\$28,929	\$108,482	\$38,571	\$718,750	\$1,412,418	\$564,967	\$564,967	\$282,484	Number and type of demonstration toilets constructed, number of well maintained clean toilets	Kyoga WMZ, CMC, DNRO, DEO, DWO	36	0.75	0.75	0.4	
			Construct 34 ecosan toilets	34	Nos	3,600	122,400																				
			Construct 16 rubbish skips	16	Nos	714	11,429																				
			Carry out 44 awareness raising campaigns (50 people per campaign)	2200	Nos																						
			Train households on waste management and disposal in 8 villages (100 people per village)	800	Nos																						
			Form and train 16 sanitation groups (20 people per group)	320	Nos																						
			Form and train 24 committees on ecosan toilets (10 people per committee)	360	Nos																						
			Form and train 23 committees on management, operation and maintenance of latrines (10 people per committee)	345	Nos																						
Carry out 1 study on collapsable soil to find the most appropriate toilet system	1	Ls	17,857	17,857																							
<b>Institutional Capacity Building</b>																											
4.4.1	Train experts (import expertise) in the development of technology guidelines, training and other approaches	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Train experts in the development of technology guidelines, training and other approaches	100	Nos			2	1.5	0.3	1	\$0	\$1,607	\$8,036	\$1,071	\$17,857	\$28,571				\$28,571	Availability of technology guidelines in each district	Kyoga WMZ, CMC, consultant	6	0.25	1	0.2
4.4.2	Enhance and strengthen the capacity of BMUs	Serere, Soroti, Ngora, Kumi, Katakwi, Bukedea	Form or reactivate 23 BMUs (20 people per BMU)	460	Nos			6	6	1.8	18.37	\$21,429	\$6,429	\$32,143	\$6,429	\$328,036	\$394,464	\$197,232	\$197,232		Number of BMU members trained, number and type of activities carried out by the BMUs	Kyoga WMZ, CMC, DNRO, DEO, DAO	24	0.25	1	0.3	
			Train 227 BMU members	227	Nos																						
			Sensitise 23 communities (50 people per community)	1150	Nos																						
			Establish 4 BMU shelters	4	Nos	5,357	21,429																				
4.4.3	Enhance and strengthen the capacity of rice grower associations	Bulambuli, Nakapiripirit, Soroti, Serere, Ngora, Kumi, Katakwi, Bukedea, Kween	Form 39 rice grower associations (15 people per association)	585	Nos			9	9	2.7	17.35	\$723,214	\$9,643	\$48,214	\$9,643	\$309,821	\$1,100,536		\$440,214	\$440,214	\$220,107	Number of persons trained, number and type of activities carried out by the rice grower associations	Kyoga WMZ, CMC, DNRO, DEO, DAO	36	0.25	1	0.3
			Train 500 rice grower association members	500	Nos																						
			Carry out 12 awareness raising campaigns (50 people per campaign)	600	Nos																						
			2 exchange visits to established associations (25 people per visit)	50	Nos																						
			Construct processing centres with rice mills, storage facilities, rice haulers	10	Lot	71,429	714,286																				
			Provide seeds	1	Lot	7,143	7,143																				
Develop training material	1	Lot	1,786	1,786																							
<b>Legislation and Enforcement</b>																											
4.5.1	Strengthen enforcement bodies with capacity	Amudat, Napak	Train and enforce environmental committees (3), law enforcement bodies (3) (police, UWA, LDUs) and community LCs on environmental law enforcement,	110	Ls		0	6	3	1.2	1.1	\$0	\$6,429	\$16,071	\$4,286	\$19,643	\$46,429	\$27,857	\$18,571		Number of persons trained, number of law enforcement activities carried out	Kyoga WMZ, CMC, DNRO, DEO, Env. police	24	0.25	0.5	0.2	
			Train police in environmental affairs, increase of no. of environmental police in Napak																								
4.5.2	Develop by - laws and ordinances on water and environmental management and protection	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Develop by - laws and ordinances on water and environmental management and protection	1	Ls		0	3	3	0.6	1	\$0	\$3,214	\$16,071	\$2,143	\$17,857	\$39,286	\$39,286			Availability of by - laws, ordinances on water and environmental management and protection, 20 % reduction of environmental related offences	Kyoga WMZ, CMC, consultant	12	0.25	1	0.2	
<b>Total</b>												<b>\$87,337,247</b>	<b>\$965,893</b>	<b>\$2,778,348</b>	<b>\$1,066,071</b>	<b>\$9,528,750</b>	<b>\$101,676,309</b>	<b>\$15,256,960</b>	<b>#####</b>	<b>\$18,550,860</b>	<b>\$27,389,109</b>	<b>\$20,081,538</b>					



REPUBLIC OF UGANDA  
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DIRECTORATE OF WATER RESOURCES MANAGEMENT  
KYOGA WATER MANAGEMENT ZONE

