



Ministry of Water and Environment
Directorate of Water Resources Management
Kyoga Water Management Zone



Awoja
Catchment Management Plan

FOREWORD



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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 environmental degradation and ensure more efficient utilization of water resources to meet various social and economic demands.

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 resource. 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 the lead agency for implementation of Catchment based Water Resources Management (CbWRM) in Uganda, my ministry through the Directorate of Water Resources Management (DWRM) 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 socio-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 pursued in the short, medium and long term up to the year 2040.

Awoja Catchment Management Plan was the first to be developed following the Uganda Catchment Planning Guidelines of 2014 and was endorsed by the Awoja Catchment Management Committee (CMC) in may 2015.

My Ministry is therefore pleased to formally make this 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, the 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 related resources for prosperity.

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

For God and My Country

ACKNOWLEDGEMENT

I would like to thank the Directorate of Water Resources Management for spearheading the preparing of Catchment Management Plans in Uganda. This is a stakeholders 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 the Kyoga Water Management Zone for coordinating the plan preparation process and the Awoja Catchment Management Organisation 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 through the Water Management and Development Project for providing the funding that enabled preparation and printing of this CMP.



Alfred Okot Okidi

Permanent Secretary,
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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 living 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 Awoja Catchment with 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

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.

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 (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
No	3. Mitigation and Adaptation (Floods, Droughts and Landslides)
3.1	Flood management and preparedness for floods
3.2	Construction of infrastructure for flood control
3.3	Cattle keeping practices
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

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, atleast every five years to suit other administrative planning cycles.

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ACRONYMS AND ABBREVIATIONS

ACF	Action Contre le Faim (Action Against Hunger)
ACTED	Agency for Technical Cooperation and Development
ARC2	African Rainfall Climatology model version 2
asl	Above Sea Level
ASM	Artisanal and small-scale mining
AWMZ	Albert Water Management Zone
BOD	Biochemical oxygen demand
CAO	Chief Administrative Officer
CBO	Community Based Organization
CbWRM	Catchment based Water Resources Management
CCU	Climate Change Unit
CFM	Collaborative Forest Management
CIS	Community Information System
cm	Centimetre
CMC	Catchment Management Committee
CMO	Catchment Management Organisation
CMP	Catchment Management Plan
CMS	Catchment Management Secretariat
CSF	Catchment Stakeholder Forum
CSO	Civil Society Organisation
CTC	Catchment Technical Committee
DDP	District Development Plan
DEA	Directorate of Environmental Affairs
DESS	Department of Environmental Support Services
DHD	District Health Department
DIO	District Information Officer
DOM	Department of Meteorology
DPO	District Production Officer
DWD	Directorate of Water Development
DWO	District Water Officer
DWRM	Directorate of Water Resources Management
DWSSC	District Water and Sanitation Coordination Committee
ENRM	Environmental Natural Resources Management
FAO	Food and Agriculture Organization of the United Nations
FDGs	Focus Group Discussion
FEWS	Flood Early Warning System
FIETS	Financial, Institutional, Environmental, Technical and Social
FSSD	Forestry Sector Support Department
GIS	Geo-Information System
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
ha	Hectare
IP	Implementation Plan
IUCN	International Union for Conservation of Nature
IWRM	Integrated Water Resources Management
JICA	Japan International Cooperation Agency
KIDDP	Karamoja Integrated Disarmament and Development Programme
km ²	Square Kilometre
KUWS	Karamoja Umbrella of Water and Sanitation
KWMZ	Kyoga Water Management Zone
l	Litre
LC	Local Council
LCB	Local Capacity Builders
LED	Local Economic Development
LLG	Lower Local Government
LSM	Large-scale mining
M&E	Monitoring and Evaluation
MAAIF	Ministry of Agriculture Animal Industry and Fisheries
masl	Metres Above Sea Level
MCM	Million Cubic Metre
MEMD	Ministry of Energy and Mineral Development
MLG	Ministry of Local Government

mm	Millimetre
Mm ³	Million cubic meters
MOFED	Ministry of Finance, Planning and Economic Development
MOH	Ministry of Health
MoU	Memorandum of Understanding
Mt	Metric ton
MTI	Ministry of Tourism and Industry
MTTI	Ministry of Tourism, Trade and Industry
MWE	Ministry of Water and Environment
MWT	Ministry of Works and Transport
n.a.	not applicable
NAADS	National Agricultural Advisory Services
NaFORRI	National Forestry Resources Research Institute
NELSAP	Nile Equatorial Lakes Subsidiary Action Program
NEMA	National Environmental Management Authority
NFA	National Forest Authority
NGO	Non-Governmental Organization
NRDs	Natural Resources Departments
NRM	Natural Resources Management
NWRA	National Water Resources Assessment
NWSC	National Water and Sewerage Corporation
O&M	Operation & Maintenance
OPM	Office of the Prime Minister
PME	Planning, Monitoring and Evaluation
RWTSUs	Regional Wetlands Technical Support Units
SME	Small and Medium Enterprises
SNV	Netherlands Development Organisation
SSEA	Strategic Social and Environmental Assessment
SWAT	Soil and Water Assessment Tool
SWOT	Strength, Weaknesses, Opportunities and Threats
TLU	Tropical Livestock Units
TSU	Technical Support Unit
UBOS	Uganda Bureau of Statistics
UGX	Ugandan Shilling
UNMA	Uganda National Meteorological Authority
UNRA	Uganda National Roads Authority
UNWMZ	Upper Nile Water Management Zone
UOs	Umbrella Organisation
UWA	Ugandan Wildlife Authority
UWASNET	Uganda Water and Sanitation NGO Network
UWS-E	Umbrella of Water and Sanitation East
VSLA	Village Saving and Loan Association
VWMZ	Victoria Water Management Zone
WASH	Water, Sanitation and Hygiene
WfP	Water for Production
WMD	Wetlands Management Department
WMZ	Water Management Zone
WRA	Water Resources Assessment
WSDf-E	Water Sector Development Facility East
WSS	Water Supply Scheme
WSSBs	Water Supply and Sanitation Boards
WUC	Water Users Committee
yr	Year

I INTRODUCTION

1.1 Background to Catchment Planning

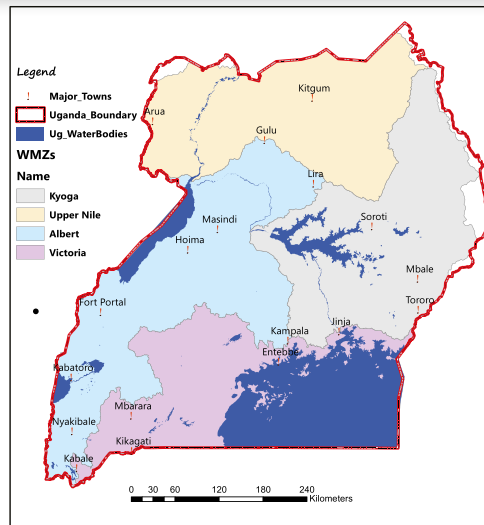


Figure 1.1: Water Management Zones in Uganda

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 has been 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) was 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.

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 respective catchments 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 MikeBasin 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 (km²), is mountainous to the east and drains into a lake region in the west.

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 report has six chapters prepared to ensure 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.

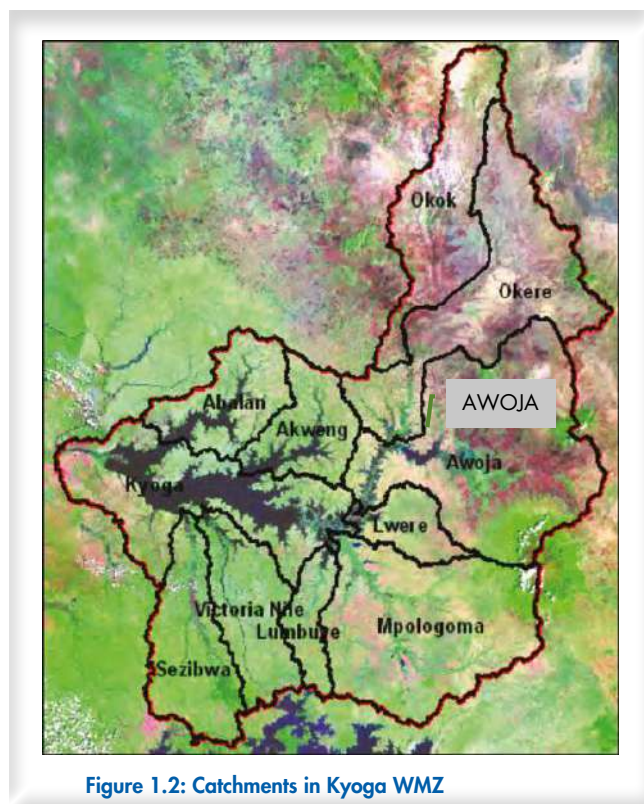


Figure 1.2: Catchments in Kyoga WMZ

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 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.

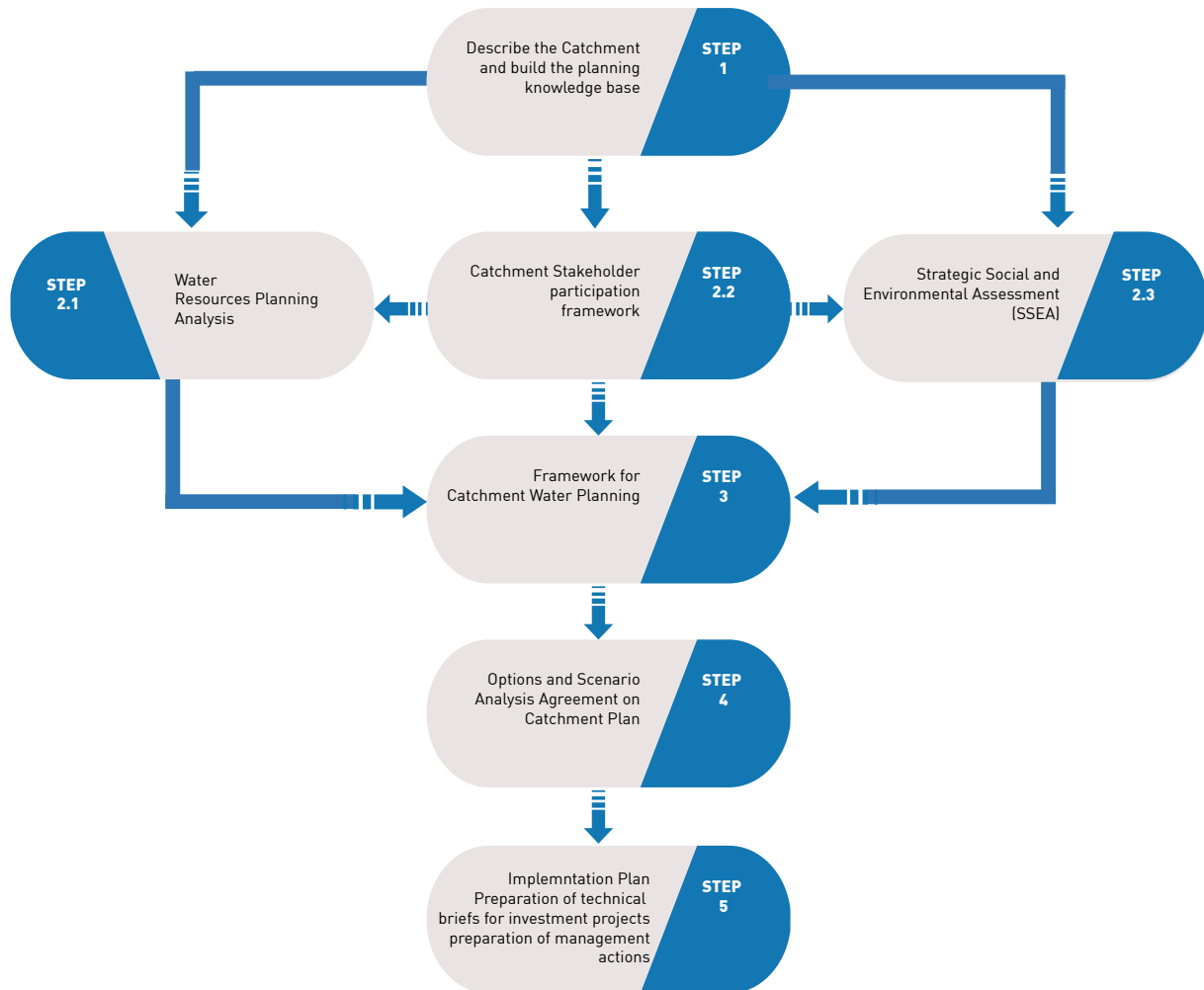


Figure 2.1: The catchment management planning process

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 objective
- 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 **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 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 which provides the process of gathering issues and developing options, assesses and shortlists them, categorises them in terms of the Awoja Catchment objectives, evaluates them with the application of a scenario evaluation with Mike Basin, costing and an off-line multi-criteria screening template. The Options Report 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 INSTITUTIONAL, LEGAL AND POLICY CONTEXT

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 purpose
- 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 Development Plan (NDP II) 2015/16 – 2019/2020.

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 (see Error! Reference source not found.). 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.



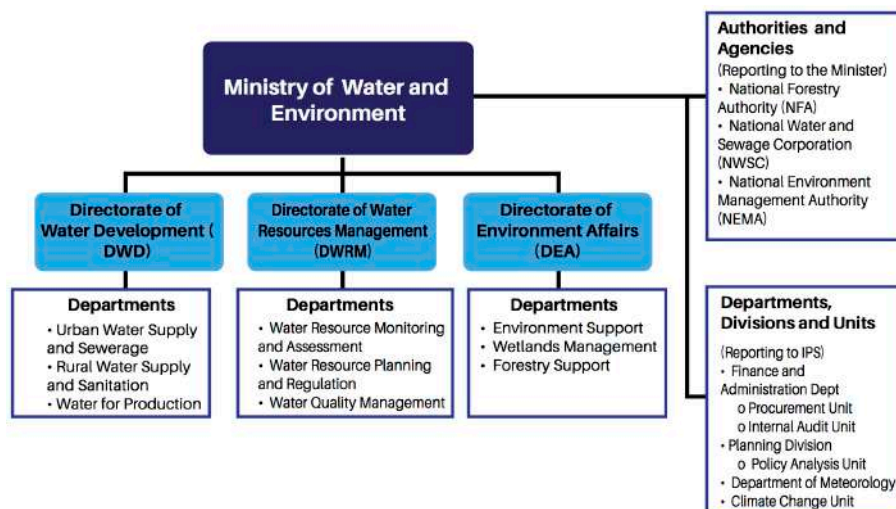


Figure 3.1: Institutional Setup at a National Level (MWE, 2009)

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.

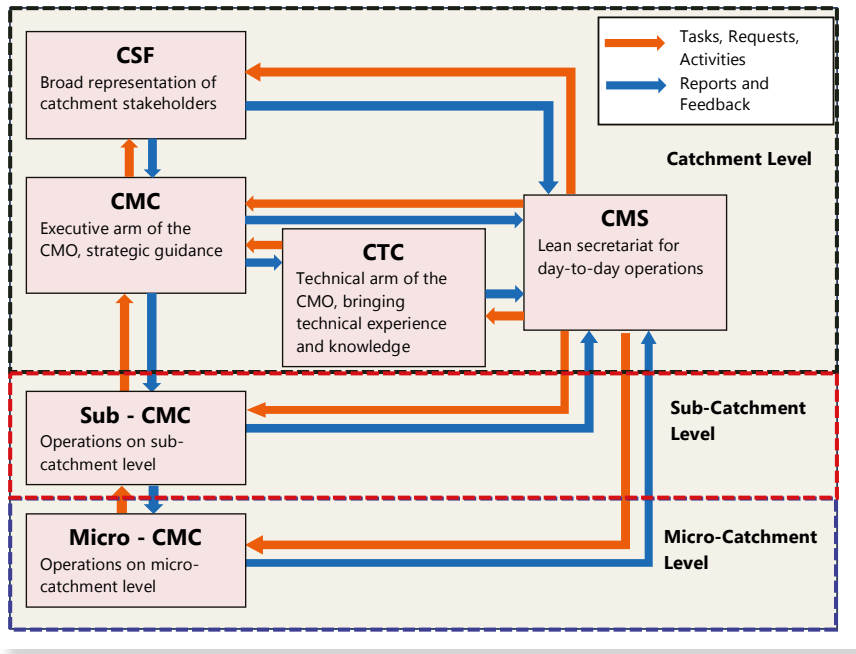


Figure 3.2: Catchment Management Organisation Structure (DWRM)

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.



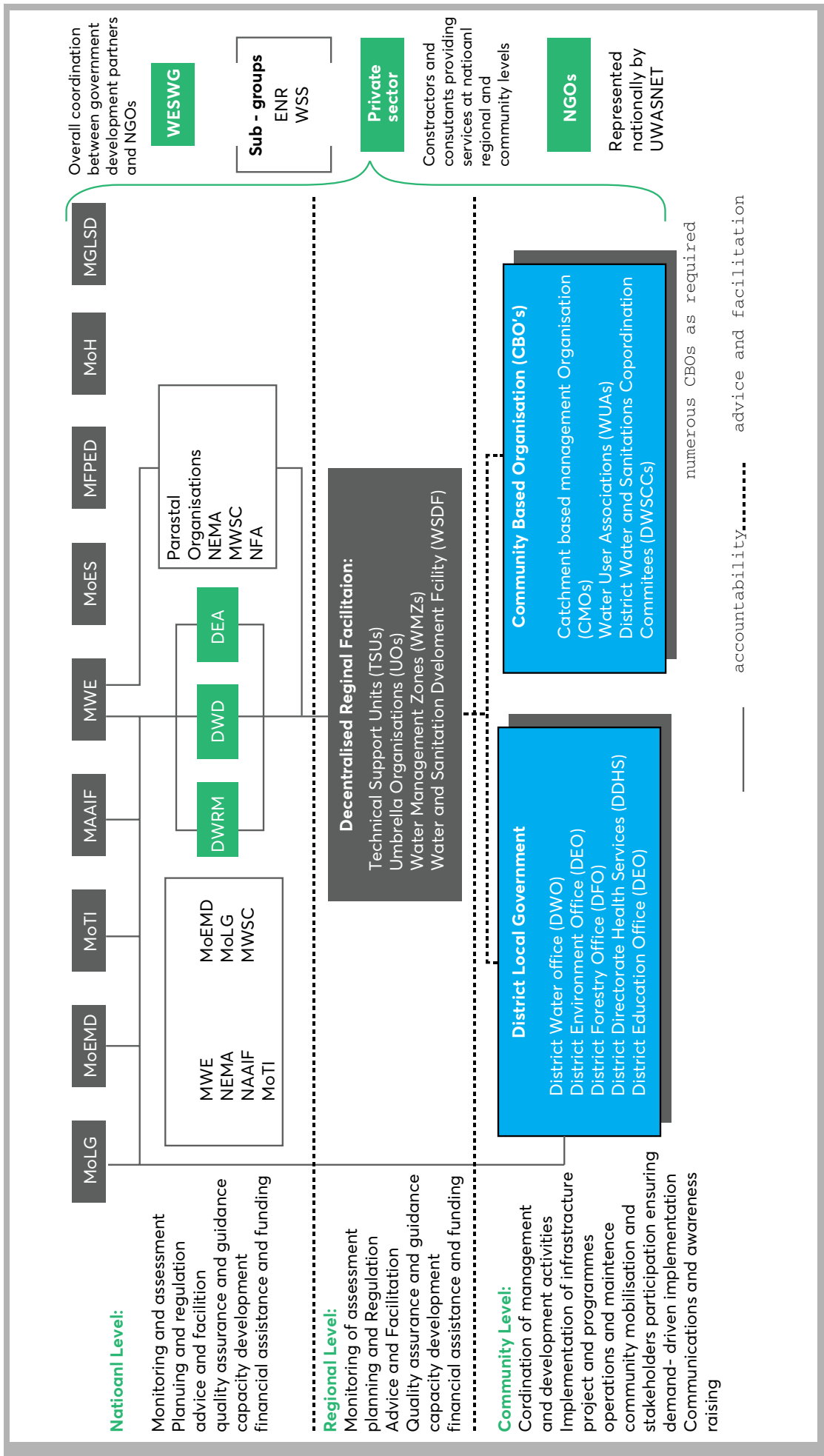


Figure 3.3: An Overview of Uganda's Water and Environment Sector (MWE, 2009)

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: Institutional issues and implications 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 (km²), which is about 19% of the total area of the KWMZ. The Awoja Catchment covers an area consisting of 14 districts (Table 4.1: **Districts fully or partly included in the Awoja Catchment** 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	

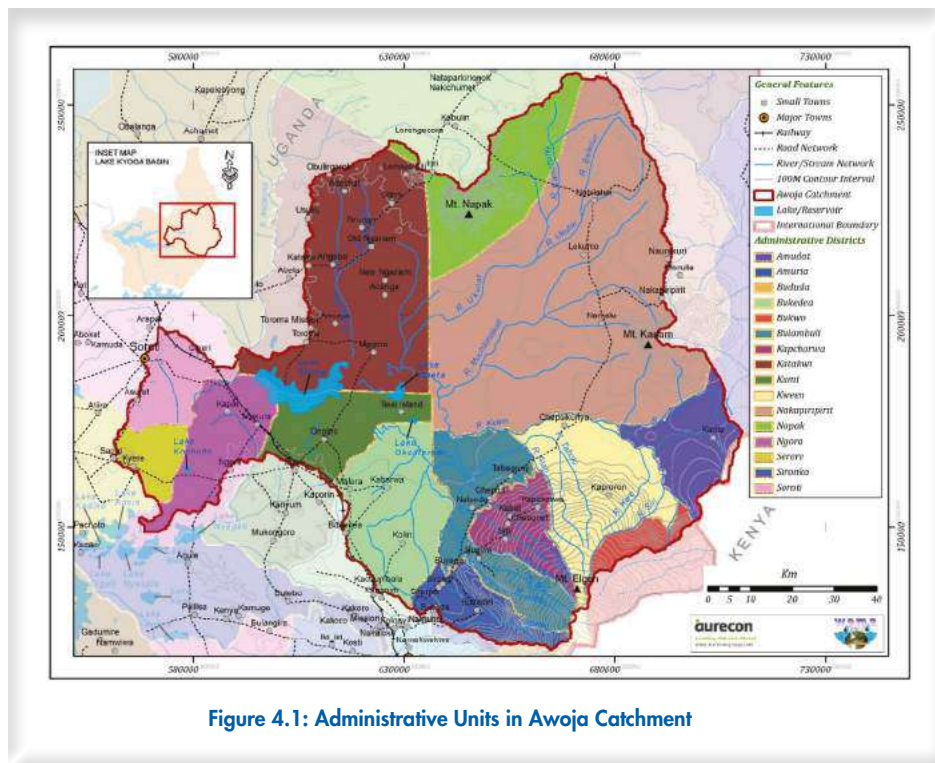


Figure 4.1: Administrative Units in Awoja Catchment

4.1.2 Sub-catchments

Following the hydrological drainage, fourteen sub-catchments were delineated in the Awoja Catchment, Figure 4.2, and named after the major river in each sub-catchment, Table 4.2: Names of Sub-Catchments in Awoja Catchment

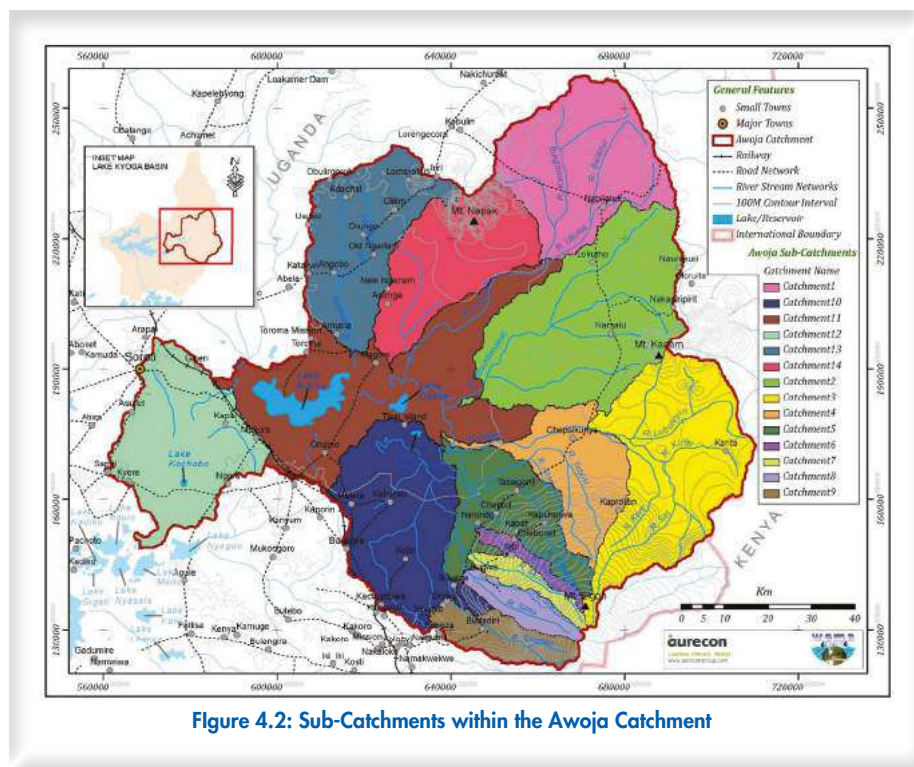


Figure 4.2: Sub-Catchments within the Awoja Catchment

Names of Sub-Catchments in Awoja

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 1
- Sub-catchments 6, 7 and 8 flow into sub-catchment 5, which flows into sub-catchment 1
- Sub-catchment 9 flows into sub-catchment 10, which flows into sub-catchment 1
- Sub-catchment 11 flows into sub-catchment 12

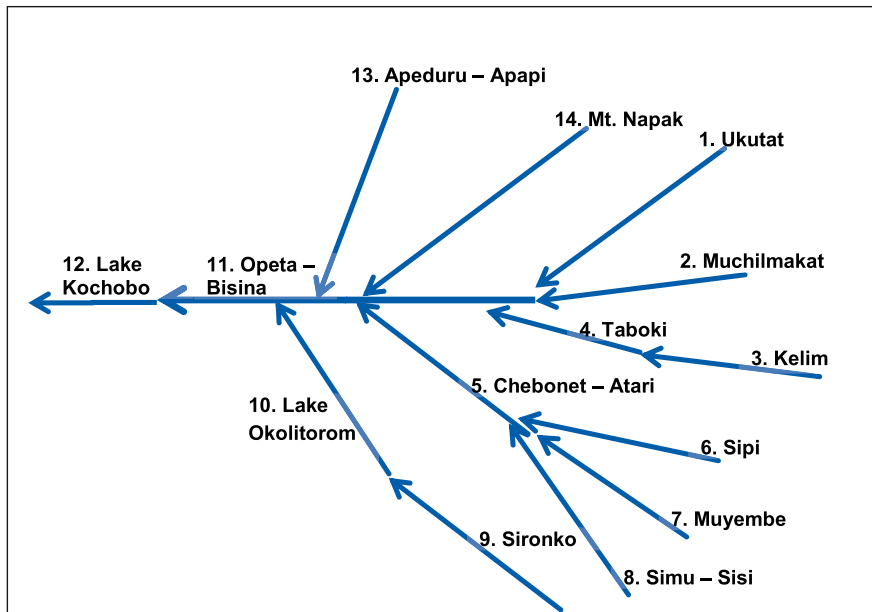


Figure 4.3: Schematic layout of flow between the respective sub-catchments

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

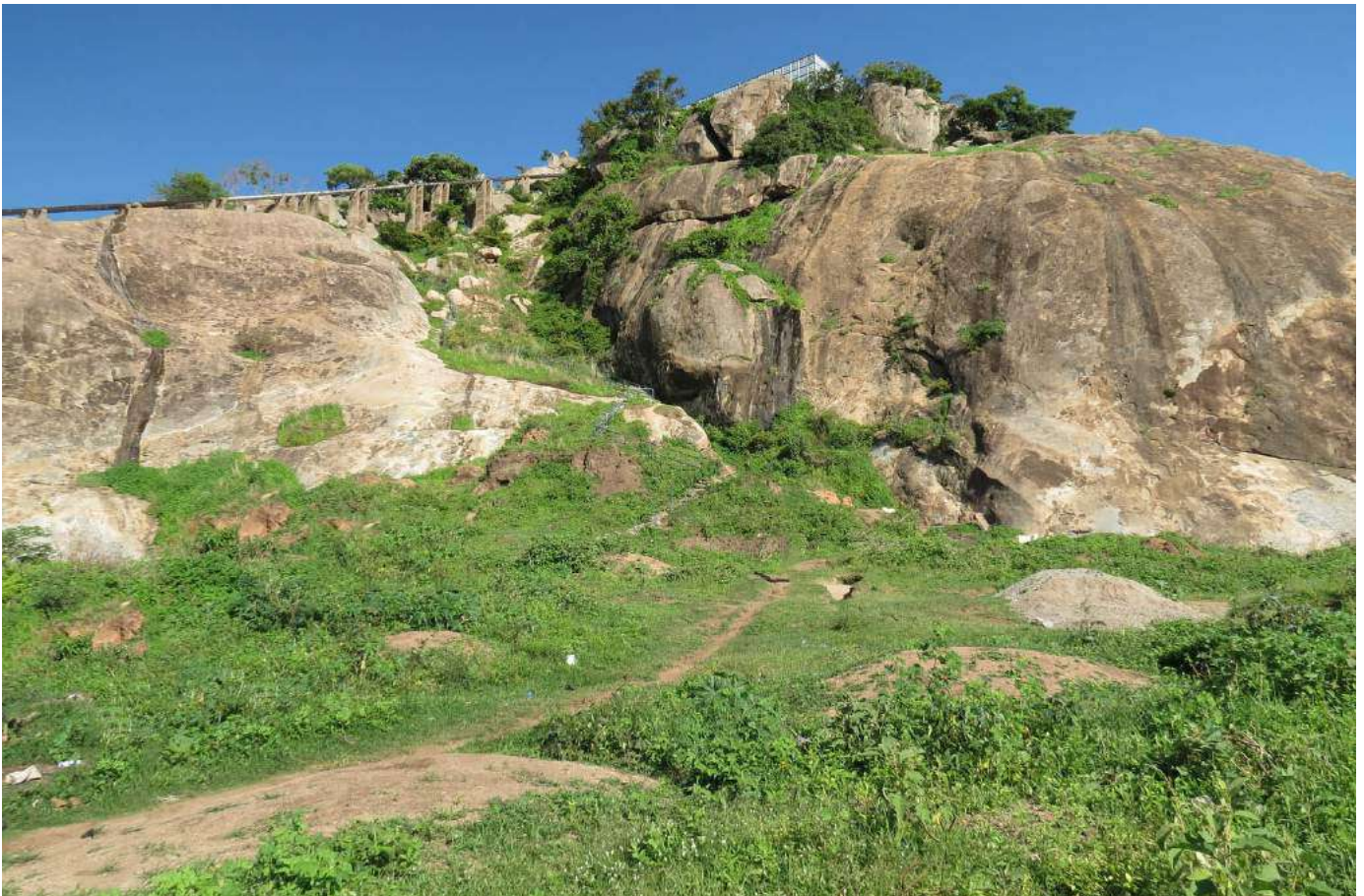
The southern edge of the Awoja Catchment is marked by Mount Elgon at the border of Uganda and Kenya. Mount Elgon includes the highest peak in the area, with an elevation of 4,321m. Mount Kadam (3,063m) lies to the north of Mount Elgon, between the districts of Nakapiripirit and Amudat. Mount Napak (2,537m) 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, volatilisation¹, 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 laterisation², 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 ferrallitic (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.



¹McGraw-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.

²Oxford 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.

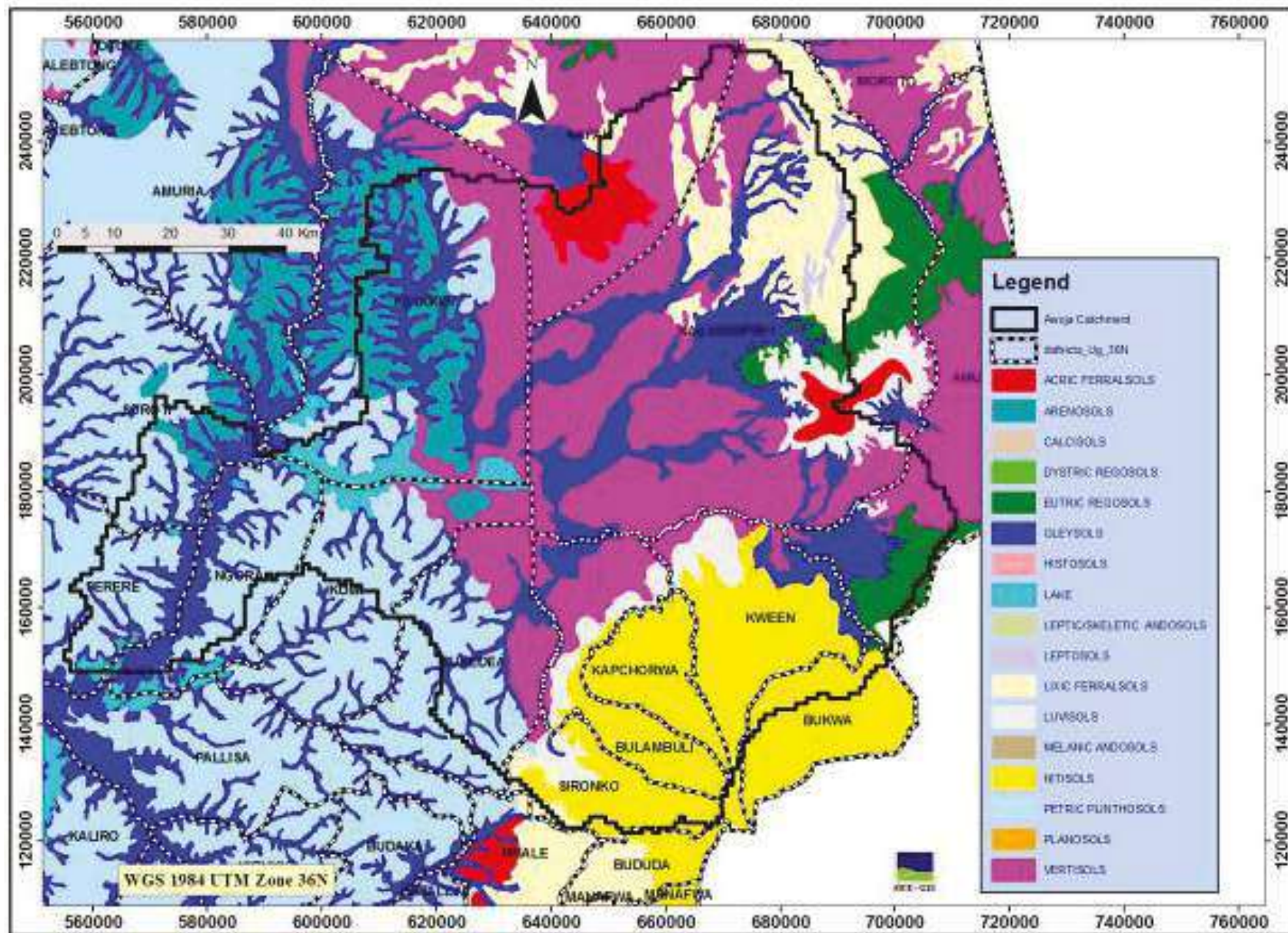


Figure 4.6: Soil Types in the Awoja Catchment

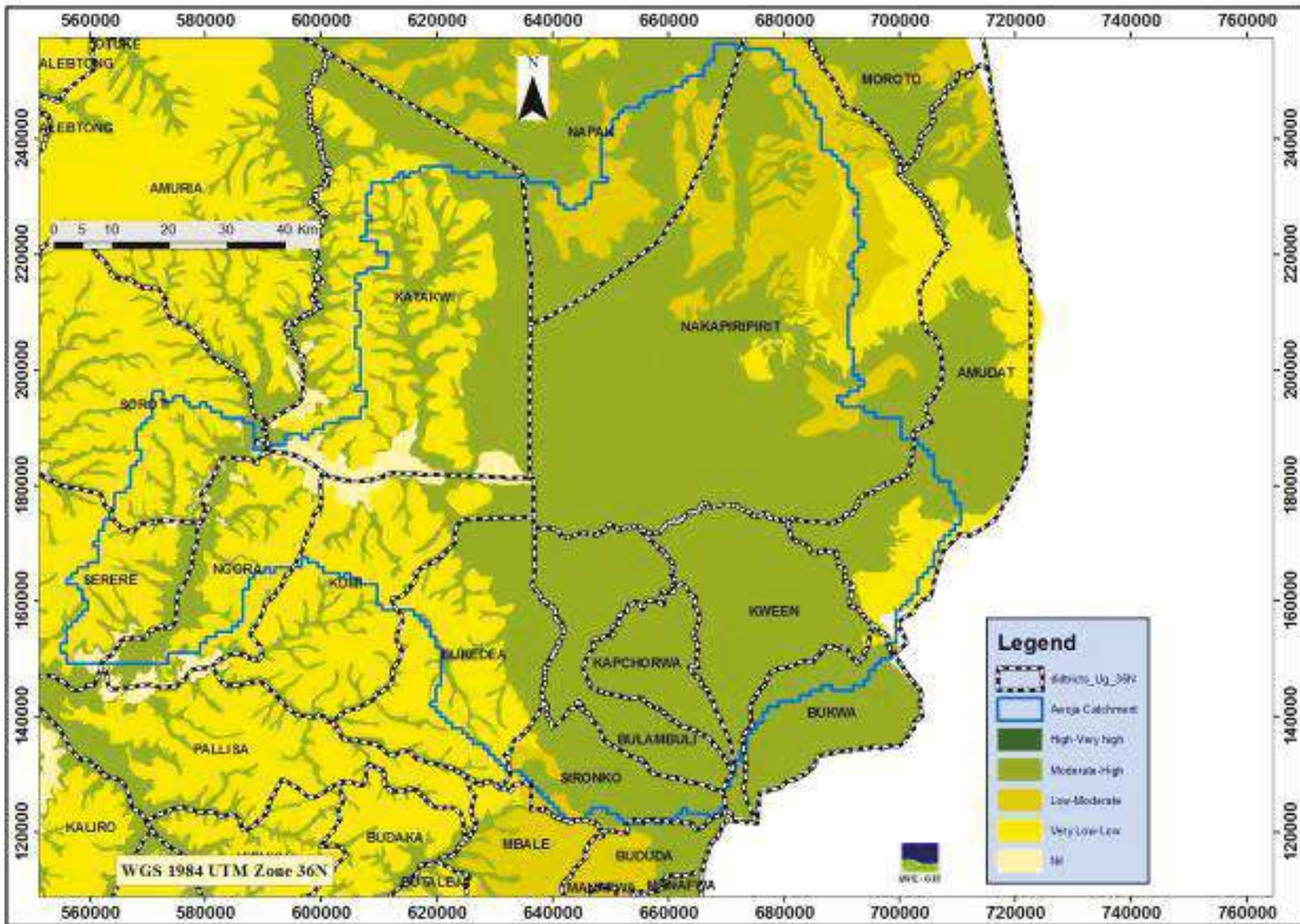


Figure 4.7: Soil Productivity

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

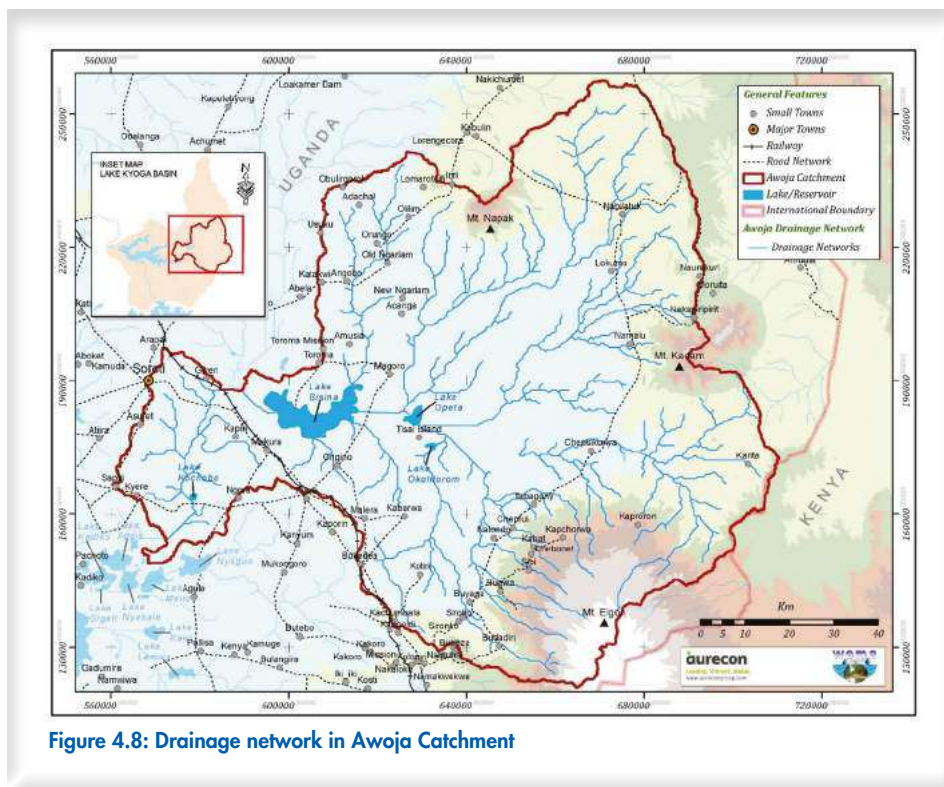
Surface water in the Awoja Catchment constitutes rivers, lakes, wetlands and temporary wetlands. Very limited infrastructure has been constructed for the utilisation of surface water for productive purposes including hydropower generation, domestic and industrial water supply, irrigation, and for accommodating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



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

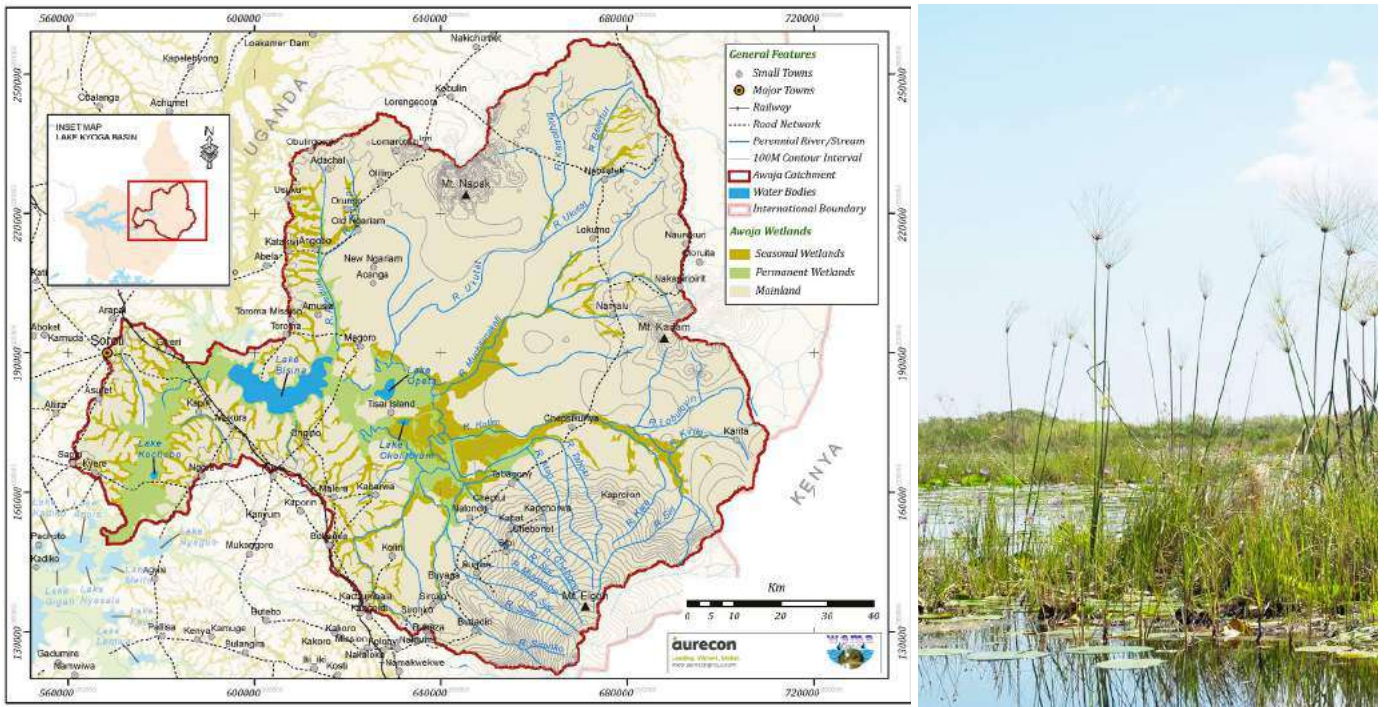


Figure 4.9: Rivers, lakes and wetlands in the Awoja Catchment

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 Opeta, 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: **Wetland Areas within Awoja** 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 ²	Area in km ²	Converted in km ²	Wetland Area in km ²		% 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
Total		4,195	70	4,265		

Districts like Bukwa, 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: **Natural runoff by sub-catchment in the Awoja Catchment (excluding wetland losses)** 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: **Cumulative stream flows and wetland losses** 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 ²)	Natural runoff		Unit runoff (mm)
ID	Name			m ³ /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
Total		1,230	11,013		1,615	142
Average				3.65		



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 ²	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.

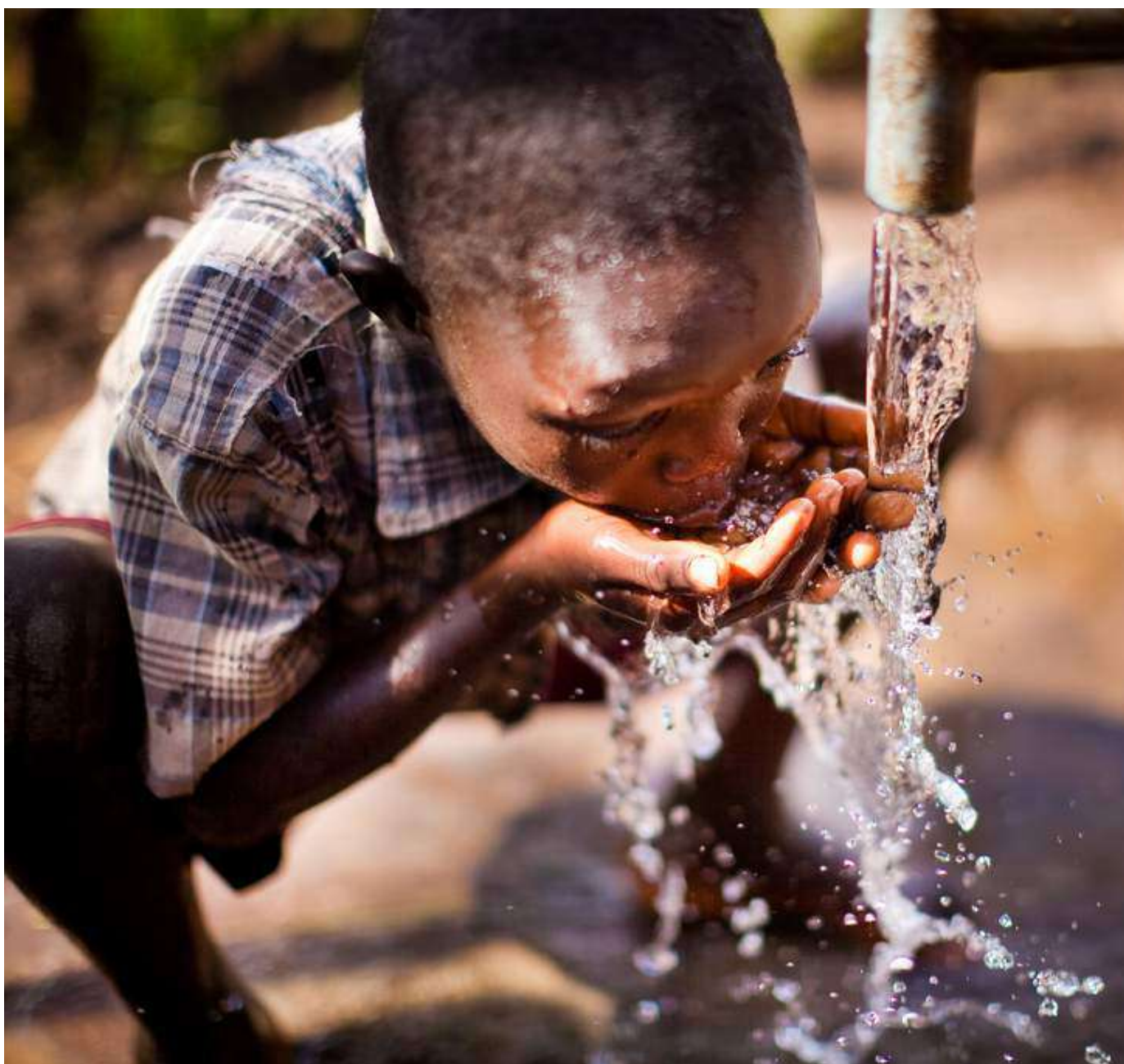
Further, the wetlands need to be recognised for the ecotourism potential they have. Ecotourism should be promoted in areas set aside for biodiversity protection.

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 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.



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.

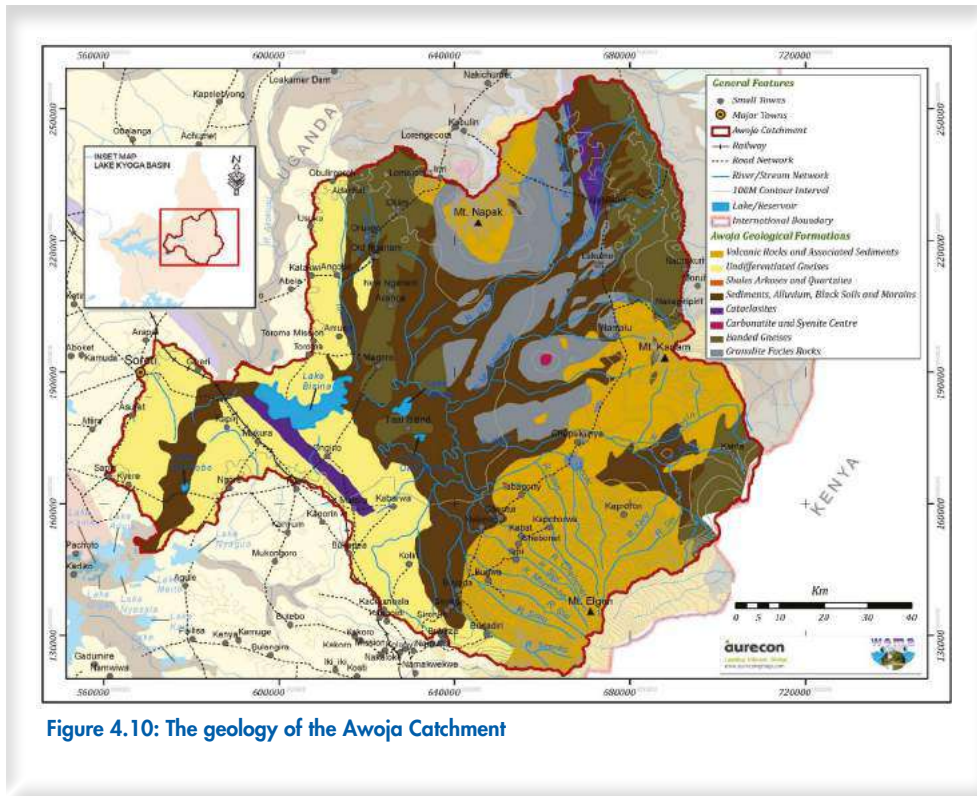


Figure 4.10: The geology of the Awoja Catchment

The potential groundwater yield available for development per sub-catchment is indicated in Table 4.6: Potential sustainable groundwater yield by sub-catchment in the Awoja Catchment. 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 ²)	Potential GW Yield (MCM/km ² /yr)	Potential GW Yield (m ³ /km ² /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
	Total	236.0	6626.9		
	Average			0.040	110.3

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 Total water resources potential per sub-catchment. Reference source not found. 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
Total		1615	236

4.2.4 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.

4.2.5 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 m³, 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.

4.2.6 Risk of floods and droughts

4.2.6.1 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

4.2.6.2 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.

4.2.6.3 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 an
- 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 4.8: 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

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 4.9: **Sanitation coverage in the Awoja Catchment in 2011**.

Table 4.9: 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 3,000m³/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 4.10: 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
Bukwa	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
Maroto (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 m³/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 4.11: 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 4.12: Water demands by sub-catchment for 2013

	Sub-catchment	Total Area (km ²)	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 ² MCM/yr/km ²
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 4.13: Water demands by sub-catchment for 2040

	Sub-catchment	Total Area (km ²)	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 ² (MCM/yr/km ²)
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 4.1: Water Balance Assessment with average annual potential and demands

		Potential water resources							2013					2040					
Sub-catchment		Incremental Natural runoff	Net cumulative runoff after serving upstream demands 2013	Net cumulative runoff after serving upstream demands 2040	EWR (15% of runoff)	Flows available after EWR 2013	Flows available after EWR 2040	Potential GW Yield	Domestic demand	Livestock	Rainfed average annual demand	Total demand excl. EWR	Water surplus using only surface water	Domestic demand	Livestock	Rainfed average annual demand	Total demand excl EWR	Water surplus using only surface water	
ID	Name	MCM/yr																	
1	Ukutat	16	16	16	2.40	13.60	13.60	6.50	0.49	2.38	0.28	3.15	10.45	3.77	2.38	1.39	7.54	6.06	
2	Muchilmakat	143	143	143	21.45	121.55	121.55	44.30	0.41	2.25	1.03	3.69	117.86	3.13	2.25	4.56	9.94	111.61	
3	Kelim	177	177	177	26.55	150.45	150.45	19.50	0.74	1.60	2.76	5.10	145.35	4.19	1.60	6.84	12.63	137.82	
4	Taboki	120	265	258	18.00	247.35	239.82	15.00	0.76	0.75	3.88	5.39	241.96	3.75	0.75	5.71	10.21	229.61	
5	Chebonet-Atari	120	271	270	18.00	253.32	251.86	13.50	1.11	0.85	3.08	5.04	248.28	4.24	0.85	2.80	7.89	243.97	
6	Sipi	40	40	40	6.00	34.00	34.00	1.70	0.10	0.07	0.32	0.49	33.51	0.47	0.07	0.45	0.99	33.01	
7	Muyembe	63	63	63	9.45	53.55	53.55	5.00	0.20	0.13	0.46	0.79	52.76	0.76	0.13	0.41	1.30	52.25	
8	Simu-Sisi	78	78	78	11.70	66.30	66.30	3.10	0.32	0.19	0.74	1.25	65.05	1.03	0.19	0.48	1.70	64.60	
9	Sironko	121	121	121	18.15	102.85	102.85	6.80	0.87	0.48	3.11	4.46	98.39	2.76	0.48	1.80	5.04	97.81	
10	Lake Okolitorom	157	255	255	23.55	231.84	231.26	30.90	1.87	1.59	3.81	7.27	224.57	8.72	1.59	3.64	13.95	217.31	
11	Opeta-Bisina	234	848	804	160.95	687.02	643.32	24.70	1.01	1.46	0.89	3.36	683.66	6.24	1.46	1.28	8.98	634.34	
12	Lake Kochobo	159	843	793	184.80	657.86	608.54	24.30	1.54	1.67	1.85	5.06	652.80	8.84	1.67	2.10	12.61	595.93	
13	Apeduru-Apapi	70	70	70	10.50	59.50	59.50	27.70	0.77	0.90	1.34	3.01	56.49	6.33	0.90	2.40	9.63	49.87	
14	Mt. Napak	117	117	117	17.55	99.45	99.45	13.00	0.34	0.42	0.33	1.09	98.36	2.83	0.42	0.36	3.61	95.84	

Table 4.1: Water Balance Assessment in the driest year analysed

Sub-catchment		Driest consecutive period (1961 - 1978)	Domestic demand	Livestock	2013 Rainfed average annual demand	Total demand excl. EWR	Max annual deficit using only surface water	Domestic demand	Livestock	2040 Rainfed average annual demand	Total demand excl. EWR	Max annual deficit using only surface water
ID	Name	Year	MCM/yr									
1	Ukutat	1971	0.49	2.38	0.28	3.15	(3.06)	3.77	2.38	1.39	7.54	(6.25)
2	Muchilmakat	1974	0.41	2.25	1.03	3.69	0	3.13	2.25	4.56	9.94	(1.48)
3	Kelim	1965	0.74	1.60	2.76	5.10	0	4.19	1.60	6.84	12.63	(0.87)
4	Taboki	1966	0.76	0.75	3.88	5.39	0	3.75	0.75	5.71	10.21	(0.12)
5	Chebonet-Atari	1972	1.11	0.85	3.08	5.04	(0.32)	4.24	0.85	2.80	7.89	(0.36)
6	Sipi		0.10	0.07	0.32	0.49	0	0.47	0.07	0.45	0.99	0
7	Muyembe		0.20	0.13	0.46	0.79	0	0.76	0.13	0.41	1.30	0
8	Simu-Sisi		0.32	0.19	0.74	1.25	0	1.03	0.19	0.48	1.70	0
9	Sironko		0.87	0.48	3.11	4.46	0	2.76	0.48	1.80	5.04	0
10	Lake Okolitorom	1972	254.45	30.90	1.87	1.59	0	7.27	247.18	8.72	1.59	(0.91)
11	Opeta-Bisina	1970	912.05	24.70	1.01	1.46	0	3.36	908.69	6.24	1.46	(12.66)
12	Lake Kochobo	1975/1961	1047.20	24.30	1.54	1.67	(34.80)	5.06	1042.14	8.84	1.67	(159.31)
13	Apeduru-Apapi	1966/1965	59.50	27.70	0.77	0.90	(0.03)	3.01	56.49	6.33	0.90	(2.25)
14	Mt. Napak	1966	99.45	13.00	0.34	0.42	0	1.09	98.36	2.83	0.42	(0.05)

Table 4.15: Water Balance Assessment in the driest year analysed

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 4.16: 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 people⁴, with population densities indicated in Figure 4.11.

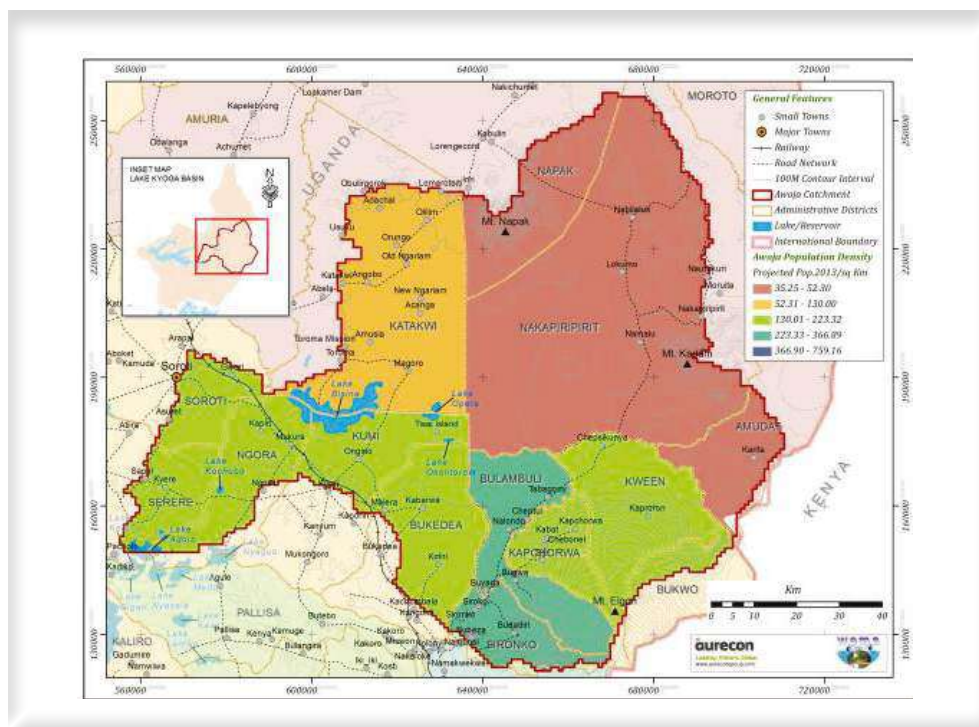


Figure 4.11: Population density in Awoja catchment

The Lake Kyoga Basin has an average population density of 134 inhabitants per a square kilometre (inhabitants/km²) ranging from 50 to 250 inhabitants/km² 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 4.17: 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%

⁴Population 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.

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 4.18: 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 Catchment⁵. 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 agriculture within the catchment is rainfed. The current land-use practices of the Awoja catchment are depicted in Figure 4.12.

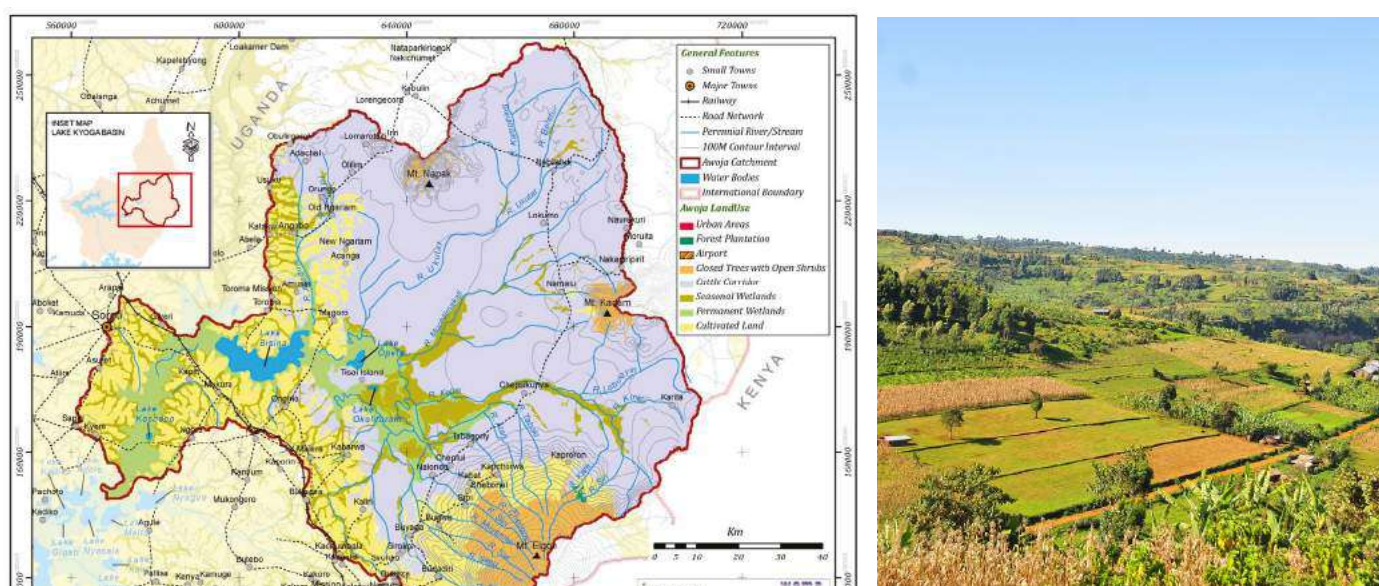


Figure 4.12: Land use practices in the Awoja Catchment

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.

⁵Soroti 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%).

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 cropland⁶. 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 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.



⁶National Development Plan, 2010.

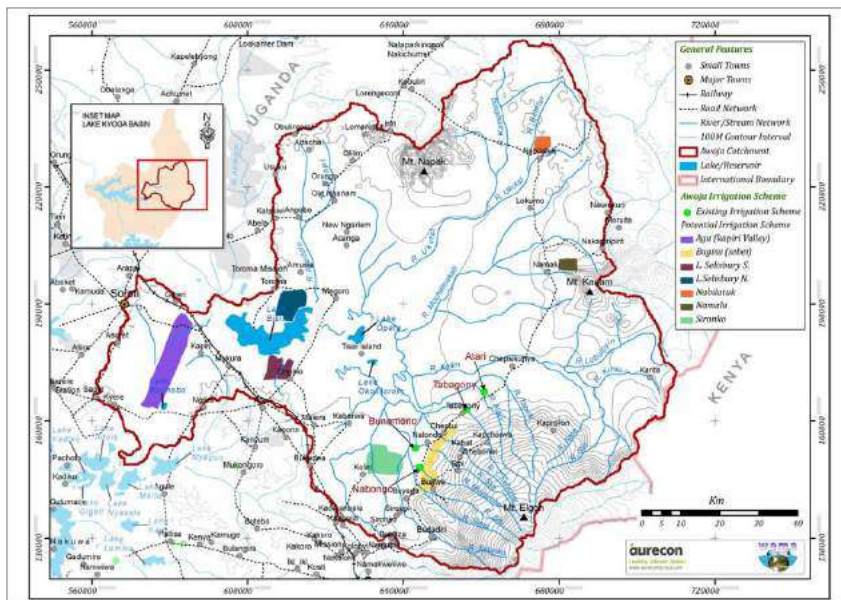


Figure 4.13: Existing and potential irrigation sites in Awoja catchment

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 4.19: Rainfed crop areas per sub-catchment

Sub-catchment number	Sub-catchment	Rainfed crop area (km ²)
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
	Awoja	5,371



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 tilapi

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.

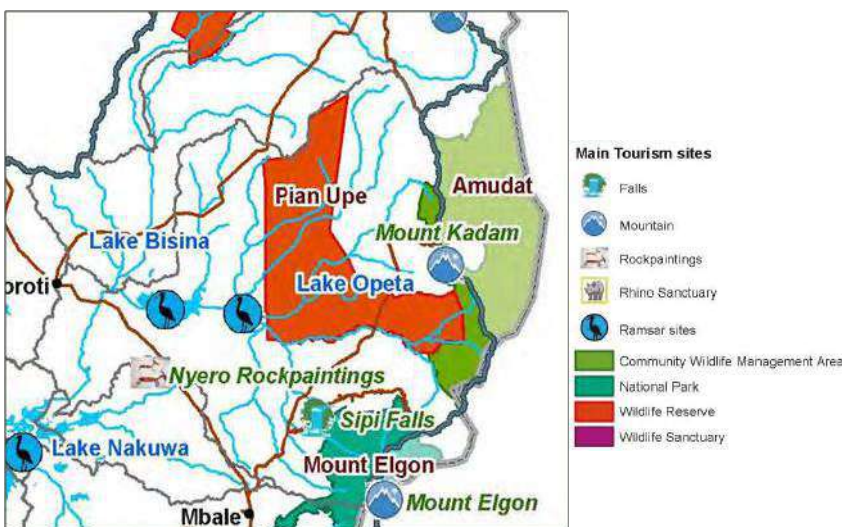


Figure 4.14: Potential tourism areas in the Awoja catchment

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.



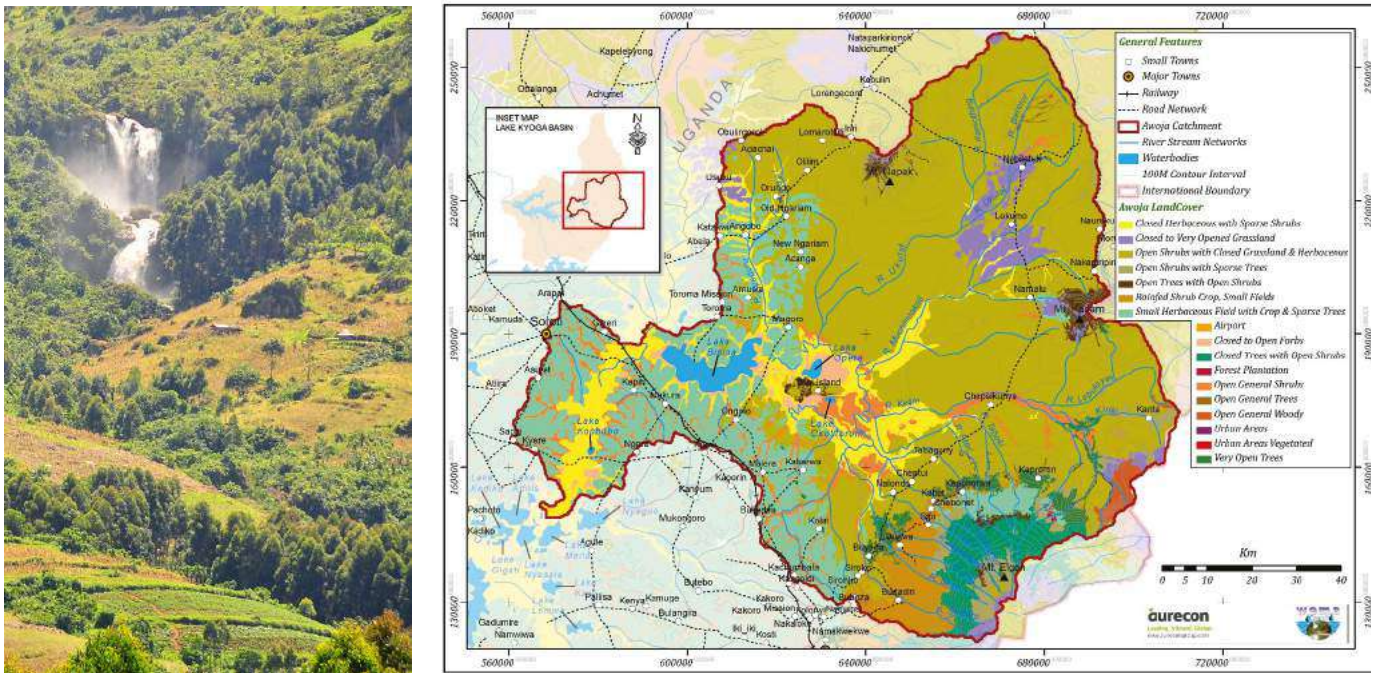


Figure 4.15: Land cover within the Awoja Catchment

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 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. 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.

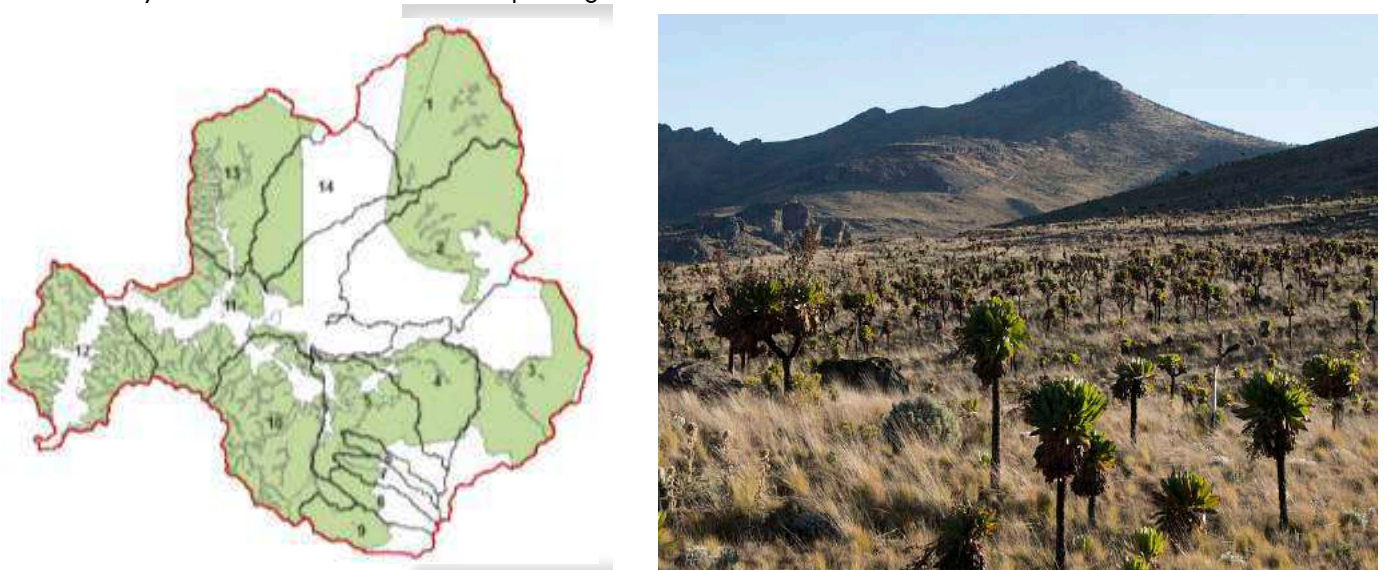


Figure 4.16: Inhabitable areas of the Awoja catchment (green)

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.

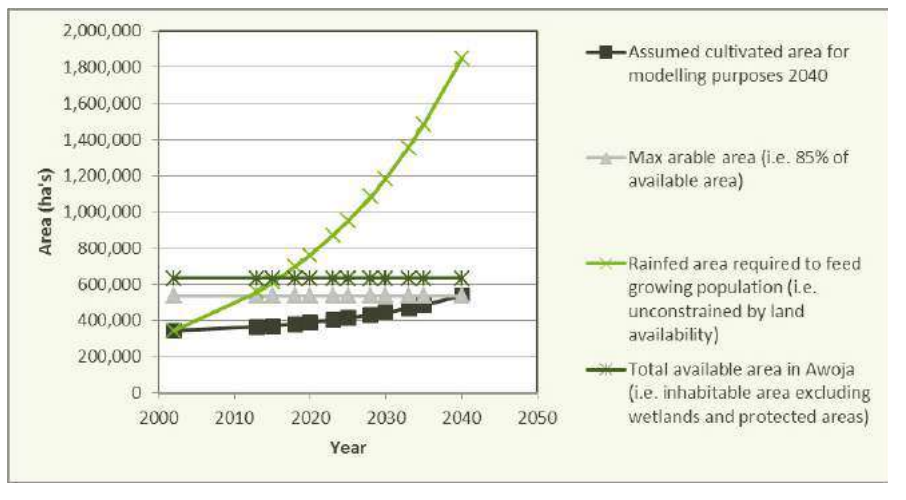


Figure 4.17: Comparison of potential rainfed area and required rainfed area to sustain population growth

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 4.20: Social and Environmental Issues and Implications

Issues	Background and Implications
High population density and growth rate	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.
High poverty levels	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.
Limited land ownership	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.
Livelihoods- subsistence agriculture with low productivity	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.
Livelihoods – cattle farming	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.
Limited access to basic services	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.
Natural disasters	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.
Land degradation	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.
River degradation	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.
Wetlands	Encroachment and exploitation of wetlands cause siltation and degradation. Wetlands lose their ecological functionality and capacity to provide ecosystem services, including ability to filter water to lakes. Floods result in the displacement of people and loss of crops.



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.

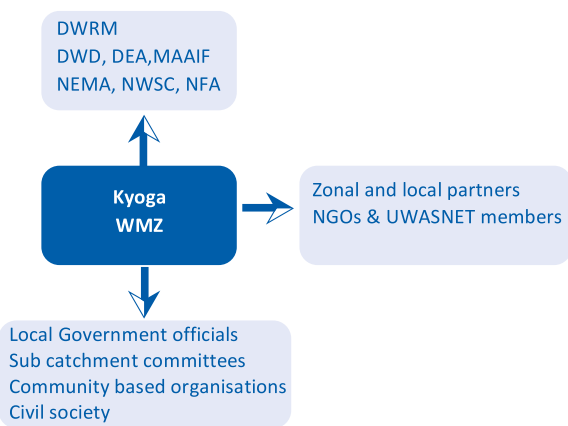


Figure 4.18: Stakeholder interaction with the Kyoga WMZ team

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 4.19: 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 4.21: Key stakeholder groups identified in process of development of CMP

Government Institutions	Public and private sector Organisations	NGOs and Civil Society Organisations	Public
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"> • District officials in the 14 districts • Ministry of Water & Environment (MWE) • Department of Rural water supply in MWE • Ministry of Agriculture, Animal Industry and fisheries (MAAIF) – Directorate of Irrigation • Directorate of Fisheries • Wetlands Management Directorate in MWE • Directorate of Water Development (DWD) • Directorate of Water Resource Management (DWRM) • Ministry of Energy & Mineral Development (MEMD) 	<ul style="list-style-type: none"> • IUCN • Radio Veritas • Radio Kapchorwa • Voice of Teso • Teso Broadcasting Services (TBS Radio) 	<ul style="list-style-type: none"> • UWASNET • Soroti Catholic Diocese Integrated Development Organisation (SOCADIDO) • Uganda Muslim Rural Development Association (UMURDA) • WaterAid • HorizonT3000 • German Technical Cooperation (GIZ) • SNV • Christian Action to End Poverty (CATEP) • Temele Development Organization (TEMEDO) • ACTED • Drop in the bucket 	<ul style="list-style-type: none"> • Fishermen • Farmer groups • Women farmers • Youth • Community leaders • Communities • Water User Committees



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 4-22: Issues arising from stakeholder interaction

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



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 4.23: SWOT analysis table of the situation in Awoja Catchment

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



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 4.24: Development and Management options identified by stakeholders

DEVELOPMENT OPTIONS	TO INCLUDE	PURPOSE
Infrastructure refurbishment	<ul style="list-style-type: none"> Rehabilitation of valley dams, valley tanks, boreholes, pumps, pipelines and canals 	To secure original investment and to optimise efficiency and use
Construction of valley dams and tanks	<ul style="list-style-type: none"> Valley dams, valley tanks, stock watering dams, reservoirs 	Multipurpose
Piped water schemes	<ul style="list-style-type: none"> Diversions, pumps 	Water to villages
Groundwater development	<ul style="list-style-type: none"> Boreholes and pumps Shallow wells Spring protection Artificial recharge 	Domestic water Emergency stock-watering
Rainwater harvesting	<ul style="list-style-type: none"> Household water tanks (concrete or plastic) Also on public buildings 	Household water security
Sand Dams		Erosion control and water supply
Irrigation	<ul style="list-style-type: none"> Scheme irrigation (valley dams, abstraction from lakes and rivers) Homestead irrigation 	Food security (seasonal droughts)
Small Hydro Power		Power supply
Aquaculture	<ul style="list-style-type: none"> Pond revitalization Small farm aquaculture 	Food security
Buffer zone set-asides	<ul style="list-style-type: none"> Riparian protection zones Roadside protection zones 	Source protection
Legislation and enforcement	<ul style="list-style-type: none"> Water use (abstraction) Wetlands protection Waste discharge Fisheries – BMUs Buffer zone set asides Sand mining Environmental flows 	Source protection and utilisation
Sustainable land management programme	<ul style="list-style-type: none"> Catchment rehabilitation Wetland utilisation Riverbank stabilisation Guidelines for sustainable land management Reforestation and grazing management (stand-alone options) 	Source protection Soil and water conservation
Reforestation programme	<ul style="list-style-type: none"> Protection of sensitive areas Agro-forestry Reforestation programmes Woodlots 	Source protection Energy source
Sanitation systems	<ul style="list-style-type: none"> Awareness/ sanitation culture Eco and composting toilets Storm water retention Waste discharge management 	Water quality and health
Energy supply (in addition to SHPs)	<ul style="list-style-type: none"> Alternative energy sources Energy efficiency (e.g. stoves) 	
Water use efficiency	<ul style="list-style-type: none"> Repairs to infrastructure Irrigation systems Awareness Controls over water use 	This is a baseline activity.
Awareness raising	<ul style="list-style-type: none"> Sensitisation programmes 	Sanitation Sustainable land management Deforestation Wetlands Overgrazing
Flood management and preparedness	<ul style="list-style-type: none"> Early warning systems Flood preparedness plans Disaster management planning 	Flood protection
Cattle keeping practices	<ul style="list-style-type: none"> Determine carrying capacity Design grazing programmes Animal improvement Stock watering (see above) 	Source protection including wetlands
Extension services (information and training)	<ul style="list-style-type: none"> Water use efficiency Sustainable land management and reforestation Agronomic practice Crop improvement Rangeland utilisation 	
Monitoring	<ul style="list-style-type: none"> Climate and streamflow Water quality 	Knowledge base
Institutional capacity building	<ul style="list-style-type: none"> Staff, logistics, equipment Training/guidelines/handbooks 	



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: Issues prioritised by stakeholders (Soroti Workshop, 18 July 2013). 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
5	Lack of awareness on environmental management	Regulation and enforcement	Poor agronomic practices	Insecurity
6	Overgrazing	Limited awareness		Floods / Droughts
Additional issues listed but not prioritised by stakeholders				
	a. Siltation b. Drought c. Population d. Water Pollution e. Poverty f. Landlessness g. Weak institutional regulation and enforcement h. Low safe water coverage and poor sanitation	a. Institutional capacity	a. Soil erosion b. Overgrazing c. Domestic water supply d. Water for production e. Traditional cultural growth of short term crops f. Customary land tenure	a. Lack of alternative energy sources

These issues clearly show that there is need for development and management to achieve sustainability in catchment protection. Many issues often also express causes and consequences in their own right. So deforestation is, for example, a cause of soil erosion (key issue) and one potential consequence is landslides. But deforestation and landslides can also legitimately be classed as issues.

In order to sort and classify the issues and provide an additional perspective, they are put into categories or themes Table 5.2: Issues, strategic implications, and possible measures. 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

Mitigating Risk

Issues	Strategic Implications	Possible measures
Drought hazard	<ul style="list-style-type: none"> Starvation – especially in the cattle corridor. Food security 	<ul style="list-style-type: none"> Irrigation schemes and irrigation technologies (especially pump technology) Small-scale irrigation Stock watering dams, especially their density Improvement of monitoring networks
Flood hazard	<ul style="list-style-type: none"> Flood damage, loss of crops, property, lives 	<ul style="list-style-type: none"> Review of the reasons for increased flooding Flood warning systems River protection works Improvement of monitoring networks
Landslides	<ul style="list-style-type: none"> Loss of life, land, crops, infrastructure Erosion 	<ul style="list-style-type: none"> Land use planning. Comprehensive and integrated reforestation and rehabilitation, Implementation of Sustainable Land Management Programme Establishment of siltation monitoring system for future planning
Soil erosion	<ul style="list-style-type: none"> Loss of productive land Degradation of water quality Damage to wetlands Exacerbation of flooding Damage to lakes 	<ul style="list-style-type: none"> Catchment Management (see below)
	<ul style="list-style-type: none"> Soil erosion is the single most serious and integrative issue within the Awoja catchment. Almost all aspects of land use and management have a soil erosion feedback loop 	



Catchment Management

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



Wetlands (Environmental Services)

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



Providing Water to People

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



Agriculture - Irrigated and Rainfed

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



Cattle Keeping

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

Aquaculture

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

Hydro-Electric Power

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

Institutional

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

Management

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



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

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 flood
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: Strategic objectives of the Awoja Catchment.

Table 5.4: Strategic objectives of the Awoja Catchment

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



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: Management and Investment Options.

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
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



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 the 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

1.1 Sustainable Land and Environmental Management	
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.



1.2 Reforestation	
	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.
1.3 Lakes and Wetlands management	
	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.
1.4 Buffer zone set-asides	
	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.

Table 5.7: Development for Socio-Economic Growth options

2.1 Sanitation systems	
	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)

2.2 Refurbishment of Infrastructure	
	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.

2.3 Piped water schemes (Surface water)
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 Sorotii 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.
2.4 Groundwater development
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).
2.5 Rainwater harvesting - (Roof water tanks and roof catchments)
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.
2.6 Sand dams
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.
2.7 Dams (Small stock watering dams, valley dams and tanks, large dams)
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 multipurpose 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.
2.8 Enhancement of irrigation
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.

2.9 Water use efficiency

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).

2.10 Small hydropower

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.

2.11 Alternative energy supply and energy efficiency

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.

2.12 Aquaculture

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

2.13 Socio-economic strengthening

Create the opportunity for farmers as pilots to establish new activities to generate income, especially as they undertake conservation methods on their land. Validate the resources, which exist to promote eco-tourism.

2.13.1 Create an ecological tourism organisation, train it and provide the necessary starting equipment e.g. a boat.

2.13.2 Promote horticulture.

2.13.3 Promote bee keeping.



Table 5.8: Floods and Droughts Mitigation options

3.1 Flood management and preparedness for floods
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.
3.2 Construction of infrastructure for flood control
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.
3.3 Cattle keeping practices
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

4.1 Monitoring
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.
4.2 Extension services (information and training)
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).
4.3 Awareness raising
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.
4.4 Institutional capacity building
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.
4.5 Legislation and enforcement
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 Short - Listed 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 5.9: Social and Institutional Development Options



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



¹ **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

Options		SC1	SC2	SC3
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	
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
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

Options		SC1	SC2	SC3
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
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 inter-disciplinary, 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
	Total	1021	1272	1436
	Rank	3	2	1



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
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
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
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
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 Aqu 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

Ref. No.	Options	Numbers Covered in the whole catchment		
		Sub counties	Parishes	Villages
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
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	
1.1.8.1	Introduce improved farming practices	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Construct 40 cylos, 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	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	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	Kyoga WMZ, CMC, DNRO, DEO, DAO, DFO, CDO	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 ² , 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		
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		
1.1.1.0	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	x	
Reforestation										
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	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, Ngora	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		

Ref. No.	Options	Districts concerned	Type and No. of structure	Responsibility	Period of Intervention				
					1	2	3	4	5
Catchment Protection and Conservation Sustainable Land and Environmental Mangement									
1.2.4	Planting of trees in degraded areas	Bukwo, Kween, Bukambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Amudat, Kumi, Ngora	Planting trees: 1,155ha, seedlings: 630,500, tree nurseries: 6	Kyoga WMZ, CMC, DNRO, DEO, DFO, CDO		x	x	x	x
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	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Train CMCs, forest management, land care and agricultural managers	Kyoga WMZ, CMC, DNRO, DEO, DAO, DFO, consultant	x		x		x
Lakes and Wetlands Management									
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
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 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
Buffer Zone Set - asides									
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 200ha, 30m 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, 15km river pegging of River Sironko, tree planting on 114ha, fodder 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	Kyoga WMZ, CMC, DNRO, DEO, CDO			x	x	
Development for socio-economic growth									
Sanitations Systems									
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 3stance, 24 lined pit latrines 4 stance, 40 VIP latrines 5stance, 10 VIP latrines 2stance, 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	x		

Ref. No.	Options	Districts concerned	Type and No. of structure	Responsibility	Period of Intervention				
					1	2	3	4	5
	Catchment Protection and Conservation Sustainable Land and Environmental Mangement								
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 microorganism (EMO) for sludge reduction	Kyoga WMZ, CMC, DNRO, DEO, DWO			x		
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	x			
	Piped Water Schemes (Surface)								
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
	Sand Dams								
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	x			
	Dams								
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	Kyoga WMZ, CMC, DNRO, DEO, DAO, DWO	x	x	x		
	Enhancement of Irrigation								
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	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	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	x	
	Water Use Efficiency								
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	

Ref. No.	Options	Districts concerned	Type and No. of structure	Responsibility	Period of Intervention				
					1	2	3	4	5
	Catchment Protection and Conservation Sustainable Land and Environmental Mangement								
	Small Hydropower								
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
	Alternative Energy Supply								
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	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 wind turbines, 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	x	
	Aquaculture								
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 ponds4	Kyoga WMZ, CMC, DNRO, DEO, DAO		x	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	x			
	Socio-economic Strengthening								
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, 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	Kyoga WMZ, CMC, DNRO, DEO, CDO		x	x	x	x
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 including seeds, establish 10 demonstration plots, 12 greenhouses, irrigation pumps, treadle pumps, pipes, fencing	Kyoga WMZ, CMC, DAO		x	x	x	x
2.13.3	Promote bee keeping	Bukwo, Kween, 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	Kyoga WMZ, CMC, DAO			x	x	x
	Mitigation and Adaptation								
	Flood and Landslide Management and Preparedness for Floods and Landslides								
3.1.1	Demarcate areas considered unsafe for habitation or other use and warn inhabitants	Bukwo, Kween, Bulambuli, Kapchorwa, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Demarcate 104 areas unsafe for habitation and 5 settlements in game reserves	Kyoga WMZ, CMC, DNRO, DEO, DAO, DRMC		x	x		
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/ loads	Kyoga WMZ, CMC, Consultant	x				

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					1	2	3	4	5
	Catchment Protection and Conservation Sustainable Land and Environmental Mangement								
3.1.2	Develop an early flood warning system	Bukwo, Kween, 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	Kyoga WMZ, CMC, DNRO, DEO, DRMC			x	x	
	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	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
	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	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
	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	Kyoga WMZ, CMC, consultant			x	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				

Ref. No.	Options	Districts concerned	Type and No. of structure	Responsibility	Period of Intervention				
					1	2	3	4	5
	Catchment Protection and Conservation Sustainable Land and Environmental Mangement								
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			
	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, 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, DeDO		x	x	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				
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 piggery 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
	Institutional Capacity Building								
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	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	
	Legislation and Enforcement								
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 police in environmental affairs, increase of number of environmental police in Napak	Kyoga WMZ, CMC, DNRO, DEO, Env. police	x	x			
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	Kyoga WMZ, CMC, consultant	x				

Ref. No.	Options	Districts concerned	Type and No. of structure	Responsibility	Period of Intervention				
					1	2	3	4	5
	Catchment Protection and Conservation Sustainable Land and Environmental Mangement								

Explanations:

2.3.1	Design and construct River Agu scheme to supply Kumi and surroundings - water and wastewater works			Construction plans are under way
2.8.8	Construction of new irrigation schemes: Type B Formal Irrigation			
2.7.1	Needs identification for location and type of dams and associated abstraction facilities	Bulambuli, Napak, Nakapiripirit, Soroti, Serere, Ngora, Bukedea		4 valley dams, 17 dams, 4 abstraction facilities for livestock watering and 4 for irrigation with treadle pumps
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 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 have been increased to 36 as it should be done for all nurseries.
- 3 The number of committees has been increased as all sand dams should have a committee.
- 4 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.



Table 6.3: Indicators for the Options

Ref. No.	Options	Indicator
Catchment Protection and Conservation		
Sustainable Land and Environmental Management		
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
Reforestation		
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
Lakes and Wetlands Management		
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
Buffer Zone Set - asides		
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
Sanitations Systems		
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
Refurbishment of infrastructure		
2.2.2	Refurbish valley dams and tanks	Number of times valley dams and times valley tanks refurbished and used

Ref. No.	Options	Indicator
	Catchment Protection and Conservation	
	Sustainable Land and Environmental Management	
	Piped Water Schemes (Surface Water)	
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
	Sand Dams	
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
	Dams	
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
	Enhancement of Irrigation	
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
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
	Water Use Efficiency	
2.9.1	Water efficiency evaluation and recommendations	Evaluation report
	Small Hydropower	
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
	Alternative Energy Supply	
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
	Aquaculture	
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
	Socio-economic Strengthening	
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
	Mitigation and Adaptation	
	Flood and Landslide Management and Preparedness for Floods and Landslides	
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
	Catchment Protection and Conservation	
	Sustainable Land and Environmental Management	
	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	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
	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	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
	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.	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
	Awareness Raising	
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
	Institutional Capacity Building	
4.4.1	Train experts (import expertise) in the development of technology guidelines, training and other approaches	Availability of technology guidelines in each district
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
	Legislation and Enforcement	
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

Ref. No.	Options	Indicator
	Catchment Protection and Conservation	
	Sustainable Land and Environmental Management	
	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	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
	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	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
	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.	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
	Awareness Raising	
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
	Institutional Capacity Building	
4.4.1	Train experts (import expertise) in the development of technology guidelines, training and other approaches	Availability of technology guidelines in each district
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
	Legislation and Enforcement	
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)	804.3	402.2	402.2			
		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						
		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								
1.1.3	Identification and regular (annually) eradication of floating islands / invasive alien plants	Procure 3 tractors	320.3	256.2	64.1			
		Procure 9 motor boats						
		Procure 18 wheelbarrows, hoes and other harvesting equipment						
		Construction of 6 barriers before Awoja bridge						
1.1.8	Ecological water requirements: Revisiting legislation and catchment assessment	Put in place legislation		117.9				
		Improve catchment assessment						
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					
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	Establish 8 runoff management structures (contours, bunds, terraces)	1,478.9	1,478.9	985.9	739.4	246.5	
		Practice agroforestry on 40ha, half woodlots						
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	Put in place woodlots / agroforestry of 344 ha	658.3	493.8	493.8			
		Construct contour bunds of 190km						
		Road design / construction for 128km						
		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)								
1.1.5	River bank protection and stabilisation - gabions, management of cattle access points, protection of riparian vegetation	Carry out training of fire fighting 58 committees (10 people per committee)	4,119.2	4,119.2	2,353.8	1,176.9		
		Development of fire management plans						
		Carry out quarterly public awareness raising (113 communities, 50 people each)						
		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						
		Construct weirs						
		Construct bridges						
Stone pitching of cattle access points								
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			
		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)						

Ref. No.	Options	Description of Intervention	Yearly Cost Allocation [Thousand USD]				
			2015/16	2017	2018	2019	2020
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						
1.2.4	Planting of trees in degraded areas	Plant trees for 12km boundary (1m wide stretch)		82.0	49.2	16.4	16.4
		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)					
		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,	Procure 630,500 seedlings	22.5		22.5		
	forest management, land care and agricultural managers: 1 training in each district every two years	Plant 6 tree nurseries (0.2ha each)					Train CMCs, forest management, land care and agricultural managers
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
1.3.3	Study for economic valuation of wetland resources and disseminate the results	Update 13 wetland inventories regularly			62.9		
		Procure GIS equipment					
		Economic valuation of wetland resources and its dissemination					
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	Update of 49 protection zones		94.3	31.4	15.7	15.7
		Produce GIS maps for all wetlands					
		Establish 1 protection zone with suitable vegetation (plant riparian vegetation, 5ha)					
		Procure GPS and GIS equipment					
	Develop 94 wetland management action plans						
1.3.5	Restoration of vital (unique) critical (subject to on - going degradation) wetlands	Review and update 126 wetland management action plans			368.1	276.1	276.1
		De-silt 3 rivers					
1.4.1	Mapping, demarcation of riparian and roadside protection zones and identify and implement source protection measures	Restoration/tree planting in 63 wetlands (0.5ha each)			1,717.5	1,717.5	
		Develop woodlots of 5ha					
		Fence 1 acre with live hedges (0.254km by 1m wide)					
		Peg off 12 open access areas for animals (each 0.5km)					
		Restore the fish population in 16 areas					
		Awareness creation in 40 villages (50 people per village)					
		Train 2 wetland management committees (10 people per committee)					
		Law enforcement and bylaws					
De-silt 15 rivers							

Ref. No.	Options	Description of Intervention	Yearly Cost Allocation [Thousand USD]				
			2015/16	2017	2018	2019	2020
2.1.1	Improve sanitation technology and building material support and implement them	Establish a riparian buffer zone of 200ha					
		30 m buffer zone along River Sironko and its tributaries (30km)					
		Demarcation zones along Rivers Siit, Nyalit, Chepkwir, Kapteret, River Sipi and its tributaries (100km)					
		Protection zones along 16 rivers (100km)					
		Demarcation pillars in 6 areas					
		15km river pegging of River Sironko					
		Tree planting on 114ha					
		Fodder grass planting for 36ha					
		Woodlots: 15ha					
		Seedlings: 50,000					
		Road side tree planting for 453km (1m wide)		633.4	633.4		
		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					
		Put in place 3 cesspools					
		Procure 4 cesspool emptiers					
		Construct 2 sewage systems					
		Establish and protect 2 lagoons	1,786.7	1,461.9			
		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
2.6.1	Feasibility studies and design of prioritised sand dams. Construction, with cooperation and input from local communities	Lay 500km of pipeline extension					
		Construct 10 sand dams	890.4	890.4			
2.7.2	Feasibility & design of prioritized dams for stock watering and humans needs. Construction, with cooperation and input from local communities	Train 10 sand dam management committees (10 people per committee)					
		Construct 19 dams	1,300.0	2,166.7	866.7		
2.8.2	Enhancement of rain fed agriculture	Construct 14 valley dams					
		Install 4 abstraction facilities for livestock watering					
		Install 4 irrigation facilities with treadle pumps	1,282.0	1,098.9	549.4	366.3	366.3
		Establish 288 rain water harvesting technologies for irrigation					
2.8.5	Construction of new irrigation schemes: Low - power pumped schemes that utilize water from nearby rivers, swamps and lakes	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 (20ha per system)		163.2	163.2		
		Provide short-term and drought resistant crops for 18 villages					
		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)							

Ref. No.	Options	Description of Intervention	Yearly Cost Allocation [Thousand USD]				
			2015/16	2017	2018	2019	2020
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)	98.6				
		Construct 2 rock catchment based schemes (5ha per scheme)					
		Carry out feasibility studies for 82 irrigation schemes					
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	502.2	167.4	167.4		
		Train 1.430 persons on woodstove making and equip them					
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	21.4				
		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							
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	54.5	54.5			
		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					
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
2.13.2	Promote horticulture	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					
		Procure 53 life jackets					
		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		139.6	104.7	69.8	34.9		
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

Ref. No.	Options	Description of Intervention	Yearly Cost Allocation [Thousand USD]				
			2015/16	2017	2018	2019	2020
3.1.1	Demarcate areas considered unsafe for habitation or other use and warn inhabitants	Procure 6,490 beehives	63.8	63.8			
		Procure 864 harvesting gear					
		Provide processing, packaging and marketing equipment for all					
		Set up 2 honey collection centres and 33 honey processing plants					
		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	65.0				
		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						
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	602.5	602.5	301.2		
		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						
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	25.9	19.4	6.5	6.5	
		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					
		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

Ref. No.	Options	Description of Intervention	Yearly Cost Allocation [Thousand USD]				
			2015/16	2017	2018	2019	2020
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	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					
		Develop training guidelines and awareness raising materials					
4.3.2	Introduction of a community radio programme dedicated to environmental matters	Establish 4 radio stations	237.7	95.1	47.5	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:			501.4	300.9	200.6
		Establish 3 radio listening clubs					
		Provision of IEC material for dissemination					
		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)			565.0	565.0	282.5
		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 5stance VIP latrines					
4.4.1	Train experts (import expertise) in the development of technology guidelines, training and other approaches	Construct 34 ecosan toilets				28.6	
		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)					
		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		440.2	440.2	220.1	
		Sensitise 23 communities (50 people per community)					
		Establish 4 BMU shelters					
4.5.1	Strengthen enforcement bodies with capacity	Form 39 rice grower associations (15 people per association)	27.9	18.6			
		Train 500 rice grower association members					
		Carry out 12 awareness raising campaigns (50 people per campaign)					
		2 exchange visits to established associations (25 people per visit)					
		Construct processing centres with rice mills, storage facilities, rice haulers					
		Provide seeds					
		Develop training material					
4.5.2	Develop by - laws and ordinances on water and environmental management and protection	Train police in environmental affairs, increase of number of environmental police in Napak	39.3				
	Develop bylaws and ordinances on water and environmental management and protection						
Total			15,257	20,397.8	18,550.9	27,389.1	20,081.5

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ANNEXES

ANNEX 1 – Screening of Options

SCREENING CRITERIA

OFF-LINE SCREENING OF OPTIONS		SCREENING CRITERIA												Screened Totals for Sub-options
		Overall impact of option	Importance of issue(s) addressed	Social Benefit	Economic benefit	Environmental cost (-ve)	Environmental benefit (+ve)	Opportunity costs (if any)	Ease of implementation (physical feasibility)	Cost	Capacity to implement	Consequences of failure to implement	Sustainability	
No	Option / Sub-option	Addresses one issue (1) 2-3 issue (3) more than 3 issues (5)	Low (1) Medium (3) High (5)	Low (1) Medium (3) High (5)	Low (1) Medium (3) High (5)	High Negative Impact (-5) Minimal negative impact (-3) No impact (0)	No impact (0) Minimal positive impact (3) High impact positive (5)	Very high (-3) High (-2) (Limited (-1) None (0)	Very difficult (-3) Difficult (-2) Feasible/possible (2) Very feasible (3)	Prohibitive (-5) Very expensive (-3) Expensive (-1) Reasonably affordable (3) Very affordable (5)	None/inadequate (-3) Weak (-2) Capacity to be built/recruited (-1) Limited capacity (1) Good - available (3)	None. Issue(s) will resolve naturally over time (-3) Issue(s) increase but remain at same relative scale (0) Escalation of issue(s) (3)	Definite long-term sustainability (5) Sustainable (3) Uncertain-it depends (0) Short-term only (-3) Most unlikely (-5)	
1. Source Protection														
1.1	Sustainable land & environmental management													
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	5	1	1	0	0	0	2	2	1	3	5	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	5	5	5	5	0	5	-1	-2	-2	-1	3	3	25
1.1.3	Identification and regular (annually) eradication of floating islands / invasive alien plants	3	5	3	3	0	3	0	2	3	3	3	3	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	3	5	1	1	0	5	-2	2	2	1	3	3	24
1.1.5	Riverbank protection and stabilisation - gabions, management of cattle access points, protection of riparian vegetation	5	5	3	1	0	5	-2	-2	-1	-1	3	3	19
1.1.6	Rehabilitation of degraded landscapes through construction of check dams, demi-lunes, swales, brush packs and stone packs, fanya juu etc.	3	5	5	3	0	5	0	2	-2	-1	3	3	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	5	5	5	5	0	5	0	2	-1	3	3	3	35
1.1.8	Ecological water requirements: revisiting legislation and catchment assessment	3	3	1	1	0	5	-1	2	3	1	3	5	26
1.1.8.1	Introduce improved farming practices	5	5	5	5	0	5	0	3	3	3	0	3	37
1.1.9	Build the capacity on conservation methods, especially for wetlands	5	5	3	3	0	0	-1	3	5	3	0	0	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	1	5	1	1	0	0	0	2	-1	-1	0	0	8

1.2	Reforestation														
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	1	0	0	0	2	2	1	0	3	18	
1.2.2	Establish nurseries for provision of seedlings and establish distribution, training and management systems in all districts - pilot projects	5	5	5	5	0	3	-1	2	-1	-1	3	3	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	5	5	5	5	0	5	-1	-2	-2	-1	3	3	25	
1.2.4	Plant trees in degraded areas	5	5	1	3	0	5	0	2	3	1	3	3	31	
1.3	Lakes and wetlands management														
1.3.1	Regular updating of district wetland inventories by districts	1	3	1	1	0	3	0	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	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	-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	-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	-2	-2	3	0	15	
1.4	Buffer zone set-asides														
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	2	-1	0	-3	9	
2. Development for Socio-economic Growth															
2.1	Sanitation systems														
2.1.1	Improve sanitation technology, and building material support and implement them	3	5	5	3	0	5	0	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, Nakapiririt)	3	1	1	3	-3	3	0	-3	-3	-3	0	0	-1	
2.2	Refurbishment of infrastructure														
2.2.2	Refurbish valley dams and tanks	5	5	5	5	-3	3	-1	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	-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	-1	-1	0	0	17	
2.3	Piped water schemes (Surface water)														
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	1	0	3	12	
2.3.2	Soroti treatment and distribution - expand in stages (NWSC)	1	5	5	1	-3	0	-1	-2	2	1	0	3	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	1	5	5	1	-3	0	-1	-2	2	1	0	3	12	

2.4	Groundwater development													
2.4.1	Feasibility studies of availability and supply for prioritised towns and settlements	3	5	2	2	0	2	0	3	2	-1	2	5	25
2.4.2	Design and construction of groundwater schemes for towns/settlements	5	5	5	5	-2	2	-1	-1	2	-1	3	2	24
2.4.3	Groundwater schemes / boreholes for domestic and livestock supply - evaluation, design, construction (focus on Districts 1,2 and 14)	5	5	5	3	-3	3	0	2	0	-1	3	3	25
2.5	Rainwater harvesting (roof water tanks and roof catchments)													
2.5.1	Provision of subsidised rainwater tanks to willing buyers. Implementation should be based on a cost-sharing mechanism	3	5	5	3	0	3	0	2	5	3	0	3	32
2.6	Sand dams													
2.6.1	Feasibility studies and design of prioritised sand dams. Construction, with cooperation and input from local communities	3	5	5	3	0	3	0	-2	3	1	0	5	26
2.7	Dams (small stock watering dams, valley dams and tanks, large dams)													
2.7.1	Needs identification for location and type of dams and associated abstraction facilities	4	5	4	4	-1	0	0	3	5	1	3	2	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	-1	2	0	2	-1	-1	3	1	21
2.8	Enhancement of irrigation													
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, Kericho and Teso	4	5	5	5	-2	0	-1	2	1	-1	0	-1	17
2.8.2	Enhancement of rainfed agriculture	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	-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	-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	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	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	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	0	-1	-3	-4	-2	3	0	5
2.9	Water use efficiency													
2.9.1	Water efficiency evaluation and recommendations	2	2	2	3	0	5	0	2	3	0	2	3	24
2.10	Small hydropower													
2.10.1	Investment and implementation in hydropower installations and grid distribution	1	5	3	5	-1	1	-1	2	3	3	0	3	24

2.11	Alternative energy supply														
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	-2	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	-2	3	-1	3	3	29	
2.12	Aquaculture														
2.12.1	Develop a manual on aquaculture techniques (building on available material)	3	3	1	1	0	0	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	2	1	-1	0	3	16	
2.12.3	Train and assist farmers on the appropriate fishing techniques and equipment as well as the protection of breeding grounds	3	5	3	5	0	5	0	2	3	-1	3	0	28	
2.13	Socio-economic strengthening														
2.13.1	Create an ecological tourism organisation, train it and provide the necessary starting equipment e.g. a boat	3	5	1	5	0	5	-1	2	3	-1	0	0	22	
2.13.2	Promote horticulture	3	3	3	5	-3	0	-1	2	3	3	-3	0	15	
2.13.3	Promote bee keeping	3	3	3	5	0	3	-1	2	3	-1	-3	0	17	
3. Floods and Droughts Mitigation															
3.1	Flood management and preparedness for floods														
3.1.1	Demarcate areas considered unsafe for habitation or other use and warn inhabitants	5	5	5	3	0	3	-1	2	5	3	3	3	36	
3.1.2	Develop an early flood warning system	1	3	3	3	0	0	0	2	-3	1	3	0	13	
3.1.3	Development / compilation of a hazard / risk map for landslides / sedimentation / floods	3	3	3	3	0	3	0	3	1	3	0	0	22	
3.2	Construction of infrastructure for flood control														
3.2.1	Plan and implement flood retention structures, with cooperation and input from local communities	5	5	5	5	-3	3	-1	2	0	3	3	3	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	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	-3	3	0	2	3	3	3	3	30	
3.3	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	3	3	3	1	0	5	-1	2	2	3	3	3	27	
3.3.2	Livestock improvement programme	1	1	5	5	0	0	0	2	2	3	0	3	22	
3.3.3	Promote dairy farming	3	5	3	5	-3	3	-2	-2	-3	-2	-3	0	4	

4. Social and Institutional Development														
4.1	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	5	5	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	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	0	5	0	2	2	3	3	3	32
4.2	Extension services (information and training)													
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	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	0	5	0	2	2	3	3	3	36
4.3	Awareness raising													
4.3.1	Develop training guidelines and awareness raising materials (building on currently available materials)	5	5	5	3	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	0	5	0	2	-1	3	3	3	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	1	1	5	3	0	3	0	3	0	3	3	0	22
4.3.4	Implement demonstration projects - schools, model farms etc. (capital costed elsewhere)	5	5	5	5	0	5	0	2	-1	1	0	0	27
4.3.5	Introduction of awareness raising programmes in schools	5	5	5	5	0	5	0	2	-1	3	3	3	35
4.4	Institutional capacity building													
4.4.1	Train experts (import expertise) in the development of technology guidelines, training, and other approaches	5	3	1	3	0	5	0	2	3	3	0	3	28
4.4.2	Enhance and strengthen the capacity of BMUs	5	5	3	3	0	5	-1	2	3	-1	3	0	27
4.4.3	Enhance and strengthen the capacity of rice grower associations	3	3	3	5	-5	0	-1	2	3	1	0	0	14
4.5	Legislation and enforcement													
4.5.1	Strengthen enforcement bodies with capacity	5	5	5	5	0	5	0	2	3	1	3	0	34
													Average score for options	22.6
													No of options	77

INTERVENTION SITES FOR THE OPTIONS

District: AMUDAT

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures
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	Naporokocha Lokoma Lomamcheche Chepkararat Lwakai Lokales Karengochoe	Road design, woodlots and agro forestry, bridges for access	120 km from the main road, 10 hectares in each village, 3 bridges
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
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 Naporokocha 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)
1.1.5	River bank protection and stabilisation - gabions, management of cattle access points, protection of riparian vegetation	Amudat	Karita	Lokales	Lokales Lomamchche Moru-arengan Agula Napokocha Karita Center Kaichom	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
1.1.8	Ecological water requirements: Revisiting legislation and catchment assessment	Amudat	N / A	N / A	N / A	N / A	N / A

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures	
1.1.8.1	Introduce improved farming practices	Amudat	Karita	Lokales	Lwakai	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	
					Karita			
					Lokales			
					Lomamcheche			
					Amuna			
					Kaichom			
					Karita			
Naporokocha								
1.1.9	Build the capacity on conservation methods, especially for wetlands	Amudat	Karita	Lokales		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)	
				Karita				
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		
			Karita					
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	
1.2.2	Establish nurseries for provision of seedling and establish distribution, training and management systems in all districts - pilot projects	Amudat	Karita	Lokales	Lomamcheche	3 nurseries	1 nursery per village	
				Karita	Karita TC			
				Losidole	Cheptapoyo			
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	Lomamcheche	Reforestation, woodlots	3 areas of reforestation and 5 places of woodlots	
					Naporokocha			
					Karita			
					Kanyerus			
				Karita	Lwakai			
				Losidok	Cheptapoyo			
1.2.4	Planting trees in degraded areas	Amudat	Karita	Lokales	Kaichum	Trees: Neem, gurutvira, acacia, teak, dryland eucalyptus etc.	2 ha per village	
					Karita			Naporochoch
								Agule
								Lomamcheche
								Lwakai
								Alalam
								Chepkararat

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No. of structures
1.3.1	Regular updating of district wetland inventories by districts	Amudat	Karita		Greek	Establish inventory	1 quarterly update
				Lokales	Lokales		
				Losidok	Lokoma		
1.3.2	Updating of demarcated protection zones and acceptable utilization of wetlands, producing GIS maps of wetlands at various levels	Amudat	Karita	Karita	All	GPS handsets, laptop, computers, updating of zones	3 handsets, 3 laptops
				Lokales	All		
				Losidok	All		
1.3.3	Study for economic valuation of wetland resources and disseminate the results	Amudat	N / A	N / A	N / A	N / A	N / A
1.3.4	Review and update the wetland management / action plans	Amudat	Karita	Lokales	Greek	Conduct quarterly review meetings, review draft action plan for Greek, develop plan for Lokoma	4 in a year
				Losidok	Lokoma		
1.3.5	Restoration of vital (unique) critical (subject to on - going degradation) wetlands	Amudat	Karita	Lokales	Lomamcheche	Create community awareness, plant trees, law enforcement and by-laws	2 villages for awareness creation, 2 wetlands restored
				Karita	Naporokocha		
1.4.1	Mapping, demarcation of riparian and roadside protection zones and identify and implement source protection measures	Amudat	Karita	Lokales	Greek River	GPS, GIS system, maps, signposts, laptops, pillars	3 handsets, 1 GIS, 2 signposts, 3 laptops
				Karita	Karita River		
				Losidok	Lokoma Wetland Chepkararat River		
2.1.1	Improve sanitation technology and building material support and implement them	Amudat	Karita	Lokales	Lwakai	Pit latrines, hand washing facilities, awareness creation	8 pit latrines (4stance plus urinar) per vllage and 8 hand washing facilities per village
					Naporokocha		
					Lokales		
				Karita	Karita		
					Kaichom		
					Kanyerus		
					Amuna		
Losidok	Lokoma						
2.1.2	Improve faecal sludge management (collection, transportation, treatment and re-use) through clustering of small towns (Kumi, Sironko, Kapchorwa, Nakapiripirit)	Amudat	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
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
2.3.2	Soroti treatment and distribution - expand in stages (NWSC)	Amudat	N / A	N / A	N / A	N / A	N / A

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures
2.6.1	Feasibility studies and design of prioritised sand dams. Construction, with cooperation and input from local communities	Amudat	Karita	Lokales	Chepkararat	Construction of sand dams	3 sand dams
					Karita		
				Karita	Karengeboche		
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
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	This area receives moderate rainfall	2 dams
					Karita		
2.8.2	Enhancement of rain fed agriculture	Amudat	Karita	Lokales	Kakoron	Treadle pumps, sprinkler irrigation, introduce short term and drought resistant crops, training of farmers	20 farmers per village
					Narukanes		
					Lokales Ward A		
					Lokales Ward B		
					Agule		
					Moruakuruk		
2.8.3	New irrigation schemes: Undertake feasibility studies of identifies areas	Amudat	Karita	Lokales	Lomancheche	Feasibility studies	5 schemes
					Naporokocha		
					Lokales		
					Karita		
					Kaichom		
2.8.4	Construction of new irrigation schemes: Improved (seasonal) Wetlands Schemes	Amudat	Karita	Lokales	Lomancheche		5 schemes
					Naporokocha		
					Lokales		
					Karita		
					Kaichom		
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
2.8.6	Construction of new irrigation schemes: Simple gravity-fed schemes.	Amudat	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
2.8.8	Construction of new irrigation schemes: Type B formal irrigation Formal Irrigation		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
2.10.1	Investment and implementation in hydropower installations and grid distribution	Amudat	N/A	N / A	N/A	N / A	N / A

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures
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	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
					Naporokocha		
					Lokales		
					Lomamcheche		
				Karita	Amuna		
					Karita		
					Kanyerus		
2.11.2	Promote use of energy efficient woodstoves by making the technology readily available	Amudat	Karita	Karita	Kaichom	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
					Karita		
					Amuna		
				Lokales	Naporokocha		
					Kanyerus		
					Lwakai		
					Lokales		
2.12.1	Develop a manual on aquaculture techniques (building on available material)	Amudat	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
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
2.13.1	Create an ecological tourism organisation, train it and provide the necessary starting equipment e.g a boat	Amudat	Karita	Lokales	Lomamcheche	Create and build capacity of CBOs, build camps, train guides	4 well equipped campsites, 4 cameras, 4 binoculars, 2 capacity buildings of CBOs and guides, 4 guide books
					Arukanes		
					Lokales		
				Karita	Agule		
					Naoporokocha		
2.13.2	Promote horticulture	Amudat	Karita	Lokales	Lokales	Vegetable gardens, introduction of good seeds	20 farmers per village
					Agule		
				Karita	Kakoron		
					Kaichom		

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures
2.13.3	Promote bee keeping	Amudat	Karita	Karita	Kaichom	Beehives, value addition, harvesting, processing and packaging equipment, train farmer groups	600 beehives, 60 pcs of harvesting gear, training of 12 farmer groups
					Karita		
					Amuna		
				Lokales	Lwakai		
					Lomamcheche		
					Kanyerus		
3.1.1	Demarcate areas considered unsafe for habitation or other use and warn inhabitants	Amudat	Karita	Lokales	Naporokocha	Discussion with people of settlement in game reserve	
					Lokoma		
					Arukanes		
					Agule		
					Lomamcheche		
3.1.2	Develop an early flood warning system	Amudat	Karita	Lokales	Lokales	Early warning systems	6
					Agule		
					Arukanes		
					Kakoron		
					Moruakuruk		
					Lomamcheche		
3.1.3	Development / Compilation of hazard / risk map for landslides / sedimentation / floods	Amudat	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	Amudat	N/A	N / A	N/A	N / A	N / A
3.3.2	Livestock improvement programme	Amudat	Karita	Karita	Lomamcheche	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
					Lokales		
					Karita		
					Kaichom		
					Lokoma		

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures
3.3.3	Promote dairy farming	Amudat	Karita	Lokales	Kaichom Karita Amuna Naporokocha 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
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
4.1.2	Expand, rehabilitate, and improve the water quality, evaporation, rainfall, ground water and streamflow monitoring network systems systems and lake and wetland water level monitoring gauges. Implement sedimentation monitoring	Amudat	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
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		Train committed cadres	3 (1 per parish)
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
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
4.3.2	Introduction of a community radio programme dedicated to environmental matters	Amudat	Karita	Lokales Karita Losidok		Develop a radio station for Amudat, community radio programmes, radio listening clubs	1 radio station, 3 (1 per parish)
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	Lokales	Kaichom Karita Amuna Naporokocha Lwakai Lomamcheche Lokales Kanyerus	Train on waste management of disposal at household level on human waste, awareness raising	8 villages
4.3.4	Implement demonstration projects - schools, model farms etc. (capital costed elsewhere)	Amudat	Karita	Lokales Kaita	Lokales P/S Karita P/S	Model schools farms	2

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures
4.3.5	Introduction of awareness raising programmes in schools.	Amudat	Karita	Lokales	Lokales P/S	Awareness raising	3
				Karita	Karita P/S		
				Losidok	Chetapoyo P/S		
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
4.4.3	Enhance and strengthen the capacity of rice grower associations	Amudat	N / A	N / A	N / A	N / A	N / A
4.5.1	Strengthen enforcement bodies with capacity	Amudat	Karita	Karita		Strengthen environmental committees, strengthen law enforcement bodies (police, UWA, LDUs)	2 x 3 per parish
				Lokales			
				Losidok			
	Construct piped borne water supply systems	Amudat	Karita	Lokales	Kaichom	Piped water systems	8 schemes
					Karita		
					Amuna		
					Naporokocha		
					Kanyerus		
					Lokales		
					Lwakai		
					Lomamcheche		

INTERVENTION SITES FOR THE OPTIONS

District: BUKEDEA

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures
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	Bukedea	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	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
1.1.3	Identification and regular (annual)eradication of floating islands/ invasive alien plants	Bukedea	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	Bukedea	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	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
1.1.8	Ecological water requirements: revisiting legislation and catchment assessment	Bukedea	N/A	N/A	N/A	N/A	N/A
1.1.8.1	Introduce improved farming practices	Bukedea	Kachumbala	Kotia	Kotia	Organic farming (compost & slurry), field ditches, hedgerows, strip ban	20 households
				Akwarikwar	Akwarikwar	Agroforestry & zero grazing	20 households
				Kajamaka	Kalupo	Hedgerows, strip bans	20 households
				Katekwan	Katekwan	Cattle tracks	5
			Kidongole	Koena	Koena	Agroforestry & woodlots	10 ha respectively
1.1.9	Build the capacity on conservation methods, especially for wetlands	Bukedea	Kachumbala HQ			Training of environmental committees in wetlands on wetland management	60 people per S/C (1 committee per SC)
			Bukedea TC				
			Kolir HQ				
			Malera HQ				
			Bukedea HQ				
1.1.10	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
1.2.1	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
1.2.2	Establish nurseries for provision of seedling and establish distribution, training and management systems in all districts - pilot projects	Bukedea	Bukedea HQ	Kamon	Kamon	Nurseries	1 nursery per village
			Kolir	Kolir	Kolir		
			Bukedea TC	Emokori	Emokori		
			Kachumbala	Kachumbala	Kachumbala		
			Kidongole	Kidongole	Kidongole		
			Malera	Kabarwa	Kabarwa		

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures
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	Bukedea	Bukedea HQ	Kamon	Kamon	Capacity building, woodlots, tree planting	30 ha per village, 6 community sensitisations
			Kolir	Kolir	Kolir		
			Bukedea TC	Emokori	Emokori		
			Kachumbala	Kachumbala	Kachumbala		
			Kidongole	Kidongole	Kidongole		
1.2.4	Planting trees in degraded areas	Bukedea	Kachumbala	Kachumbala	Kachumbala	Tree seedlings	30 ha
1.3.1	Regular updating of district wetland inventories by districts	Bukedea	Bukedea HQ	Kamon	Kamon wetland	GIS Software, GPS, procurement of computers, water proof ware	Wetland inventory exists, but requires updating
			Kolir	Kolir	Kolir wetland		
			Bukedea TC	Emokori B	Anyebo wetland		
				Oswapai	Oswapai wetland		
				Okunguro	Obiro wetland		
			Kachumbala	Emokori	Emokori wetland		
			Kachumbala	Kachumbala	Kachumbala wetland		
				Kobori	Kobori wetland		
				Katekwan	Katekwan wetland		
			Kidongole	Kidongole	Kidongole wetland		
Kotiokot	Aakol wetland						
Malera	Kabarwa	Kabarwa wetland					
1.3.2	Updating of demarcated protection zones and acceptable utilization of wetlands, producing GIS maps of wetlands at various levels	Bukedea	Bukedea TC	Emokori B	Anyebo wetland	Provide GIS Software, GPS, computers for updating of the demarcated zones	Update demarcations
				Oswapai	Oswapai wetland		
				Okunguro	Obiro wetland		
			Kidongole	Kobori	Kobori wetland		
			Malera	Katekwan	Katekwan wetland		
Malera	Kotiokot	Aakol wetland					
1.3.3	Study for economic valuation of wetland resources and disseminate the results	Bukedea	N/A	N/A	N/A	N/A	N/A
1.3.4	Review and update the wetland management / action plans	Bukedea	Bukedea HQ	Kamon	Kamon wetland	Need for review of the action plans	1 per S/C
			Kolir	Kolir	Kolir wetland		
			Bukedea TC	Emokori	Emokori wetland		
			Kachumbala	Kachumbala	Kachumbala wetland		
			Kidongole	Kidongole	Kidongole wetland		
Malera	Kabarwa	Kabarwa wetland					
1.3.5	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		
			Malera	Katekwan	Katekwan wetland		
Malera	Kotiokot	Aakol wetland					
1.4.1	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
2.1.1	Improve sanitation technology and building material support and implement them	Bukedea	Bukedea TC	Amunit	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)
					Busano HC111		
				Kolir	Tajar P/S		
					Tajar HC11		
				Malera	Kangole P/S		
Bukedea TC	Kangole HC11	Kangole TC	Emokori-Cattle market				

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures						
2.1.2	Improve faecal sludge management (collection, transportation, treatment and reuse) through clustering of small towns	Bukedea	N/A	N/A	N/A	N/A	N/A						
2.2.2	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											
2.3.1	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						
2.3.2	Soroti treatment and distribution - expand in stages (NWSC)	Bukedea	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	Bukedea	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	Bukedea	Malera	Aminit	Aminit	Valley dams	5						
				Kolir	Kamatur			Kamatur					
				Kangole	Kangole			Kangole					
					Kaleu			Kaleu					
					Kodike			Kodike					
2.7.2	Feasibility & design of prioritized dams for stock watering and humans needs. Construction, with cooperation and input from local communities	Bukedea	Malera	Aminit	Aminit	Valley dams	5						
				Kolir	Kamatur			Kamatur					
				Kangole	Kangole			Kangole					
					Kaleu			Kaleu					
					Kodike			Kodike					
2.8.2	Enhancement of rain fed agriculture	Bukedea	Malera	Kokwech	Kokwech	Underground pumps, delivery pumps for irrigation, best farming practices (mulching, contours)	15 farmers per village						
				Kotiokot	Kamuno			Sagam					
					Komongmeri			Komongmeri	Akou Etom				
				Bukedea HQ	Kocheka			Kocheka	Omonyono				
				Bukedea TC	Kacabul			Apopo					
				2.8.3	New irrigation schemes: Undertake feasibility studies of identifies areas			Bukedea	Malera	Kamatur	Kamatur	Undertake feasibility studies	8 schemes
										Kolir	Tajar		
Kocus	Kocus												
Aminit	Aminit												
Kangole	Kangole	Kaleu											
	Kaleu	Kaleu											
	Kodike	Kodike											
	Koreng	Koreng											
2.8.4	Construction of new irrigation schemes: Improved (seasonal) Wetlands Schemes	Bukedea	Malera	Kamatur	Kamatur	Valley dams	8 schemes						
				Kolir	Tajar			Tajar					
					Kocus			Kocus					
					Aminit			Aminit					
				Kangole	Kangole			Kangole					
					Kaleu			Kaleu					
					Kodike			Kodike					
Koreng	Koreng												

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures
2.8.5	Construction of new irrigation schemes: Low - power pumped schemes that utilize water from nearby rivers, swamps and lakes	Bukedea	Kolir	Kamatur	Kamatur		8 schemes
				Tajar	Tajar		
				Kocus	Kocus		
				Aminit	Aminit		
			Malera	Kangole	Kangole		
				Kaleu	Kaleu		
				Kodike	Kodike		
				Koreng	Koreng		
2.8.6	Construction of new irrigation schemes: Simple gravity - fed schemes	Bukedea	Kolir	Kamatur	Kamatur		8 schemes
				Tajar	Tajar		
				Kocus	Kocus		
				Aminit	Aminit		
			Malera	Kangole	Kangole		
				Kaleu	Kaleu		
				Kodike	Kodike		
				Koreng	Koreng		
2.8.7	Construction of new irrigation schemes: Type A Formal Irrigation	Bukedea	N/A	N/A	N/A	N/A	N/A
2.8.8	Construction of new irrigation schemes: Type B Formal Irrigation	Bukedea	N/A	N/A	N/A	N/A	N/A
2.9.1	Water efficiency evaluation and recommendations	Bukedea	N/A	N/A	N/A	N/A	N/A
2.10.1	Investment and implementation in hydropower installations and grid distribution	Bukedea	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	Bukedea	Bukedea HQ	Suula	Suula P/S	Solar panels and biogas technology	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		
2.11.2	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			
			Kachumbala	Suula	Aloet		
				Kwarikwari	Kwarikar		
				Nyakoi			
				Aligoi	Aligoi		
			Kidongole	Kanyamutamu	Kanyamutamu A		
				Kanyamutamu	Kanyamutamu B		
				Koena	Koena A		
				Koena	Koena B		
2.12.1	Develop a manual on aquaculture techniques (building on available material)	Bukedea	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	Bukedea	Malera	Kangole	Matata	Construct new ponds, fish fingerlings, fish feeds, training on mangement of the ponds	1 pond per village, 1 farmer per village
				Kotiokot	Kotiokot		
			Bukedea HQ	Bukedea	Suula		
2.12.3	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)		

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures
2.13.1	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 (Rocks site painting)		
2.13.2	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
				Kodike	Kodike		
			Bukedea TC	Kaleu	Kaleu		
			Bukedea TC	Kachabu	Apopo		
				Tajar	Tajar		
			Kolir	Kamutur	Kamutur		
2.13.3	Promote bee keeping	Bukedea	Kidongole	Chodong	Chodong A Chodong B	Train farmers, beehives, harvesting gear, processing equipments, storage tanks, packaging material	5 farmers per village
				Kajamaka	Kosirye		
					Kawuje		
			Bukedea HQ	Kasoka	Kasoka		
					Ajamaka		
					Okunguro Parents		
			Bukedea TC	Okunguro Parent	Sagam		
					Ogaalam		
				Apopong	Popong		
			Kolir	Agangam	Agangam		
				Komongmeri	AkouEtom		
			Kachumbala	Aligoi	Aligoi		
					Kachinga		
			Malera	Malera	Kangole		
3.1.1	Demarcate areas considered unsafe for habitation or other use and warn inhabitants	Bukedea		Kamutur	Kamutur		8 villages
				Tajar	Tajar		
			Kolir	Kocus	Kocus		
				Aminit	Aminit		
				Kangole	Kangole		
				Kaleu	Kaleu		
			Malera	Kodike	Kodike		
				Koreng	Koreng		
3.1.2	Develop an early flood warning system	Bukedea		Kamutur	Kamutur	Early warning systems	8 villages
				Tajar	Tajar		
			Kolir	Kocus	Kocus		
				Aminit	Aminit		
				Kangole	Kangole		
				Kaleu	Kaleu		
			Malera	Kodike	Kodike		
				Koreng	Koreng		
3.1.3	Development / Compilation of hazard / risk map for landslides / sedimentation / floods	Bukedea	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	Bukedea	N/A	N/A	N/A	N/A	N/A

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures
3.3.2	Livestock Improvement Programme	Bukedea	Malera	Kangole	Kangole	Construction of cattle cruches / troughs, improved fodder, exotic bulls, artificial insemination, veterinary 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
					Kaleleu		
				Kodike	Kodike		
					Akungur		
				Kobaale	Kobaale		
					Aparis		
				Koreng	Koreng		
			Kamailuk				
			Kolir	Kotiokot	Kotiokot		
					Kamuno		
				Aminit	Aminit		
					Busaano		
				Kamutur	Kamutur		
					Kocus		
Kodiata	Kodiata						
	Amuwen						
3.3.3	Promote dairy farming	Bukedea	Malera	Kangole	Kangole	Milk coolers, transportation cans, exotic dairy cows, spray pumps, artificial insemination, veterinary services, training farmers	5 farmers per village trained on dairy farming practices and equipped
					Kaleleu		
				Kodike	Kodike		
					Akungur		
				Kobaale	Kobaale		
					Aparis		
				Koreng	Koreng		
			Kamailuk				
			Kolir	Kotiokot	Kotiokot		
					Kamuno		
				Aminit	Aminit		
					Busaano		
				Kamutur	Kamutur		
					Kocus		
Kodiata	Kodiata						
	Amuwen						
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	Bukedea	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	Bukedea	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.	Bukedea	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.	Bukedea	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)	Bukedea	N/A	N/A	N/A	N/A	N/A

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures
4.3.1	Develop training guidelines and awareness raising materials (building on currently available materials)	Bukedea	N/A	N/A	N/A	N/A	N/A
4.3.2	Introduction of a community radio programme dedicated to environmental matters	Bukedea				Environmental programme using the radio station in Kumi	2 emissions per 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	Bukedea	Bukedea TC	Kolir Komonmeri Kachumbala Kidongole Emokori A Suula	Kolir P/S Komongmeri P/S Kachumbala P/S Kotia P/S Kidongole P/S Kosiro P/S Bukedea SS Suuna 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
4.3.4	Implement demonstration projects - schools, model farms etc. (capital costed elsewhere)	Bukedea	Bukedea TC Kidongole Kachumbala Kolir	Emokori A Emokori B Suula Akwooro Kamon Kidongole H/Q Kosiro Kachumbala Kachumbala Kolir Komonmeri	Bukedea P/S Bukedea SS Bukedea Township Suuna P/S Akwooro P/S Kamon P/S Kidongole P/S Kosiro P/S Kachumbala P/S Kotia P/S Kolir P/S Komongmeri P/S	Woodlots, seedlings, wheel barrows, garden forks, hoes, pangas	Woodlots - 1 acre per school
4.3.5	Introduction of awareness raising programmes in schools	Bukedea	Bukedea TC Kidongole Kachumbala Kolir	Emokori A Emokori B Suula Akwooro Kamon Kidongole H/Q Kosiro Kachumbala Kachumbala Kolir Komonmeri	Bukedea P/S Bukedea SS Bukedea Township Suuna P/S Akwooro P/S Kamon P/S Kidongole P/S Kosiro P/S Kachumbala P/S Kotia P/S Kolir P/S Komongmeri P/S	Establish environmental clubs, ICT materials, drama clubs	12 schools
4.4.1	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
4.4.2	Enhance and strengthen the capacity of BMUs	Bukedea	Malera	Kangole Kotiokot	Kangole (L.Matata) Kotiokot (L.Aakol)	Establish BMUs and train members	2
4.4.3	Enhance and strengthen the capacity of rice grower associations	Bukedea	Bukedea TC Malera	Kidongole Kobori Katekwan Emokori Oswapai wetland Okunguro Kotiokot	Kobori wetland Katekwan wetland Anyebo wetland Oswapai wetland Obiro wetland Aakol 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
4.5.1	Strengthen enforcement bodies with capacity	Bukedea	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	
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	
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	
				Kapsenton	Kapkorosoi			
				Kabei	Kitau			
			Chesower	Nyalit	Bisho			Roroa
					Cheptandan			
					Chesower			
					Chemuron			
					Chepkwasta			
Tulel	Kabukwo	Turlwo						
1.1.3	Identification and regular (annually) eradication of floating islands / invasive alien plants	Bukwo	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	Bukwo	Riwo	Aralam	Aralam	Develop a fire control and protection plan for grazing and biodiversity, form and train committees for fire fighting and management	1 committee per village	
					Ngeny			
			Lower Tulel	Chepkwir	Turo			
					Tuwobei			
			Kamet	Mokoyon	Mokoyon			
1.1.5	River bank protection and stabilisation - gabions, management of cattle access points, protection of riparian vegetation	Bukwo	Chesower	Nyalit (R. Nyalit)	Kamunjan	4 cattle access points, gabions, tree planting: 4 km		
					Molol			
			Tulel/Kamet	Kapumolon (R. Chepkwir)	Kapsiywo	6 cattle access points, tree planting: 8 km		
					Rorok			
					Kapumolon			
			Kabei	Kapteret (R. Kapteret)	Kapumolon	8 cattle access points, tree planting: 7 km		
					Chekwir			
		Kapteret						
		Korosho						
1.1.8	Ecological water requirements: Revisiting legislation and catchment assessment	Bukwo	N/A	N/A	N/A	N/A		

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures
1.1.8.1	Introduce improved farming practices (as learning centres)	Bukwo	Kamet	Yemitek	Browon	Zero grazing, napier grass, contour bunds, agroforestry, mulching, fencing, fruit trees, vegetables, coffee, bananas	Train 10 farmers per village
			Riwo	Brim	Brim		
			Kortek	Kobobei	Kobobei		
			Chesower	Siit	Chepkwasta		
			Kabei	Kapsemeton	Kapsemeton		
			Tulel	Tulel	Korot		
1.1.9	Build the capacity on conservation methods especially for wetlands	Bukwo	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	Bukwo	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	Bukwo	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	Nyalit	Nyalit	Create and train a nursery management team, soil materials, seeds incl. moringa, fodder and napier grass, coffee, vegetables, avocado, jackfruit; gardening equipment	3 nurseries
			Kamet	Yemitek	Chemataw		
			Kabei	Kapsemeton	Kapsemeton		
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	Kapteret	Kona	Tree planting: local and agroforestry species, woodlots: indigeneous and multipurpose trees e.g suspana	2 ha per parish
				Brim	Shambabel		
			Riwo	Aralam	Aralam		
			Kamet	Mokoyon	Kongta		
			Tulel	Kabukwo	Rorok		
			Chesower	Bisho	Bisho		
1.2.4	Planting trees in degraded areas	Bukwo	Kortek	Chesimat	Sindet	Indigeneous and multipurpose trees	1 ha per village
					Chesimat		
					Sosur		
					Rwandoi		
					Kokorwo		
					Kapsikwa		
					Chebinying		
					Chebuyonon		
1.3.1	Regular updating of district wetland inventories by districts	Bukwo	N/A	N/A	N/A	N/A	N/A
1.3.2	utilization of wetlands, producing GIS maps of wetlands at various levels	Bukwo	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

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures	
1.3.4	Review and update the wetland management / action plans	Bukwo	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	
1.4.1	Mapping, demarcation of riparian and roadside protection zones and identify and implement source protection measures	Bukwo	Chesower	Nyalit (R. Nyalit)	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		
					Molol			
					Kapsiywo			
					Rorok			
					Nyalit			
					Kapkumolon			
					Chekwir			
Kapteret (R. Kapteret)	Kapteret							
Kabei	Korosho							
2.1.1	Improve sanitation technology, and building materials, support and implement them	Bukwo	Chesower			Ecosan toilets, train households on usage of ecosan toilets incl. composting, management of waste	20 ecosan toilets per S/C on household level (following criteria to be developed)	
								Kabei
								Kamet
								Tulel
								Riwo
								Kartek
2.1.2	Improve faecal sludge management (collection, transportation, treatment and re-use) through clustering of small towns (Kumi, Sironko, Kapchorwa, Nakapiripirit)	Bukwo	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	
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	
2.3.2	Soroti treatment and distribution - expand in stages (NWSC)	Bukwo	N/A	N/A	N/A	N/A	N/A	
2.6.1	Feasibility studies and design of priotised sand dams. Construction with co operation and input from local communities	Bukwo	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	
2.7.2	Feasibility and design of priotised 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	
					Riwo			Aralam
					Tulel			Chekwir

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures
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
				Lwongon	Tarack		
			Riwo	Kapchemogen	Kapchemogen		
				Aralam	Kewarwang		
			Tulel	Chekwir	Chemuron		
	Kapswama	Kaptobori					
2.8.3	New irrigation schemes: Undertake feasibility studies of identified areas	Bukwo	Chesower	R.Siit		from GFS	
			Kamet/Tulel	R. Nyalit			
2.8.4	Construction of new irrigation schemes: Improved (seasonal) wetland schemes	Bukwo	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
2.8.6	Construction of new irrigation schemes: Simple gravity- fed schemes	Bukwo	Chesower	R.Siit			3 schemes
			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
			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
2.9.1	Water efficiency evaluation and recommendations	Bukwo	N/A	N/A	N/A	N/A	N/A
2.10.1	Investment and imlementation in hydropower installations and grid distribution	Bukwo				R. Siit and R. Nyalit to be taken for hydro power by rural electrification programme	
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	Chesower			Solar systems for households (to be identified according to criteria to generate income through the system), bio gas	50 solar systems per S/C, 1 bio gas per S/C (villages to be identified)
			Kabei				
			Kamet				
			Tulel				
			Riwo				
			Kortek				

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures
2.11.2	Promote use of energy efficient woodstoves by making the technology readily available	Bukwo	Kamet	Kamet	Moson	Woodstoves at household level and in secondary schools (Kabei SS, Chesower SS, Tulel SS, Kordek Girls SS)	Identify, train and equip 10 households per village as trainers of trainers, sensitisations in 12 villages
					Chemenen		
			Riwo	Kapkware	Sheptuimat		
					Tuyet		
			Kortek	Kapkokoyo	Munda		
					Siron		
			Tulel	Mayak	Kosori		
					Koikoi		
2.12.1	Develop a manual on aquaculture techniques (building on available materials)	Bukwo	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	Bukwo	Kamet	Kamet	Chebeny	Construct 6 new ponds	1 farmer per village
			Chesower	Chesower	Chesower		
			Kortek	Kabobei	Tulwo		
			Riwo	Chepsiokei	Chepsiokei		
			Kabei	Kapsemeton	Kapsemeton		
			Tulel	Tulel	Masasha		
2.12.3	techniques and equipment as well as the protection of	Bukwo	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		Nyalit	Nyalit	Form and train an eco tourism organisation, train and equip 4 guides, 2 binoculars, advertisement material: maps, brochures, internet, develop 2 campsites	
			Chesower	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
			Kamet	Mokoyon	Mokoyon		
					Lungwa		
			Kabei	Kabei	Makunga		
					Kween		
			Kortek	Kubobei	Kapkoras		
					Bumatoy		
			Chesower	Chesower	Torokyo		
				Burkeywo	Leketetwo		
					Kakworosoy		
	Tulel	Chepkwir	Tuyobei				

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures
2.13.3	Promote bee keeping	Bukwo	Chesower	Nyalit	Siit	Bee hives, train and equip farmers, establish processing and packaging sites, promote bee keepers association and train them	2 farmers per village, promote beekeeping associations and train them
					Molol		
					Chesower		
					Chesmat		
					Kongta		
					Sumotwit		
					Kapngaran		
					Kwanwa		
3.1.1	Demarcate areas considered unsafe for habitation or other use and warn inhabitants	Bukwo	Kabei	Kapteret	Kapteret	Landslide areas: demarcation	
					Yemitek		
3.1.2	Develop an early flood warning system	Bukwo	Kabei	Kapteret	Kapteret	Landslide areas	3 early warning systems
					Yemitek		
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
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
3.3.2	Livestock improvement programme	Bukwo	Tulel	Chepkwir	Riwo	Improved breeds (cross breeds) incl. bulls, cattle dips and crushes, artificial insemination, improved fodder, good breeds of goat and sheep, zero grazing units, vetenairy services improved: vaccination, tick control	11 villages
					Aralam		
					Mokoyon		
					Mokoyon		
					Lungwa		
					Makunga		
					Kween		
					Kapkoras		
3.3.2	Livestock improvement programme	Bukwo	Tulel	Chepkwir	Bumatoyo	Improved breeds (cross breeds) incl. bulls, cattle dips and crushes, artificial insemination, improved fodder, good breeds of goat and sheep, zero grazing units, vetenairy services improved: vaccination, tick control	11 villages
					Torokyo		
3.3.2	Livestock improvement programme	Bukwo	Tulel	Chepkwir	Leketetwo	Improved breeds (cross breeds) incl. bulls, cattle dips and crushes, artificial insemination, improved fodder, good breeds of goat and sheep, zero grazing units, vetenairy services improved: vaccination, tick control	11 villages
					Kakworosoy		
3.3.2	Livestock improvement programme	Bukwo	Tulel	Chepkwir	Tuyobei	Improved breeds (cross breeds) incl. bulls, cattle dips and crushes, artificial insemination, improved fodder, good breeds of goat and sheep, zero grazing units, vetenairy services improved: vaccination, tick control	11 villages

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures
3.3.3	Promote dairy farming	Bukwo	Riwo	Aralam	Aralam	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
			Kamet	Mokoyon	Mokoyon		
			Kabei	Kabei	Lungwa		
					Makunga		
			Kortek	Kubobei	Kween		
					Kapkoras		
			Chesower	Chesower	Bumatoy		
					Torokyo		
Tulel	Chepkwir	Leketetwo					
		Kakworosoy					
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
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
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
4.2.1	Train a committed cadre of extension service providers to render interdisciplinary, integrated extension service to include CMCs, CDOs etc.	Bukwo	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
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
4.3.2	Introduction of a community radio programme dedicated to environmental matters (community radio Bukwo FM exists)	Bukwo				Establish an environmental programme	

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures
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 P/S	VIP lined latrines for schools with hand washing facilities, form and train management committees (6 people per committee)	16 schools
					Kamunjan P/S		
			Tulel	Tulel	Tulel P/S		
					Kapsiwo P/S		
					Kabokwa P/S		
					Koikoi P/S		
					Chemrot P/S		
					Kamet 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					
4.3.4	Implement demonstration projects - schools, model farms etc. (capital costed elsewhere)	Bukwo	Chesower	Chesower	Chesower P/S	Agroforestry, woodlots, nursery establishment at the schools and model farms	16 P/S, 4 SS and 2 model farms
					Chesower SS		
					Kamunjan P/S		
			Tulel	Tulel	Tulel P/S		
					Tulel 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		
Tulel	Tulel	Kamokoyon model farm					

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures
4.3.5	Introduction of awareness raising programmes in schools	Bukwo	Chesower	Chesower	Chesower P/S		
					Chesower SS		
					Kamunjan P/S		
			Tulel	Tulel	Tulel P/S		
					Tulel SS		
					Kapsiwo P/S		
					Kabokwa P/S		
					Koikoi P/S		
					Chemrot P/S		
					Kamet		
			Kamet	Yemitek	Chekwir P/S		
					Kabei		
			Kapseneton P/S				
			Kabei P/S				
Kabei SS							
Kortek	Kortek	Kortek P/S					
		Kortek Girls SS					
		Chesimat P/S					
Riwo	Aralam	Brim P/S					
		Aralam P/S					
4.4.1	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
4.4.2	Enhance and strengthen the capacity of BMUs	Bukwo	N/A	N/A	N/A	N/A	N/A
4.4.3	Enhance and strengthen the capacity of rice grower associations	Bukwo	N/A	N/A	N/A	N/A	N/A
4.5.1	Strengthen enforcement bodies with capacity	Bukwo	N/A	N/A	N/A	N/A	N/A

INTERVENTION SITES FOR THE OPTIONS

District: BULAMBULI

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures
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
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 Lusozi Upper	Runoff management and agroforestry in each village	4 runoffs and 4 agroforestry
			Buluganya	Sooti	Sooti Kikolo		
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
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
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	Stabilization - gabions on Rivers Sisiyi, Simu and Sipi	10 kms on each river in the areas where they have been heavily eroded
			Bwikhonge	Buwekanda	Bunamono Bumukoye Sipi B		
1.1.8	Ecological water requirements: Revisiting legislation and catchment assessment	Bulambuli	N / A	N / A	N / A	N / A	N / A
1.1.8.1	Introduce improved farming practices	Bulambuli	Bumasobo	Lusaso	Buwokadola	Agro forestry trees, training of 15 farmers in each village	200,000 seedlings of trees friendly to crops
					Makutano Tobongoni Gibuzale		
1.1.9	Build the capacity on conservation methods, especially for wetlands	Bulambuli	Bunambutye	Bumufuni	Buwebele	Sensitization of the local communities and empowering local environment committees	3 committees (1 in each village)
			Bwikhonge	Bunalwere	Sipi 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	Bulambuli	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	Bulambuli	N / A	N / A	N / A	N / A	N / A

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures	
1.2.2	Establish nurseries for provision of seedlings and establish distribution, training and management systems in all districts - pilot projects	Bulambuli	Muyembe	Bumugoya	Bumugoya	1 tree nursery	1 tree nursery	
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	Bulambuli	Bwikhonge	Bulumera	Bulemera Bukhaboyo Bukiyabi	Agro forestry trees along the land boundaries in all the 4 villages (3 kms in each village)	30 trees per boundary	
			Bunambutye	Bumufuni	Buwebele			
1.2.4	Planting trees in degraded areas	Bulambuli	Nabbongo	Bunangaka	Bunamono	Planting trees in degraded areas (5 ha)	200,000 trees for the 5 villages	
			Muyembe	Bumugoya	Bunanimi			
			Bwikhonge	Bunalwere	Sipi A			
			Bulengeni	Mbigi	Mbigi			
			Bulambutye	Buluguya	Bulwanga			
1.3.1	Regular updating of district wetland inventories by districts.	Bulambuli	Bukhalu	Atari		Wetlands on River Atari, Sipi, Muyembe, Simu and Sironko: Develop district wetland inventory and update it regularly	Extract wetland names, locations etc. from Sironko district wetland inventory, establish it and regularly update it	
				Tabakonyi				
				Kaptokoyi				
				Bulukuyu				
				Bunambutye	Bumfuni			
				Bwikhonge	Buwabala			
					Cheputui			
				Muyembe	Bumukoya			
					Bungwanyi			
					Buwagogo			
				Bulegeni	Simu			
					Mbigi			
					Samazi			
				Nabbongo	Bunagaka			
					Bufumbura			
Bukhalu	Bufukhula							
	Simu							
	Busabulo							
	Busiu							
	Bunalwere							
Bukhalu								

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

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures
1.3.4	Review and update the wetland management / action plans	Bulambuli	Bukhalu	Bufukhula		Establish wetland management action plans	Regularly update the wetlands management plans
				Simu			
				Busabulo			
				Busiu			
				Bunalwere			
				Bukhalu			
1.3.5	Restoration of vital (unique) critical (subject to on - going degradation) wetlands	Bulambuli	Bunambutye	Bumufuni		De-silting rivers and revegetation along river banks	
			Bwikhonge	Buwabala			
				Cheputui			
1.4.1	Mapping, demarcation of riparian and roadside protection zones and identify and implement source protection measures	Bulambuli	Bulegeni	Samazi	River Simu	Embankment, de-silting of the river and establish a riparian buffer zone	A stretch of 20 kms
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 10stances in each village
			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
2.2.2	Refurbish valley dams and tanks	Bulambuli	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
2.3.2	Soroti treatment and distribution - expand in stages (NWSC)	Bulambuli	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
2.7.1	Needs identification for location and type of dams and associated abstraction facilities	Bulambuli	Bunambutye	Bushanji	Bulweta	Construction of valley dams	3 valley dams, 1 in each village
			Nabbongo	Bumasokho	Bumasokho		
			Bukhalu	Bunalwere	Bunalwere 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
2.8.2	Enhancement of rain fed agriculture	Bulambuli	Nabbongo	Buwakooli	Bunambutye	Roof water tanks (30 in each village)	90 roof water tanks in the 3 villages
			Bulegeni		Nakitwe		
				Samazi	Nakifumboko		
2.8.3	New irrigation schemes: Undertake feasibility studies of identifies areas	Bulambuli	Bunambutye	Bunaganda	Bukitanga	River Tabakonyi	6 irrigation schemes
			Bwikhonge	Buwekanda	Bumayana	River Cheptuyi	
			Nabbongo	Bufumbula	Butta	River Sipi	
			Muyembe	Buyaka	Yembe	River Muyembe	
			Bukhalu	Busiu	Buwakhanyunyi	River Simu	
			Bulegeni	Samazi	Suguta	River Simu	

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures
2.8.4	Construction of new irrigation schemes: Improved (seasonal) Wetlands Schemes	Bulambuli	Bwikhonge	Bunalwera	Bushiende	Irrigation channels	A total of 6 kms
			Bukhalu	Simu	Simu A Simu B		
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 Buwakhanyunyi B	River Simu: Treadle pumps	3 treadle pumps in each village
2.8.6	Construction of new irrigation schemes: Simple gravity - fed schemes	Bulambuli	Bunambutye	Buluguya	Buwebele Bugobera	Gravity flow schemes	2 GFS
2.8.7	Construction of new irrigation schemes: Type A Formal Irrigation	Bulambuli	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	
2.9.1	Water efficiency evaluation and recommendations	Bulambuli	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
			Bulaago	Bugatisa	Kajere Falls		
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 Nakizungu	Bukibologoto P/S Simu HC	2 solar panels (1 in each institution)
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 materials and the appropriate technology	20 households per village
			Bukhalu	Bushienda	Bushienda		
			Muyembe	Bumugoya	Simu Corner TC		
			Nabbongo	Buwakholi	Buwakholi		
			Bwikhonge	Bulumara	Bumatsopa		
			Bunambutye	Buwebele	Busangai		
			Bulambuli TC	Bulambuli TC	Administration Cell		
2.12.1	Develop a manual on aquaculture techniques (building on available material)	Bulambuli	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	Bumwambu	Kidega	New fish ponds	1 per village
			Muyembe	Buyeke	Bushitimo		
2.12.3	Train and assist farmers on the appropriate fishing techniques and equipment as well as the protection of breeding grounds	Bulambuli	Muyembe	Bungwanyi	Bukywaka A Bukywaka B	Train fishermen on the appropriate technology and equip them	5 fishermen per village
					Bunabiuro		
			Bwikhonge	Bwikhonge	Bulako		
2.13.1	Create an ecological tourism organisation, train it and provide the necessary starting equipment e.g a boat	Bulambuli	Bulago	Tunyi	Dooba	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
			Bumasobo	Bwokhadala	Buwakhadala TC		
			Buginyanya	Logoli	Lusozi Upper		

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures
2.13.2	Promote horticulture	Bulambuli	Lusha	Bumwambu	Bumwambu	Train 20 homesteads in each village and equip them with seeds, fertilizers, watering cans, hoes, pangas and pesticides	40 homesteads
			Namisuni	Namudongo	Mabono		
2.13.3	Promote bee keeping	Bulambuli	Bumugibole	Mayiyi	Mayiyi	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 behives for each homestead and an organised training on honey production in each parish
					Matunda		
					Masesegura A		
			Masira	Ganzo	Masesegura B		
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
			Sisiyi	Luzzi	Tabari		
			Bumasobo	Bugimwela	Lugula		
			Bulugaya	Sooti	Sooti		
			Flooding: Bukhalu	Bunamuye	Bududa		
			Bunambutye	Buluguya	Buzema		
			Nabbongo	Bufumbula	Bufumbula		
3.1.2	Develop an early flood warning system	Bulambuli	Landslides: Namisumi	Gamatimbei	Kalitusi	Deveop an early warning system in the demarcated areas in each village	Install early warning equipment in each demarcated area e.g. automatic weather stations
			Sisiyi	Luzzi	Tabari		
			Bumasobo	Bugimwela	Lugula		
			Bulugaya	Sooti	Sooti		
			Flooding: 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
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	N / A	N / A	N / A	N / A	N / A

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures
3.3.2	Livestock improvement programme	Bulambuli	Muyembe	Bungwanyi	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
					Bukywaka B		
			Bwikhonge	Bwikhonge	Bunabiiro		
					Bulako		
3.3.3	Promote dairy farming	Bulambuli	Muyembe	Bungwanyi	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
					Bukywaka B		
			Bwikhonge	Bwikhonge	Bunabiiro		
					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
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
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
4.2.1	Train a committed cadre of extension service providers to render interdisciplinary, integrated extension service to include CMCs, CDOs etc.	Bulambuli	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
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
4.3.2	Introduction of a community radio programme dedicated to environmental matters	Bulambuli	District HQ			Air environment related programmes	3 programmes a week

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures
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	5stance VIP latrines	1 in each school
			Nabbongo	Bujumbura	Buwashaba P/S		
				Bunangaka	Bunongaka P/S		
			Bwikhonge	Bwikhonge	Bwikhonge P/S		
				Buyaga	Buyaga P/S		
			Bulengeni	Samazi	Samazi P/S		
Bunambutye	Tabakonyi	Tabakonyi P/S					
	Atari	Atari P/S					
4.3.4	Implement demonstration projects - schools, model farms etc. (capital costed elsewhere)	Bulambuli	Bulaago	Tunyi	Tunyi Senior Sec. School	Agricultural farms	3 demonstration farms
			Bulegeni	Samazi	Samazi P/S		
			Nabbongo	Nabbongo	Nabbongo Senior Sec. Sch		
4.3.5	Introduction of awareness raising programmes in schools	Bulambuli	Bukhalu	Busiu	Buwakhanyunyi P/S	Establish environmental clubs, IEC materials, drama clubs	8 primary schools
			Nabbongo	Bujumbura	Buwashaba P/S		
				Bunangaka	Bunongaka P/S		
			Bwikhonge	Bwikhonge	Bwikhonge P/S		
				Buyaga	Buyaga P/S		
			Bulengeni	Samazi	Samazi P/S		
Bunambutye	Tabakonyi	Tabakonyi P/S					
Atari	Atari P/S						
4.4.1	Train experts (import expertise) in the development of technology guidelines, training and other approaches	Bulambuli	N / A	N / A	N / A	N / A	N / A
4.4.2	Enhance and strengthen the capacity of BMUs	Bulambuli	N / A	N / A	N / A	N / A	N / A
4.4.3	Enhance and strengthen the capacity of rice grower associations	Bulambuli	Bunambutye	Bumufuni	Buwebele	Formation and training of rice grower associations, construction of rice mills and provision of appropriate rice seeds	Formation and training of rice grower associations (1 in each village) and rice mills (1 in each SC)
			Bwikhonge	Bunalwere	Sipi A		
4.5.1	Strengthen enforcement bodies with capacity	Bulambuli	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	C		
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		
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	Kapchesombe	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)		
					Teryet				
					Kapsep				
					Ngangata				
					Chemuron				
					Chesabit				
					Towei				
Kapsinda	Kiring	Kapteka							
Kaptanya	Tumboboi	Chebinyiny							
Kapteret	Ngangata	Sweswet							
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		
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		
1.1.5	River bank protection and stabilisation - gabions, management of cattle access points, protection of riparian vegetation	Kapchorwa	Kapsinda	Sengwel	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		
					Kaptokolo				
					Chesabit				
1.1.8	Ecological water requirements: Revisiting legislation and catchment assessment	Kapchorwa	N/A	N/A	N/A	N/A	N/A		
1.1.8.1	Introduce improved farming practices	Kapchorwa	Kapchesombe	Kwoti	Kween	Contour bunds, trenches, planting trees, napier grass, mulching	Train 10 farmers per village		
					Kapchemokok				
					Kapsinda			Cheptuya	Kapteka
					Gamogo			Kiring	Kiring
1.1.9	Build the capacity on conservation methods especially for wetlands	Kapchorwa	Kapsinda	Kawowo	Tuyobei	Training manuals	20 copies of training manuals, train community members in each village		
					Sengwel			Kuborit	
					Cheptuya			Kapsakai	
					Cheptuya			Kapteka	
					Sanzara			Chemare	
1.1.10	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		

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	C
1.2.1	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
1.2.2	Establish nurseries for provision of seedlings and distribution, training and management systems in the district - pilot projects	Kapchorwa	Kapchesombe	Kwoti	Kamakunga	Tree nursery	1 nursery per village
			Kapsinda	Kaplak	Kaplak		
			Kawowo	Tuyobei	Kiborit		
			Kapteret	Kapsabuko	Kapkwembe		
			Kaptanya	Sanzara	Chemarey		
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	Kapteret	Kaptokwoi	Kaptokwoi	Tree nurseries, inventory reports, establish woodlots and agroforestry	8 tree nurseries, 1 ha woodlot per village, 1 ha agroforestry per village
			Kapsinda	Tumboboi	Sweswet		
			Gamogo	Kapangury	Cheptilial		
			Kawowo	Ngangata	Kapengurya		
			Kapteret	Cheptuya	Moron		
			Kapsinda	Kiring	Chemuron		
			Gamogo	Kapnarbababa	Kapteka		
1.2.4	Planting trees in degraded areas	Kapchorwa	Kapchorwa	Kapchorwa	Kapchorwa	Identify the most degraded areas in the 7 SCs, provide seedlings for indigeneous and multipurpose trees	2 areas per SC (2 ha each)
1.3.1	Regular updating of district wetland inventories by districts	Kapchorwa	Kapsinda	Kapsinda	Toweï	Inventory reports	Finish the current inventory since part of it was done by JICA. Update it once in every 3 years
			Kapteret	Kapsobuko	Sirinda		
			Kawowo	Ngangat	Kapsobuko		
			Kapteret	Cheromor	Ngangat		
			Kapsinda	Kongowo	Cheromor		
			Kawowo	Sanzara	Chemarey		
			Kapteret	Ngangata	Moron		
1.3.2	Updating of demarcated protection zones and acceptable utilization of wetlands, producing GIS maps of wetlands at various levels	Kapchorwa	Kapteret	Kapteret	Tartar	Demarcate protection zones, produce GIS maps	Update once in every 3 years
1.3.3	Study for economic valuation of wetland resources and disseminate the results	Kapchorwa	Kawowo	Sanzara	All villages	N/A	N/A
1.3.4	Review and update the wetland management / action plans	Kapchorwa	Kapsinda	Tuyobei	Kiborit	Establish wetland management plans for each wetland	Update once in every 3 years

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	C
1.3.5	Restoration of vital (unique)critical (subject to on going degradation) wetlands	Kapchorwa	Kaptanya	Kaptokwoi	Kawoyon	Restoration of vegetation	
				Tuyobei	Kiborit		
			Kapsinda	Kapsabuko	Cheptaburbur		
			Kawowo	Sanzara	Chemare		
1.4.1	Mapping, demarcation of riparian and roadside protection zones and identify and implement source protection measures	Kapchorwa	Kapchesombe	Kaplak	Kaplak	Demarcation of River Sipi and its tributaries' protection zones, tree and grass planting	
			Sipi	Kapkwirwok	Kongsikerwo		
					Sirinda		
			Kapsinda	Kapsabuko	Kapsabuko		
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
			Kapteret	Kapteret	Kapteret		
			Kapsinda	Cheptuya	Chebonet		
			Kapchorwa T/C	Chemonges Square	Kaptabomwo		
			Tegeres	Tegeres	Cheptui		
2.1.2	Improve faecal sludge management (collection, transportation, treatment and re-use) through clustering of small towns (Kumi, Sironko, Kapchorwa, Nakapiripirit)	Kapchorwa	Kapchorwa T/C	Barawa word		Cess pools, sewer pools, septic tanks	Kapchorwa town and schools with ecosan and lined toilets and latrines. Empty once every 3 month
2.2.2	Refurbish valley dams and tanks	Kapchorwa	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	Kapchorwa	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
2.6.1	Feasibility studies and design of priotised sand dams. Construction with cooperation and input from local communities	Kapchorwa	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
2.7.2	Feasibility and design of priotised 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
2.8.2	Enhancement of rain fed agriculture	Kapchorwa	Kawowo	Sanzara	Kapsinda	GFS	2
					Chemare		
2.8.3	New irrigation schemes: Undertake feasibility studies of identified areas	Kapchorwa	Kapsinda	Kawowo	Cheptuya	GFS	4
					Kiring		
					Sanzara		
					Chemare		
2.8.4	Construction of new irrigation schemes: Improved (seasonal) wetland schemes	Kapchorwa	Kawowo	Sanzara	Chemare	GFS and valley dams	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

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	C			
2.8.6	Construction of new irrigation schemes: Simple gravity - fed schemes	Kapchorwa	Tegeres	Kabat	Kutung	GFS	GFSs from Rivers Atari, Cheseber and Kaptakwoi			
			Kapchesombe	Kaplak	Atar Kaplak					
			Kapteret	Tuban	Posha					
			Chema	Chema	Phema					
2.8.7	Construction of new irrigation schemes: Type A formal irrigation	Kapchorwa	N/A	N/A	N/A	N/A	N/A			
2.8.8	Construction of new irrigation schemes: Type B formal irrigation	Kapchorwa	N/A	N/A	N/A	N/A	N/A			
2.9.1	Water efficiency evaluation and recommendations	Kapchorwa	N/A	N/A	N/A	N/A	N/A			
2.10.1	Investment and implementation in hydropower installations and grid distribution	Kapchorwa	Kapchesombe	Kaplak	Titim Atar Kaplak	Dams	3			
			Sipi	Kapkwirwok	Chepkwoi					
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	Kapchorwa	Kaserem	Ngesi	Ngesi	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			
			Sipi	Kapkwirwok	Kapkwirwok					
			Kapsinda	Sengwel	Kakwanja					
				Cheptuya	Chebonet					
			Tegeres	Tegeres	Tapchor					
				Kutung	Kutung					
2.11.2	Promote use of energy efficient woodstoves by making the technology readily available	Kapchorwa	Kapchorwa T/C	Kawowo	Chemonges Square	Train 15 households per village on multi-pot stove making and equip them	15 households per village			
				Kapsinda	Kokwomury					
				Tegeres	Upper Tegeres			Basaar		
2.12.1	Develop a manual on aquaculture techniques (building on available materials).	Kapchorwa	N/A	N/A	N/A	N/A	N/A			
								Chema	Chebaseri	Kapween Kijongi
2.12.2	Assist farmers with the rehabilitation of viable aquaculture ponds and construction of new ponds-allowance made for a pilot.	Kapchorwa	N/A	N/A	N/A	New fish ponds	1 per village			
								Kawowo	Sanzara	Chemari
								Kaptanya	Kaptokwoi	Kaptokwa
								Kapchesombe	Kapchesombe	Kongsikerwo
2.12.3	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			
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				

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	C
2.13.2	Promote horticulture	Kapchorwa	Kawowo	Sanzara	Chemera	Demonstration plots	3 households per village
			Kapsinda	Kiring	Kapteka		
			Kapchesombe	Kaplak	Atari		
			Tegeres	Basaar	Basaar		
2.13.3	Promote bee keeping	Kapchorwa	Kabeywa	Kabeywa	Kabeywa	Beehives (10 per farmer), harvesting gear, processing and packaging material, marketing, train farmers	5 farmers per village
			Kapchesombe	Kwoti	Kakween		
				Basaar	Basaar		
			Tegeres	Tegeres	Tapchor		
			Kapchorwa T/C	Kokwomury	Kaptakwoi Kokwomury		
3.1.1	Demarcate areas considered unsafe for habitation or other use and warn inhabitants	Kapchorwa	Kapchesombe	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
			Kapteret	Kapengurya	Kapengurya	Landslides	
			Gamogo	Kapnarababa	Kapnarababa	Landslides & erosion	
			Tegeres	Basaar	Basaar	Landslides & erosion	
			Chema	Kapkwai	Amtek	Landslides & erosion	
3.1.2	Develop an early flood warning system	Kapchorwa	Kapchesombe	Kaplak	Atar	Develop early warning systems: 2 for floods and 4 for landslides	6 early warning systems
			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
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
3.3.2	Livestock improvement programme	Kapchorwa	Kapchesombe	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	5 farmers per village
			Tegeres	Tegeres	Tapchor		
			Kaptanya	Tumboboi	Tartar		
				Ngangata	Sirinda		
					Kaptakwoi		
			Kapteret	Kaptokwoi	Kokwomury		

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	C
3.3.3	Promote dairy farming	Kapchorwa	Kapchesombe	Kaplak	Kaplak	Zero grazing units, fodder banks, milk coolers (3), train 15 famers and equip them e.g. milk cans, cattle drugs, dairy animals (1 per farmer)	5 farmers per village
			Tegeres	Tegres	Tapchor		
			Kabeywa	Kabeywa	Bugimotwo		
4.1.1	Monitoring stations must be maintained and regularly calibrated. Gauge readers need to be trained and check mechanisms introduced to encure stability and consistancy in data	Kapchorwa	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 guages. Implement sedimentation monitoring	Kapchorwa	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
4.2.1	Train a committed cadre of extension service providers to render inter - diciplinary, integrated extension service to include CMCs, CDOs etc.	Kapchorwa	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
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
4.3.2	Introduction of a community radio programme dedicated to environmental matters	Kapchorwa	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
4.3.4	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
			Sipi	Kapkwirwok	Kapkwirwok P/S		
			Tegeres	Tegeres	Tegeres P/S		
			Kapsinda	Tumboboi			
4.3.5	Introduction of awareness raising programmes in schools	Kapchorwa	Kapchesombe			Create and guide environmental committees in each school, drama groups etc., demonstrations	1 school per SC
			Kapsinda				
			Kaptanya				
			Kapteret				
			Gamogo				
			Kawowo				
			Tegeres				
			Chema				
			Kapchorwa T/C				
			Kabeywa				
			Sipi				
Kaserem							

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	C
4.4.1	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
4.4.2	Enhance and strengthen the capacity of BMUs	Kapchorwa	N/A	N/A	N/A	N/A	N/A
4.4.3	Enhance and strengthen the capacity of rice grower associations	Kapchorwa	N/A	N/A	N/A	N/A	N/A
4.5.1	Strengthen enforcement bodies with capacity	Kapchorwa	N/A	N/A	N/A	N/A	N/A

INTERVENTION SITES FOR THE OPTIONS

District: KATAKWI

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures	
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	
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	Aleles	Woodlots and agroforestry	10 ha (1 ha per village)	
					Magala			
			Kapujan	Kapujan	Apure			
					Okii			
			Magoro	Kamenu	Kamenu			
					Aleles			
			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	Boats, hoes, wheel barrows	1 boat per village, 2 wheel barrows per village	
					Ominya			
					Uputoni			
			Kapujan		Akakorio			
					Kapiyan			
					Olilima			
			Magoro		Opeta			
					Opeta			
					Kamenu			
					Kamenu			
Magoro		Anyisa						
		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	Sensitization of communities, by-laws, fire fighting equipment	5 villages	
					Ongongoja			
					Palam			
					Toroma			
					Ngariam			
1.1.5	River bank protection and stabilisation - gabions, management of cattle access points, protection of riparian vegetation	Katakwi		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		
								Ongongoja
								Kapujan
								Usuk
								Katakwi
1.1.8	Ecological water requirements: Revisiting legislation and catchment assessment	Katakwi	N/A	N/A	N/A	N/A	N/A	

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures
1.1.8.1	Introduce improved farming practices	Katakwi	Toroma	Aleles	Magala	Improved seeds	20 farmers per village
			Kapujan	Kapujan	Apule		
					Okii		
			Magoro	Kamono	Kamono		
					Aleles		
			Katakwi	Aliakamel	Apuuton		
			Omodoi	Angodingod	Aliakel		
			Ngariam	Kaikamosing	Akalele		
1.1.9	Build the capacity on conservation methods especially for wetlands	Katakwi	Palam	Angariam	Angariam	Plant trees, registration by-law formation, establish structures to enforce e.g environmental force, demonstration sites, mulching	5 wetlands
			Toroma	Aleles	Opeta wetland		
			Kapujan	Kapujan	Bisina wetland		
			Magoro	Kamono	Opet wetland		
			Katakwi	Aliakamel	Komolo 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	Katakwi	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	Katakwi	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	Aleles	Magala	Nurseries	10 nurseries
			Kapujan	Kapujan	Apule		
					Okii		
			Magoro	Kamono	Kamono		
					Aleles		
			Katakwi	Aliakamel	Apuuton		
			Omodoi	Angodingod	Aliakel		
			Ngariam	Kaikamosing	Akalele		
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	Palam	Angariam	Angariam	Capacity building, tree nurseries, management structures (committees)	10 ha per village
			Toroma	Aleles	Magala		
			Kapujan	Kapujan	Apule		
					Okii		
			Magoro	Kamono	Kamono		
					Aleles		
			Katakwi	Aliakamel	Apuuton		
			Omodoi	Angodingod	Aliakel		
Ngariam	Kaikamosing	Akalele					

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures
1.2.4	Planting trees in degraded areas	Katakwi	Toroma	Aputo	Akisim	Planting trees in degraded areas	10 ha per village
			Magoro	Kamenu	Obwokomolo		
			Katakwi	Alukuchok	Alukuchok		
			Palam	Olilim	Siliye		
			Omodoi	Omodoi	Omodoi central		
			Ngariam	Akisim	Akisim		
			Usuk	Cheleuko	Obwapesur		
1.3.1	Regular updating of district wetland inventories by districts	Katakwi	Toroma	Aleles	Magala	Carry out wetland inventory and update annually	10
			Kapujan	Kapujan	Apule Okii		
			Magoro	Kamono	Kamono Aleles		
			Katakwi	Aliakamel	Apuuton Aliakel		
			Omodoi	Angodingod	Akalele		
			Ngariam	Kaikamosing	Kaikam		
			Palam	Angariam	Angariam		
1.3.2	Updating of demarcated protection zones and acceptable utilization of wetlands, producing GIS maps of wetlands at various levels	Katakwi	Toroma	Aleles	Magala	GPS, capacity building, GIS software, computer facilitation, demarcations	10
			Kapujan	Kapujan	Apule Okii		
			Magoro	Kamono	Kamono Aleles		
			Katakwi	Aliakamel	Apuuton Aliakel		
			Omodoi	Angodingod	Akalele		
			Ngariam	Kaikamosing	Kaikam		
			Palam	Angariam	Angariam		
1.3.3	Study for economic valuation of wetland resources and disseminate the results	Katakwi	N/A	N/A	N/A	N/A	N/A
1.3.4	Review and update the wetland management / action plans	Katakwi	Toroma	Aleles	Opeta wetland	Stakeholders meeting, develop wetlands management plans, then update regularly	5 plans
			Kapujan	Kapujan	Bisina wetland		
			Magoro	Kamono	Opetwetland		
			Katakwi	Aliakamel	Komolo wetland		
			Palam	Angariam	Palam wetland		
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
			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	Ongongoja	Ongongoja	Roadside protection zone with tree planting	7 km
			Katakwi	Getum	Getom		

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures	
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	
			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, Nakapiripirit)	Katakwi	N/A	N/A	N/A	N/A	N/A	
2.2.2	Refurbish valley dams and tanks	Katakwi	Ongongoja	Akweta	Okwonomwar (Okwonomwar valley dam)	Rehabilitation of valley dams and tanks	4 dams, 2 tanks	
				Ongongoja	Oroboi (Oroboi valley tank)			
				Palam	Alelam (Aleiyanga valley dam)			
				Ngariam	Okuso (Okwopoto valley dam)			
				Usuk	Ongore (Ongore valley dam)			
				Omodoi	Asuret			Omusugunyu (Atekwa valley tank)
2.3.1	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	
2.3.2	Soroti treatment and distribution - expand in stages (NWSC)	Katakwi	N/A	N/A	N/A	N/A	N/A	
2.6.1	Construction with cooperation and input from local communities	Katakwi	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	Katakwi	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	Katakwi	Ongongoja	Okocho	Okuliak	Okuliak dam proposed	1	
2.8.2	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	
			Kapujan	Kapujan	Apule			
			Magoro	Kamenu	Aleles			
			Katakwi	Aliakamel	Aliakel			
			Palam	Ngariam	Nagriam			
			Omodoi	Angodingod	Akalel			
			Ongongoja	Ongongoja	Ongongoja			
			Ngariam	Kaikamosing	Kaikamosing			
			Usuk	Usuk	Usuk			
Katakwi TC	Northern ward	Dokomel						
2.8.3	New irrigation schemes: Undertake feasibility studies of identified areas	Katakwi	Kapujan	Olima	Ocherakwene	Feasibility study reports	3	
			Ongongoja	Okocho	Okuliak			
			Magoro	Kamenu	Agritomu			

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures	
2.8.4	Construction of new irrigation schemes: Improved (seasonal) wetland schemes	Katakwi	Kapujan	Oricamaku	Oricamaku		6 schemes	
					Kamenu			
					Aleles			
					Apuuton			
					Aliakel			
					Akalele			
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	
				Okochoko	Okuliak			
				Kamenu	Agritomu			
2.8.6	Construction of new irrigation schemes: Simple gravity - fed schemes	Katakwi	Ongongoja	Abela	Aboiboi Cheleuko	Construct 2 rock catchment based schemes	2	
2.8.7	Construction of new irrigation schemes: Type A formal irrigation	Katakwi	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	
2.9.1	Water efficiency evaluation and recommendations	Katakwi	N/A	N/A	N/A	N/A	N/A	
2.10.1	Investment and implementation in hydropower installations and grid distribution	Katakwi	Kapujan	Toroma	Toroma TC	Poles, electric wires	50 km	
				Magoro	Magoro TC			
					Orimai			
					Apapai			
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		Atoroma Girls SS	Biogas technology and solar panels	2 secondary schools and 3 health centres	
					Toroma SS			
					Otur HC			
					Odike HC			
					Cheleu HC			
2.11.2	Promote use of energy efficient woodstoves by making the technology readily available	Katakwi	Katakwi TC	Northern ward	Atoroma Girls Boarding School	Demonstrations at institutional level, training	30 family heads trained per parish and 9 schools supported	
					Toroma Boys School			
					Katakwi High School			
					Usuk			
					Usuk Girls School			
					Epel Memorial			
					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	
2.12.2	Assist farmers with the rehabilitation of viable aquaculture ponds and construction of new ponds - allowance made for a pilot	Katakwi	Katakwi TC	Katakwi	Kapujan	Olegia	Rehabilitation of ponds	20 ponds
					Toroma	Osudan		
					Magoro	Agule wetland		
					Katakwi	Aleles		
					Katakwi TC	Ochoromoni		

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures
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
2.13.1	Create an ecological tourism organisation, train it and provide the necessary starting equipment e.g a boat	Katakwi	Kapujan	Kokorio	Oreja	Creation of an ecological tourism organisation, training 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
				Orimai	Agule		
			Magoro	Opeta	Agule		
2.13.2	Promote horticulture	Katakwi	Katakwi TC	Southern ward	Ajeluk	Set up demonstration sites, seeds / organic farming, control pesticides usage, green house, treadle pumps, pipes	5 farmers per village
			Omodoi	Amusia	Amusia		
			Magoro	Magoro	Magoro TC		
2.13.3	Promote bee keeping	Katakwi	Kapujan	Kokorio	Oidotongole	Set up beehives, capacity building	50 famers per village
			Ongongoja	Olimaya	Goria		
3.1.1	Demarcate areas considered unsafe for habitation or other use and warn inhabitants	Katakwi	Magoro	Angisa	Angisa		4
			Ngariam	Kaikamosing	Kaikamosing		
			Palam	Odoot	Odoot		
			Ongongoja	Obwobwo	Obwobwo		
3.1.2	Develop an early flood warning system	Katakwi	Magoro	Angisa	Angisa	Development of early flood warning systems	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
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
3.3.2	Livestock improvement programme	Katakwi	Toroma	Akurao	Akurao	Sensitisation on artificial insemination, capacity building, demonstration materials, breeding centres, pest control structures, access to water points, improved breeding stock, enhanced veterinairy services	20 farmers per village
			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					

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures
3.3.3	Promote dairy farming	Katakwi	Toroma	Akurao	Akurao	Milk coolers, motorcycle, cans / carts, new breeds (fresians), increased pastures, improved management, introduce diary farming association	20 farmers per village
			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		
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	Katakwi	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	Katakwi	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	Katakwi	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.	Katakwi	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)	Katakwi	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)	Katakwi	N/A	N/A	N/A	N/A	N/A
4.3.2	Introduction of a community radio programme dedicated to environmental matters (at district level)	Katakwi				Radio advert on weekly basis	
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
					Magoro P/S		
			Palam	Palam	Palam P/S		
			Ongongoja	Okuda	Okuda P/S		
			Ngariam	Kaikamosi	Aperoodoot 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)
			Palam	Palam	Palam P/S		
			Ongongoja	Okuda	Okuda P/S		
			Ngariam	Kaikamosi	Aperoodoot P/S		

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures
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
					Magoro P/S		
			Palam	Palam	Palam P/S		
					Olilim P/S		
			Ongongoja	Okuda	Okuda P/S		
Ngariam	Kaikamosing	Aperoodoot 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
4.4.2	Enhance and strengthen the capacity of BMUs (Structure already established in Bisina and Opeta but no capacity to perform)	Katakwi	Kapujan	Kokorio	Agule	Training of BMU members	10 members per BMUs
					Onja		
			Magoro	Opeta	Agule		
					Kamenu		
4.4.3	Enhance and strengthen the capacity of rice grower associations	Katakwi	Magoro	Omasia	Opeta	Formation of rice grower associations and training on sustainable wetland use, agro - processing and marketing, equipment for milling, improved seed varieties	6
					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

INTERVENTION SITES FOR THE OPTIONS

District: KUMI

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures
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
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
				Agule	Agule		4 farmers
1.1.2		Kumi	Kumi	Okouba	Okouba	Kumi Technical school for woodlot and 6 farmers	6 farmers and 1 school
1.1.3	Identification and regular (annually) eradication of floating islands / invasive alien plants	Kumi	Ongino	Akide	Akide	Mechanical harvesting	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
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
1.1.8	Ecological water requirements: Revisiting legislation and catchment assessment	Kumi	N/A	N/A	N/A	N/A	N/A
1.1.8.1	Introduce improved farming practices	Kumi	Ongino	Akide	Akide	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
				Omatenga	Agolitom		
1.1.9	Build the capacity on conservation methods especially for wetlands	Kumi	Kumi	Asinge	Asinge 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
				Otipe	Otipe		
				Omatenga	Omatenga		
				Omokonyo	Omokonyo		
				Agule	Agule		
				Abata	Abata		
				Okouba	Okouba		
				Oseera	Oseera Wetland		
				Aakum	Aakum		
				Kapolin	Kapolin		
1.1.9		Kumi	Ongino	Aakum	Ngabet wetland		
				Akolitorom	Akolitorom		
1.1.9				Akide	Akide		
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
1.2.1	Provide routine training (forestry handbook) to CMCs, forest management, land care and agricultural managers: 1 training in each district @ 2 yrs	Kumi	N/A	N/A	N/A	N/A	N/A

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures
1.2.2	Establish nurseries for provision of seedlings and establish distribution, training and management systems in all districts - pilot projects	Kumi	Kumi	Abata	Abata	Training of nursery managers and actual establishment of a tree nursery in each village	2 nurseries
			Ongino	Kachaboi	Kachaboi		
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	Kumi	Ongino	Ongino	Ongino S/C HQ	Restoring of Ongino Local Forest Reserve	1
			Kumi	Atutur	Aburibur	Restoration of Aburibur Local Forest Reserve	1
1.2.4	Planting trees in degraded areas	Kumi	Ongino	Akide Kachaboi Aakum Kapolin Agolitom Kanapa Oseera	Akide Kachaboi Aakum Kapolin Agolitom Kanapa Oseera	Planting of indigenous, multipurpose agroforestry trees on degraded land and on farms	500,000 trees planted in the villages altogether
Kumi	Kumi	Omatenga Agule Asinge Otiye Omolokonyo Okouba Abata	Ajesa Omatenga Agule Okomino Asinge Otiye Omolokonyo Okouba Abata				
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
			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	
			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
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
			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
			Kumi	Ngabet	Ngabet (Ngabet wetland)		
1.4.1	Mapping, demarcation of riparian and roadside protection zones and identify and implement source protection measures	Kumi	Ongino	Agolitom	Agolitom	Protect lake shores by planting trees and grass, protect roadsides with trees for 20 km	6
				Agule	Agule		
				Oseera	Oseera		
				Aakum	Aakum		
				Akide	Akide		
				Totolim	Totolim		

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures
2.1.1	Improve sanitation technology, and building materials, support and implement them	Kumi	Ongino	Oseera	Oseera (Oseera P/S)	Construct lined pits	3
				Kapolin	Kapolin (Kapolin P/S)		
				Akide	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, Nakapiripirit)	Kumi	Ongino	Ongino	Ongino Hospital	Treatment facility for waste (Kumi TC is not part of Awoja)	1
2.2.2	Refurbish valley dams and tanks	Kumi	Kumi	Omatenga	Omatenga (Omatenga dam)	Refurbishment of the dams	2
			Ongino	Kodukul	Kodukul (Kodukul dam)		
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
2.6.1	Feasibility studies and design of prioritised sand dams.construction with co operation and input from local communities	Kumi	N/A	N/A	N/A	N/A	N/A
2.7.1	facilities	Kumi	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	Feasibility of multi-purpose dams	3
			Kumi	Agule	Agule		
			Kumi	Ameje	Ameje		
2.8.2	Enhancement of rain fed agriculture	Kumi	Kumi	Omokonyo	Omokonyo	Rain water harvesting tanks	10 homesteads with rain water harvesting tanks in each village
			Ongino	Kapolin	Kapolin		
2.8.3	New irrigation schemes: Undertake feasibility studies of identified areas	Kumi	Ongino	Kalengera	Kalengera	Irrigation schemes	8 schemes
				Akide	Akide		
				Totolim	Totolim		
				Akolitorom	Akolitorom		
				Akolum	Akolum		
				Oseera	Oseera		
				Omatenga	Omatenga		
2.8.4	Construction of new irrigation schemes: Improved (seasonal) wetland schemes	Kumi	Kumi	Akolitorom	Akolitorom		6 schemes
				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	Kumi	Akolitorom	Akolitorom		6 schemes
				Akide	Akide		
				Osera	Osera		
				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
2.8.7	Construction of new irrigation schemes: Type A formal irrigation	Kumi	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
2.9.1	Water efficiency evaluation and recommendations	Kumi	N/A	N/A	N/A	N/A	N/A

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures
2.10.1	Investment and imlementation 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
				Agule	Agule Landing site		
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	Kumi	Kumi	Okouba	Kumi Technical School	Solar panels	3
				Omatenga	Omatenga Health Centre II		
			Ongino	Ongino	Ongino Health Centre III		
2.11.2	Promote use of energy efficient woodstoves by making the technology readily available	Kumi	Kumi	Ongino	Oseera	Woodstoves, train households and school personnel	50 households per village
				Omolokonyo	Omolokonyo		4 stoves (2 for each school)
				Kumi	Kumi (Bishop Ilukor Girls SS)		
				Okouba	Kumi Technical School		
2.12.1	Develop a manual on aquaculture techniques (building on available materials)	Kumi	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	Kumi	Kumi	Olungia	Olelia	Rehabilitation of Olelia fish ponds	4
			Ongino	Akide	Akide	Pilot fish cage farming, construction of ponds	4 (2 in each village)
				Oseera	Oseera		
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
				Omatenga	Omatenga		
				Oseera	Oseera		
					Okutot		
					Nabiyoto		
				Okutot	Ojaruo		
2.13.1	Create an ecological tourism organisation, train it and provide the necessary starting equipment e.g a boat	Kumi	Ongino	Tisai	Tisai Island	Form and train organisation, motorised boat, life jackets, binoculars, lodging facilities	1 organisation, 1 motor boat, life jackets, binoculars, lodging facilities
2.13.2	Promote horticulture	Kumi	Ongino	Akolotorom	Akolotorom	Provide vegetable seeds and train farmers on how to plant and care for the vegetables	10 farmers per village
				Akide	Akide		
				Osela	Osela		
				Aakum	Aakum		
				Okouba	Okouba		
				Omatenga	Omatenga		
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
				Totolim	Totolim		
			Kumi	Oogoria	Oogoria		

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures		
3.1.1	Demarcate areas considered unsafe for habitation or other use and warn inhabitants	Kumi	Ongino	Kumi	Agolitom	Agolitom	Demarcate flood prone areas	5 areas	
					Kapolin	Kapolin			
					Akide	Akide			
					Oseera	Oseera			
					Akum	Akum			
3.1.2	Develop an early flood warning system	Kumi	Ongino	Kumi	Agolitom	Agolitom	Develop early warning system in these areas	5 areas	
					Kapolin	Kapolin			
					Akide	Akide			
					Kanapa	Kanapa			
					Akum	Akum			
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		
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		
3.3.2	Livestock improvement programme	Kumi	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, vetenairy services improved: vaccination, tick control	12 villages	
						Kanapa			Kanapa
						Totolim			Totolim
						Akide			Akide
						Akum			Akum
						Kapolin			Kapolin
						Oseera			Oseera
						Cheele			Cheele
						Omatenga			Omatenga
						Agule			Agule
						Oogoria			Oogoria
						Asinge			Asinge
3.3.3	Promote dairy farming	Kumi	Kumi	Ongino	Tisai	Tisai Island	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	
						Kanapa			Kanapa
						Totolim			Totolim
						Akide			Akide
						Akum			Akum
						Kapolin			Kapolin
						Osela			Osela
						Cheere			Cheere
						Omatenga			Omatenga
						Agule			Agule
						Oogolia			Oogolia
						Asinge			Asinge
4.1.1	Monitoring stations must be maintained and regularly calibrated. Gauge readers need to be trained and check mechanisms introduced to encure stability and consistancy in data	Kumi	N/A	N/A	N/A	N/A	N/A		

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures		
4.1.2	Expand, rehabilitate, and improve the water quality, evaporation, rainfall, ground water and streamflow monitoring network systems systems and lake and wetland water level monitoring gauges. Implement sedimentation monitoring	Kumi	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	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	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	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)	Kumi	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	Ongino	Kumi	Agulitom	Agulitom	Ecosan toilets, sensitisations of communities, composting incl. training for 2 people per village	1 public toilet per village	
					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	Kumi	Kumi	Ongino	Kapolin	School woodlots, fruit orchards and vegetable gardens for demonstration and agricultural learning	3 schools	
									Kumi (Kumi P/S)
									Kumi (Kumi Technical Sch)
4.3.5	Introduction of awareness raising programmes in schools	Kumi	Ongino	Ongino	Ongino	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	
						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		
4.4.2	Enhance and strengthen the capacity of BMUs	Kumi	Ongino	Okutot	Agule	Agule BMU	Organize and train BMU members	7 BMUs	
					Kumi	Omatenga			Omatenga BMU
						Oseera			Oseera BMU
									Okutot BMU
									Nabiyoto BMU
									Ojaruo BMU
									Nyalaculi BMU

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures
4.4.3	Enhance and strengthen the capacity of rice grower associations	Kumi	Ongino	Kabata	Kabata	Form and train associations	1 per village
				Okouba	Okouba		
				Kadacha	Kadacha		
				Asinge	Asinge		
				Oogolia	Oogolia		
				Olunya	Olunya		
					Odidingi		
				Otipe	Otipe		
				Oseera	Oseera		
				Akum	Akum		
Alenyera	Alenyera						
4.5.1	Strengthen enforcement bodies with capacity	Kumi	N/A	N/A	N/A	N/A	N/A
	Formulate and enact ordinances and by laws on water and environmental management	Kumi				Review of the district Ordinance on wetlands, formulation of by laws	
	Enforce existing legislation on the protection of lakes, rivers, lake shores, riverbanks, wetlands and hilly and mountaineous areas	Kumi				Law enforcement	

INTERVENTION SITES FOR THE OPTIONS

District: Kween

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structures	No.of structures
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
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)
1.1.3	Identification and regular (annually) eradication of floating islands / invasive alien plants	Kween	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	Bililak 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
					Kere Kalamai Chekwutus Kabeliyo Kere Arkut Sasur Chemuron Kere Kamwam Kamwam Kapyomat Kaporon (River Kere) Rarawa Kwures Kapchekwatwo Moyok (River Kere) Moyok Kere Tulwo west Kamatelong Chekwube Mukut Kwosir Tapot Kapngotiny Kapteris Kwosir (River Chepyakaniet) Teren Poy Kapchesobey Kitawoi (River Yemtyony) Tarak		

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structures	No.of structures	
1.1.5	River bank protection and stabilisation - gabions, management of cattle access points, protection of riparian vegetation	Kween	Binyiny (River Chepyakaniet)	Chepyakaniet	Kaptakalient	15 km of riverbank protection in each SC with live markers and indogeneous tree planting for restoration (30 m of river width, 1.200 seedlings per SC), gabions 100 m per SC, score checks over 30 m per river with cattle access points (2 per village)	15 km of riverbank protection in each SC with live markers and indogeneous tree planting for restoration (30 m of river width, 1.200 seedlings per SC), gabions 100 m per SC, score checks over 30 m per river with cattle access points (2 per village)	
					Chemuron			
					Chepyakaniet			
				Tabagon	Kapchekwrop			
					Chesakat			
					Kabachirya			Kabachirya
			Nganyet					
			Sutto					
			Sosho	Mokonak				
				Atyai				
				Anio Kwanik				
			Kapkwot	Sosho				
				Cherikri				
				Mukutano				
Ngenge (River Ngenge)	Cheptarare	Makunga						
		Kaptaroi						
		Chaptarere						
		Kapndaroi						
					Ngorywomwet			
1.1.8	Ecological water requirements: Revisiting legislation and catchment assessment	Kween	N / A	N / A	N / A	N / A	N / A	
1.1.8.1	Introduce improved farming practices	Kween	Upper slope (greater Benet): Kitawoi	Tereboy	Tereboy	Contour bunds, trenches, planting trees, napier 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 napier grass altogether, train 210 farmers in total	
					Tapot			
					Sukut			
			Mid slope (greater Binyiny): Kaptoyoy	Kaptoyoy	Kapchekwoi			
					Kapsamyi			
					Rwakoi			
Lower slope (greater Ngenge): Ngenge	Kapkwot	Kaptulel						
		Makunka						
		Tuyobei						
1.1.9	Build the capacity on conservation methods, especially for wetlands	Kween	Ngenge	Sikwo	Sikwo	Develop training manuals, train community TOTs	20 copies of training manuals per S/C, train 10 TOTs per village/wetland, train community members	
					Sundet			
				Kiriki	Kiriki			Nabucheche
				Kaptoyoy	Kerop			Kapkure

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structures	No.of structures
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
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
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
1.2.3	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 Chepsennton Kabaw Tambajja Kwenge Kachekworis Bosha Kapkwowet Tabagon Kapkwobaliat Cheptandan Sukut Kongta	Tree seedlings	50,000 tree seedlings
1.2.4	Planting trees in degraded areas	Kween	Kwanyiny	Kaptoyoy	Kapcheber Kapchemiriot Ngoryemwo Munda Bumotoi Cheburei	Seedlings	25,000 seedlings
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) Kere (Kere) Sundet (Sundet) Kerop Kapkure (Kubal) Kiriki Kiriki Nabucheche (Kiriki)	Update inventory	Once in 3 years
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) Sundet (Sundet) Kere (Kere) Kapkure (Kubal) Kiriki Kiriki Nabucheche (Kiriki)	Demarcation pillars as boundary marks, production of maps	Update maps once in 3 years
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

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structures	No.of structures
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
				Sundet	Sundet (Sundet)		
				Kere	Sundet		
				Kaptoyoy	Kerop		
				Kiriki	Kiriki		
1.3.5	Restoration of vital (unique) critical (subject to on - going degradation) wetlands	Kween	Kaptoyoy	Kerop	Kapkure	Fencing with live hedges	1 acre
1.4.1	Mapping, demarcation of riparian and roadside protection zones and identify and implement source protection measures	Kween	Kawoi	Kaptoyoy	Kerop - Kapnarkut road	4 km	Demarcate road reserves with pillars (both sides), plant trees as boundary markers for 26 km
				Benet	Kapnarkut - Mengya road	4 km	
				Katawoi	Mengya - Binyiny road	4 km	
				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	Nyimei	Rwanda	Ecosan toilets, train communities on usage	5 per village (2stance each)
				Kapkwata	Kisangani		
				Kiriki	Kiriki		
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
2.2.2	Refurbish valley dams and tanks	Kween	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
2.3.2	Soroti treatment and distribution - expand in stages (NWSC)	Kween	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
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
2.7.2	Feasibility & design of prioritized dams for stock watering and humans needs. Construction, with cooperation and input from local communities	Kween	Ngenge	Sikwo	Sikwo	Valley dams	2
2.8.2	Enhancement of rain fed agriculture	Kween	Ngenge	Sundet	Sundet	Rainwater harvesting tanks and irrigation equipment incl. pumps for 5 farmers per village plus training	Rainwater harvesting tanks and irrigation equipment incl. pumps for 5 farmers per village plus training
				Kiriki	Korite		
				Kapkwot	Kapkwot		
					Kabashirya		
					Kaplopotwo		

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structures	No.of structures
2.8.3	New irrigation schemes: Undertake feasibility studies of identified areas	Kween	Ngenge	Sikwo		GFS	3 (1 scheme per SC)
				Sundet			
				Kapkwot			
				Kere			
				Kiriki			
				Kapswama			
2.8.4	Construction of new irrigation schemes: Improved (seasonal) wetland schemes	Kween	Ngenge	Sundet	Sundet	Valley dams	2
				Sikwo	Sikwo		
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
2.8.6	Construction of new irrigation schemes: Simple gravity - fed schemes	Kween	Ngenge	Sikwo		GFS	3 (covering the different parishes)
				Kapkwot			
				Sundet			
				Kere			
				Kabachirya			
2.8.7	Construction of new irrigation schemes: Type A Formal Irrigation	Kween	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
2.9.1	Water efficiency evaluation and recommendations	Kween	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
			Kwanyiy (Siit River)				
			Benet (Atari River)				
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	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
					Kapchemelei PS		
			Benet	Likil	Tuyobei TC		
			Kitawoi	Mulungwa	Mulungwa PS		
			Kaptoyoy	Tereniboi	Tereniboi HC		
				Kerop	Kapcheropta HC		
2.11.2	Promote use of energy efficient woodstoves by making the technology readily available	Kween	Binyiny TC	Kisongi	Kisongi	Village demonstrations (1 per village), train 10 households per village on woodstove making and equip them	Village demonstrations (1 per village), train 10 households per village on woodstove making and equip them
				Mulungwa	Mulungwa		
				Likil	Kapsirik		
			Benet	Kaseko	Kapnukakut		
			Kwosir	Kwosir	Kwosir		
			Kaptum	Cheminy	Cheminy		
			Kitawoi	Tereniboi	Tereniboi		
Kaptoyoy	Kaptoyoy	Sukut					
2.12.1	Develop a manual on aquaculture techniques (building on available material)	Kween	N / A	N / A	N / A	N / A	N / A

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structures	No.of structures				
2.12.2	Assist farmers with rehabilitation of viable aquaculture ponds and in the construction of new ponds - allowance made for a pilot	Kween	Ngenge	Kapkwot	Kaptula	Construction of fish ponds	3				
					Mukunka						
					Tuyobei						
2.12.3	Train and assist farmers on the appropriate fishing techniques and equipment as well as the protection of breeding grounds	Kween	Ngenge	Sikwo	Sikwo (Atari)	Train 10 farmers for each wetland and equip them	10 farmers per wetland				
					Kiriki			Kiriki	Nabucheche (Kiriki)		
2.13.1	Create an ecological tourism organisation, train it and provide the necessary starting equipment e.g a boat	Kween	Benet	Mulungwa		Create and train 2 ecological tourist organisations, (caves, forests, cultural sites, cliffs etc.), set up 2 campsites with tents (3) each, 2 restaurants, 4 binoculars	Train 15 members (guides (4) included) of each ecological organisation, 2 campsites with 3 tents each, 2 restaurants, 4 binoculars				
2.13.2	Promote horticulture	Kween	Kitawoi	Terenboy	Terenboy	3 demonstration plots, train 10 farmers per village and equip them e.g. seeds, chemicals, fencing	3 demonstration plots, 10 farmers per village				
					Tapot						
					Sukut						
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				
					Sitotwet						
					Kaptoyoy			Ngoryemwo	Ngoryemwo		
					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				
					Seretyo						
					Nabucheche						
					Kiriki	Kiriki		Kapchemeleye	Landslides		
								Likil		Loch	
								Tambaya		Tewenge	
Benet	Piswa	Kabarak									
3.1.2	Develop an early flood warning system	Kween	Ngenge	Cheptere	Cheptere	Early flood warning systems	7				
					Seretyo						
					Kiriki			Kiriki	Nabucheche		
									Kapcemeleye		
					Benet			Piswa	Kabarak	Likil	Loch
										Tambaya	Tewenge
3.1.3	Development / Compilation of hazard / risk map for landslides / sedimentation / floods	Kween	N / A	N / A	N / A	N / A	N / A				

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structures	No.of structures
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
3.3.2	Livestock improvement programme	Kween	Kitawoi	Terenboy	Terenboy Tapot Sukut	6 artificial insemination kits, improved breeds (cross breeds) incl. bulls, improved fodder, good breeds of goats and sheep, zero grazing units, vetenairy services improved: vaccination, tick control	6 villages
			Ngenge	Kapkwot	Kaptula Mukunka Tuyobei		
3.3.3	Promote dairy farming	Kween	Kitawoi	Terenboy	Terenboy Tapot Sukut	Zero grazing units, fodder banks, milk coolers (2), train 30 famers 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)
			Ngenge	Kapkwot	Kaptula Mukunka Tuyobei		
4.1.1	Monitoring stations must be maintained and regularly calibrated. Gauge readers need to be trained and check mechanisms introduced to encure stability and consistancy in data	Kween	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 systems and lake and wetland water level monitoring gauges. Implement sedimentation monitoring	Kween	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
4.2.1	Train a committed cadre of extension service providers to render inter - diciplinary, integrated extension service to include CMCs, CDOs etc.	Kween	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
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
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

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structures	No.of structures
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
				Kapkwata	Kworus PS		
			Kiriki	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
			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						
4.3.5	Introduction of awareness raising programmes in schools	Kween	Kwanyiny		Kaporotwo PS	Environmental committees in each school, drama groups etc., posters, pamphlets	
					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		
4.4.1	Train experts (import expertise) in the development of technology guidelines, training and other approaches	Kween	N / A	N / A	N / A	N / A	N / A
4.4.2	Enhance and strengthen the capacity of BMUs	Kween	N / A	N / A	N / A	N / A	N / A
4.4.3	Enhance and strengthen the capacity of rice grower associations	Kween	Ngenge	Kapkwot	Tuyobei	Create and train 2 rice grower associations, formulate association constitutions, develop training manuals, registration certificates, 1 exchange visit to established associations	1 association per village
			Kiriki	Kiriki	Nabucheche		
4.5.1	Strengthen enforcement bodies with capacity	Kween	N / A	N / A	N / A	N / A	N / A

INTERVENTION SITES FOR THE OPTIONS

District: Nakapiripirit

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structures	No.of structures	
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	
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			Lokatapan	Komoojoj	Establishment of woodlots, maintenance of community access roads Kagata-Lomorimor (5 km) and Kagata-Lomorunyagae (3 km)	Woodlots: 1 in each village of 1 ha, community access roads: 2	
					Nakilor			
					Loperot			Nakuluny
								Aoyalira
					Kaiku			Kawach
								Lokwasinyon
				Lomototo				
				Nakayot				
				Namalu	Apeded			
					Nakwanga			
					Nasinyono			
					Loregae			Loreng
				Kobeyon				
				Aoyareng				
				Nabata				
				Lolachat	Loatham			Arecheck
					Natirae			Kanangakinoi
								Moruangamion
					Lotaruk			Nachele
				Lokidodoka				
Kakomongole	Sakale	Nathinyonoit						
	Namorototo	Lorengedwat						
	Akuyam	Lokale						
	Okwapon	Alibumun						
Achelen								
Lopeduru								
		Lokerumun						
1.1.3	Identification and regular (annually) eradication of floating islands / invasive alien plants	Nakapiripirit	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	Nakapiripirit	Namalu	34 parishes		Develop a fire risk management plan, train and equip communities on fire fighting, create village committees, sensitisations of communities on fire management	5 people trained per parish	
			Loregae					
			Nabilatuk					
			Kakomongole					
			Lolachat					

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structures	No.of structures
1.1.5	River bank protection and stabilisation - gabions, management of cattle access points, protection of riparian vegetation	Nakapiripirit	Namalu	Amaler River		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), 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
				Kanapu River			
				Namalu River			
			Kakomongole	Alibamu River			
				Angoleturot River			
				Akwamuyen River			
			Loregae	Napiananya River			
			Lolachat	Kanyipa River			
				Nataa/Kamusing R.			
				Lolelia River			
			Nabilatuk	Nabilatuk River			
			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	
1.1.8.1	Introduce improved farming practices	Nakapiripirit	Lorengedwat		Nangamit	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
				Narisai	Nadi		
				Nasiyoroit	Nayoet		
					Lonagat		
				Kamaturu	Lokwakwa		
					Kamaturu		
			Nabilatuk		Lotede		
				Acegeretolim	Nacucu		
				Lokale	Napanyan		
					Napongai		
				Nakobekobe	Nasinyonoit		
				Moruanyibuin	Narukeng		
	Ariamaoi						

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structures	No.of structures	
1.1.9	Build the capacity on conservation methods, especially for wetlands	Nakapiripirit	Namalu	Kokuwam	Kocolikokoi	Form (if necessary) and train wetland user committees, sensitization meetings on wetland management	1 committee for each wetland, sensitisation meetings	
					Okudud			
				Loperot	Lokitelalokwa			
					Nacucu (Nakilero)			
					Komojoj			
				Lokatapan	Lomorunyagan			
					Lomanakalele			
				Loregae	Losang			Kalokarese
					Loregae			Kalosepic
					Natiria			Naitakosowan
	Lolachat	Sokale	Kolobebe					
	Nabilatuk	Kosike	Tirkol / Kamosiny					
	Lorengedwat	Narisia	Lomogol					
1.1.10	Monitoring the impacts of sustainable land and environmental management in terms of improved farming practices (individual benefits) and downstream water management	Nakapiripirit	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	Nakapiripirit	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	Nakapiripirit	Kakomongole	Okwapun	Lokeruman	2 nurseries each 25 x 15 m, procurement of seeds, train people of village to manage the nursery	2	
			Nabilatuk	Moruanyibuin	Lolelia			
Support the implementation of a reforestation programme			Namalu	Kokuwam	Lokiteladida	Development of a reforestation programme, identification of host farmers (2 per village), hands on training for the farmers, woodlots	Training of 2 host farmers per	
					Nameiasi			
					Nakipenet			
					Kaiku			Lokwasinyon
								Nasinyono
								Nakwanga
								Loleliarengan
								Arumocholi
					Namalu Forest Reserve			Kocholikokoi
								Angoleturot
								Arechek
								Lokale
					Akwyam			Nacele
								Acelel
								Alibamun
	Lopeduru							
Kakomongole	Okwapun	Lokeruman						

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structures	No.of structures	
1.2.3	aimed at restoring lost woodland and at establishing woodlots to reduce the pressure on natural forest. Link to agroforestry and sustainable land management	Nakapiripirit	Loregedwat	Masinyonit	Kalonyama	with agroforestry (1 ha per village), provision of seedlings, procurement of demonstration tools	village, provision of seedlings for 1 ha per village and demonstration tools	
				Naturum	Kiraido			
			Loregae	Moruegatuny	Nabulanger			
1.2.4	Planting trees in degraded areas	Nakapiripirit	N / A	N / A	N / A	N / A	N / A	
1.3.1	Regular updating of district wetland inventories by districts	Nakapiripirit				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	
					Kokuwam			Kocolikokoi
								Okudud
				Loperot	Lokitelalokwa			
					Nacucu (Nakilero)			
					Komojoj			
			Namalu	Lokatapan	Lomorunyagan			
					Lomanakalele			
			Loregae	Losang	Kalokarese			
			Loregae	Loregae	Kalosepic			
					Natiria	Naitakosowan		
			Lolachat	Sokale	Kolobebe			
			Nabilatuk	Kosike	Tirkol / Kamosiny			
			Loregedwat	Narisia	Lomogol	Erect demarcation pillars		
					Kokuwam			Kocolikokoi
								Okudud
				Loperot	Lokitelalokwa			
					Nacucu (Nakilero)			
					Komojoj			
			Namalu	Lokatapan	Lomorunyagan			
					Lomanakalele			
			Loregae	Losang	Kalokarese			
			Loregae	Loregae	Kalosepic			
					Natiria	Naitakosowan		
			Lolachat	Sokale	Kolobebe			
			Nabilatuk	Kosike	Tirkol / Kamosiny			
			Loregedwat	Narisia	Lomogol			
1.3.2	Updating of demarcated protection zones and acceptable utilization of wetlands, producing GIS maps of wetlands at various levels	Nakapiripirit						
1.3.3	Study for economic valuation of wetland resources and disseminate the results	Nakapiripirit	N / A	N / A	N / A	N / A	N / A	
						Erect demarcation pillars		
					Kokuwam			Kocolikokoi
								Okudud
				Loperot	Lokitelalokwa			
					Nacucu (Nakilero)			
					Komojoj			
			Namalu	Lokatapan	Lomorunyagan			
					Lomanakalele			
			Loregae	Losang	Kalokarese			
			Loregae	Loregae	Kalosepic			

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structures	No.of structures
1.3.4	Review and update the wetland management / action plans	Nakapiripirit	Lolachat	Natiria	Naitakosowan	Develop wetland management plans, implement them and update them yearly	1 wetland management plan for each wetland
				Sokale	Kolobebe		
				Kosike	Tirkol / Kamosiny		
				Narisia	Lomogol		
1.3.5	Restoration of vital (unique) critical (subject to on - going degradation) wetlands	Nakapiripirit	Namalu	Lokatapan	Nacucu (Nakilero)	Zoning of wetlands based on activities, establish woodlots along wetlands	Woodlots (5 ha)
1.4.1	Mapping, demarcation of riparian and roadside protection zones and identify and implement source protection measures	Nakapiripirit	Lorengedwat	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), 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
					Kanapu River		
					Namalu River		
				Kakomongole	Alibamu River		
					Angoleturot River		
				Loregae	Akwamuyen River		
				Lolachat	Napiananya River		
					Kanyipa River		
					Nataa/Kamusing R.		
				Nabilatuk	Lolelia River		
					Nabilatuk River		
				Lorengedwat	Omaniman River		
					Kabilamerok River		
					Naroror River		
	Aperikipe River						
				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			
				Nabilatuk	Nabilatuk TC	Nabilatuk TC P.S.	
						Arenyesef S.S.	
						Health Centre 4	
						Acegeretolim Girls P.S.	
						Nabilatuk market	
Nabilatuk Police Station							

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structures	No.of structures	
2.1.1	Improve sanitation technology and building material support and implement them	Nakapiripirit	Kakomongole	Tokora TC	Health Centre 4	Establish flush toilets (5 stances) following the development of piped water systems and drainable VIPs in institutions	30 toilets	
					Tokora P.S.			
					Okwapon P.S.			
					Tokora TC			
			Lorengedwat	Naturum	Lorengedwat P.S.			
					Kamaturu P.S.			
					St.Kizito S.S.			
					Health Centre 3			
			Lorengedwat	Naturum	Lorengedwat market			
					Lorengedwat SC HQ			
Loregae	Loregae TC	Loregae SC HQ						
		Napenaya P.S.						
Loregae	Loregae TC	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	Valley tanks	15 valley tanks	
					Lochagar			
					Aoilem			
			Nabilatuk	Kosike	Trikae			
					Kalokameri			
					Lollmat			
			Nabilatuk	Alegeretolim	Namutealoma			
					Mungamit			
					Naotaba			
			Lorengedwat	Kamaturu	Kamaturu			
					Locilimukat			
			Loregae	Loreng	Akwamunyen			
					Lasam			Komuriapus/Kidule
								Kabong
			Loregae	Loreng	Manenei			
Loperot								
Loregae	Loreng	Loporinadotukas						
2.3.1	Design and construct river Agu scheme to supply Kumi and surroundings - water and wastewater works	Nakapiripirit	N/A	N/A	N/A	N/A	N/A	
2.3.2	Soroti treatment and distribution - expand in stages (NWSC)	Nakapiripirit	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 (River Ominiman)	Nakapiripirit	Lolachat	Locorkamodoi River		Sand dams	4 sand dams	
			Nabilatuk	Nataa River				
			Lorengedwat	Omaniman River				
			Loregae	Nakirienget River				

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structures	No.of structures	
2.7.1	Needs identification for location and type of dams and associated abstraction facilities	Nakapiripirit	Nabilatuk Lorengedwat	Kalokameri	Losimit	Site for dam in Lorengedwat: Kojam and 3 water dams in Nabilatuk	4 dams	
				Kosike	Nanyonai-angialio			
				Narisai	Lolemut			
				Naoi (Kojam)				
2.7.2	Feasibility & design of prioritized dams for stock watering and humans needs. Construction, with cooperation and input from local communities	Nakapiripirit	Nabilatuk Lorengedwat	Kalokamari	Losimit	Site for dam in Lorengedwat: Kojam and 3 water dams in Nabilatuk	4 dams	
				Kosike	Nanyonai-angialio			
				Narisai	Lolemut			
				Naoi (Kojam)				
2.8.2	Enhancement of rain fed agriculture	Nakapiripirit	Nabilatuk	Nabilatuk SC HQ	4 P.S.	Rainwater harvesting technologies in schools, health centres, SC headquarters and households	15 primary schools, 2 secondary schools, 2 health centres, 4 SC headquarters and 30 households in each SC	
					1 S.S.			
					Health centre 4			
					Nabilatuk SC HQ			
			Lorengedwat	Lorengedwat SC HQ	3 P.S.			
					Lorengedwat SC HQ			
					Health centre			
			Lolachat	Lolachat SC HQ	Lolachat SC HQ			
					4 P.S.			
			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	Narisai	Lokwamer	Irrigation schemes	4 irrigation schemes	
			Nabilatuk	Acegeretolim	Nayonai angiminito			
			Namalu	Kokuwam	Loleliarengan			
				Lokatapan	Kagata			
2.8.4	Construction of new irrigation schemes: Improved (seasonal) Wetlands Schemes	Nakapiripirit	Loregae	Losam	Napomcholot	Irrigation schemes	6 irrigation schemes	
					Locholi			
			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	Namalu River	Irrigation schemes	4 irrigation schemes	
				Kaiku	Amaler			
			Kakomongole	Namorotot	Alibamun			
					Lorengedwat/Curutdeny			
2.8.6	Construction of new irrigation schemes: Simple gravity - fed schemes	Nakapiripirit	Namalu Kakomongole	Kokuwam	Nasiyono	Irrigation schemes	3 irrigation schemes	
				Kaiku	Lokiteladida			
2.8.7	Construction of new irrigation schemes: Type A Formal Irrigation	Nakapiripirit	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	
2.9.1	Water efficiency evaluation and recommendations	Nakapiripirit	N / A	N / A	N / A	N / A	N / A	

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structures	No.of structures
2.10.1	Investment and implementation in hydropower installations and grid distribution	Nakapiripirit	Loregae			Establish connections to the national grid from Namalu to the SCs	30 km stretch to the national grid
			Lolachat				
			Nabilatuk				
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	Nakapiripirit	Lorengedwat	Naturum	Lorengedwat P.S.	Establish solar power in Lorengedwat SC in the institutions and wind power in the other SCs	6 solar power installations, 24 wind power installations
					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		
			Namalu	Namalu TC	Nambole market		
					St. Mary's P.S.		
					Namalu Mixed P.S.		
					Kagata P.S.		
					Namalu SC HQ		
					Health Centre 3		
					Amaler P.S.		
			Nabilatuk	Nabilatuk TC	Namalu market		
					Namalu Catholic Church		
					Namalu Church of Uganda		
					Namalu Police Station		
Nabilatuk TC P.S.							
Kakomongole	Tokora TC	Arenyesef S.S.					
		Health Centre 4					
		Acegeretolim Girls P.S.					
		Nabilatuk market					
		Nabilatuk Police Station					
Kakomongole	Tokora TC	Health Centre 4					
		Tokora P.S.					
		Okwapon P.S.					
2.11.2	Promote use of energy efficient woodstoves by making the technology readily available	Nakapiripirit	Namalu	All parishes		Training private households on woodstove technology	10 households per parish
			Loregae	All parishes			
			Lorengedwat	All parishes			
			Kakomongole	All parishes			
			Nabilatuk	All parishes			
2.12.1	Develop a manual on aquaculture techniques (building on available material)	Nakapiripirit	N / A	N / A	N / A	N / A	N / A

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structures	No.of structures			
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	Loperot	Loperot	Construction of (50*25) m fish ponds	4 fish ponds			
			Loregae	Loreng	Kobenyon					
			Kakomongole	Okwapun	Lopeduru					
			Nakapiripirit TC	Lobuneit	Lobuneit					
2.12.3	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			
2.13.1	Create an ecological tourism organisation, train it and provide the necessary starting equipment e.g a boat	Nakapiripirit	Lorengae	Nakaale	Nakathian	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			
2.13.2	Promote horticulture	Nakapiripirit	Namalu			Train 50 farmers per SC (to be identified according to defined criteria) and provide them with starting kits (seeds for water melon, sunflower, simsim etc.)	Train 50 farmers per SC and provide them with starting kits (seeds for water melon, sunflower, simsim etc.)			
			Lolachat							
			Kakomongole							
			Nabilatuk							
			Lorengedwat							
Lorengae										
2.13.3	Promote bee keeping and processing	Nakapiripirit	Namalu			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			
			Lolachat							
			Kakomongole							
			Nabilatuk							
			Lorengedwat							
Lorengae										
				Kokuwam	Namalu	Land slides	11 landslide prone areas			
					Masiyono					
					Amaler					
				Lokiteludida						
				Nameiasi						
				Mokiperet						
			Namalu	Kaiku	Lokurasiyon					
								Alibamun		
								Lorengedwat/Curutdeng		
			Namorotot	Kawar Naparan						
			Kakomongole	Tokora	Nadip					
										Loperot
										Lokitelalokwa
Mukulungi										
Apeicherait										
Lokoreto										
Okudud										
Aoilira										
Loperot	Namalu TC									

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structures	No.of structures		
3.1.1	Demarcate areas considered unsafe for habitation or other use and warn inhabitants	Nakapiripirit	Namalu	Lokatapan	Makiloro	Flooding	23 flood prone areas		
					Komojoj				
					Naminit				
					Lokinyergunet West				
					Loberro				
					Lowatachin				
					Lokinyergunet East				
			Loregae	Lokatapan	Makule			Alamaer	
					Loreng			Loeng / Lopirai	
					Lasam			Mayoroit	
					Naturum			Arechek	
			Lolachat	Natirai	Lolachat			Lotaruk	Nacile
									Lokebui
									Lotikotoi
				Naitakosowan					
			Namalu	Kaiku	Namalu	Landslides: Install traditional EWS systems on village level, establish EWS committees and train them (1 per village)			
					Kokuwam			Masiyono	
								Amaler	
								Lokiteludida	
								Nameiasi	
								Mokiperet	
			Kakomongole	Namorotot	Kakomongole				Alibamun
									Lorengedwat/Curutdeng
								Tokora	Kawar Naparan
			Namalu	Lokatapan	Namalu			Lokatapan	Loperot
									Lokitelalokwa
									Mukulungi
									Apeichera
Lokoreto									
Okudud									
Aoilira									
Namalu TC									
Makiloro									
Komojoj									
Naminit									
Lokinyergunet West									
Loberro									
Lowatachin									
Lokinyergunet East									

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structures	No.of structures	
3.1.2	Develop an early flood warning system and land slide	Nakapiripirit	Lolachat	Naturum	Makule	Alamaer	Flooding: Install traditional EWS systems on village level, establish EWS committees and train them (1 per village)	
					Loeng	Loeng / Lopirai		
					Lasam	Mayoroit		
					Naturum	Arechek		
					Lotaruk	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	
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 livestock census, train CAHWS, livestock enumerators and veterinary officers		
3.3.2	Livestock improvement programme	Nakapiripirit	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)	
								Namalu
								Kakomongole
								Lolachat
								Nabilatuk
3.3.3	Promote dairy farming	Nakapiripirit	Lorengedwat			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	
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	
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	
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	

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structures	No.of structures
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
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
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
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	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
					Namalu Police Station		
			Nabilatuk	Nabilatuk TC	Nabilatuk TC P.S. Arenyesef S.S. Health Centre 4 Acegeretolim Girls P.S. Nabilatuk market Nabilatuk Police Station		
					Health Centre 4		
			Kakomongole	Tokora TC	Tokora P.S. Okwapon P.S. Tokora TC		
					Health Centre 3		
					Lorengedwat P.S. Kamaturu P.S. St.Kizito S.S. Health Centre 3 Lorengedwat market Lorengedwat SC HQ		
			Lorengedwat	Naturum	Loregae SC HQ		
					Napenaya P.S. Nabulengor HC 2 Nambole market		
			Loregae	Loregae TC			

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structures	No.of structures
4.3.4	Implement demonstration projects - schools, model farms etc. (capital cost elsewhere)	Nakapiripirit	Namalu			Establish school gardens, form young farmers associations	In all schools in all SCs (43 schools)
			Lolachat				
			Kakomongole				
			Nabilatuk				
			Lorengedwat				
			Lorengae				
			Nakapiripirit TC				
4.3.5	Introduction of awareness raising programmes in schools	Nakapiripirit	Namalu			Form environmental clubs in schools, assign focal point teachers on environment, identify and train teachers in environmental management	In all schools in all SCs (43 schools)
			Lolachat				
			Kakomongole				
			Nabilatuk				
			Lorengedwat				
			Lorengae				
			Nakapiripirit TC				
4.4.1	Train experts (import expertise) in the development of technology guidelines, training and other approaches	Nakapiripirit	N / A	N / A	N / A	N / A	N / A
4.4.2	Enhance and strengthen the capacity of BMUs	Nakapiripirit	N / A	N / A	N / A	N / A	N / A
4.4.3	Enhance and strengthen the capacity of rice grower associations	Nakapiripirit	Namalu			Form and train / support existing rice growers association, construct rice stores, procure rice haulers	1 rice grower association in Namalu and 1 in Lorengae
			Lorengae				
4.5.1	Strengthen enforcement bodies with capacity	Nakapiripirit	N / A	N / A	N / A	N / A	N / A
	Develop by-laws and ordinances against environmental destruction	Nakapiripirit					

INTERVENTION SITES FOR THE OPTIONS

District: NAPAK

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures		
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		
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		
			Iriiri	Iriiri	Alekilek				
			Lotome	Morungor	Naooi				
					Naitakosowan				
			Matany	Nakichumet	Kokoris				
					Kotipe				
Nakichumet									
1.1.3	Identification and regular (annually) eradication of floating islands / invasive alien plants	Napak	N/A	N/A	N/A	N/A	N/A		
					Nakichumet				
					Natirae				
					Poron				
					Nakichumet			Komutiurunyo	
								Nasinyonoit	
					Morulinga			Kogete	
								Nachuka	
								Morualoyete	
					Matany			Lokali	Nasiloit
									Kotiti
								Kalokengel East	Korisae
								Nariamaregae	Nakale
					Lotome			Lomuno	Adwaramukuny
									Nangirongole
									Nakaramwae
									Lotutur
									Nawatom
					Cholichol				Komo
									Lopuke
									Lomuruchubae
									Lokupoi
									Rapada
									Lobok
									Kokipurat
Kocito									
Lorengecora	Lolet	Lokeru							
		Lomuria							
		Angelepan							
		Dwol							
		Nabwal							
		Naminit							

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

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures
1.2.2	Establish nurseries for provision of seedlings and establish distribution, training and management systems in all districts - pilot projects	Napak	Lotome	Moruongor	Naitakosowan	Establish and equip greenhouse and train farmers	2 nurseries
			Matany	Nakichumet	Arecheck		
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	Moruongor	Naitakosowan	Woodlots (60), seedlings (500,000), 1 acre per village	60 woodlots, 500,000 seedlings, 1 acre per village
				Lomuno	Nangirongole		
				Kalokengel East	Koititi		
			Lorengecora	Lomuruchubae	Cholichol		
				Lopuke			
				Lokeru			
				Komo			
				Lokupoi			
				Nawatom			
				Nasinyonoit			
			Matany	Nakicumet	Nakicumet		
			Irii	Irii	Alekilek		
Tepeth	Naturumurum						
Lorengecora TC	Lorengecora B	Kopopua					
1.2.4	Planting trees in degraded areas	Napak	Lotome	Moruongor	Naitakosowan	Provision of tree seedlings, identification of degraded areas	3,500 seedlings (500 seedlings for each village)
				Lomuno	Nangirongole		
				Komo	Cholichol		
			Matany	Lokuwas	Lorukumo		
			Irii	Tepeth	Pilas		
			Lorengecora	Choichol	Cholichol		
1.3.1	Regular updating of district wetland inventories by districts	Napak	Matany	Nakicumet	Kotipe Swamp	Update every quarter, vehicle, funds, GIS software	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
			Lotome	Kalokengel West	Nangirongole Swamp		
			Lorengecora	Lolet	Lomuribangalepan 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
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
			Lotome	Kalokengel West	Nangirongole Swamp		
			Lorengecora	Lolet	Lomuribangalepan Swamp		
			Kokepurat	Kalokwangaese Swamp			

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures
1.3.5	Restoration of vital (unique) critical (subject to on - going degradation) wetlands	Napak	Matany	Nakicumet	Kotipe Swamp	Demarcation, bye laws / ordinance, grass and tree planting, awareness creation	4
			Lotome	Kalokengel West	Nangirongole Swamp		
			Lorengecora	Lolet	Lomuribangalepan Swamp		
				Kokepurat	Kalokwangaese Swamp		
1.4.1	Mapping, demarcation of riparian and roadside protection zones and identify and implement source protection measures	Napak	Iriiri	Nabwal	Nabwal	Omaniman river: flood control, tree planting (50,000 seedlings), fodder gras planting, stabilisation - gabions	50,000 seedlings
				Iriiri	Iriiri		
			Lorengecora	Cholicholi	Koomo		
				Lolet	Kobulin		
			Lotome	Nagule	Nagule		
Angolol	Angolol	Angolol					
2.1.1	Improve sanitation technology and building material support and implement them	Napak	Iriiri	Iriiri	Kasile	Public toilets (4stance with urinal and handwashing 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
			Matany	Nakicumet	Kokeris		
			Lotome	Lomuno	Kacurokimak		
				Moruongor	Naronit		
			Lorengecora	Lolet	Lolet TC		
2.1.2	Improve faecal sludge management (collection, transportation, treatment and re - use) through clustering of small towns (Kumi Sironko, Kapchorwa, Nakapiripirit)	Napak	Iriiri	Iriiri	Iriiri TC	Promote use of effective micro organism (EMO) for sludge reduction, provision of cesspool emptier, establish a lagoon in Napak	3
			Matany	Lokuwas	Matany TC		
			Ngoleriet	Lokoreto	Kangole TC		
2.2.2	Refurbish valley dams and tanks	Napak	Lorengecora	Cholicholi	Koomo (dam)	Dam	1
			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
2.3.2	Soroti treatment and distribution - expand in stages (NWSC)	Napak	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
			Lotome	Lomuno	Lomothingo		
				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
				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
				Nakichumet	Nakichumet		
			Lorengecora	Kokipurate	Kocito		
			Lotome	Lomuno	Nangirongole		
2.8.2	Enhancement of rain fed agriculture	Napak	Matany	Nakicumet	Arecheck	Treadle pumps	50
			Lotome	Moruongor	Naitakosowan	Sprinkler irrigation	50
			Lorengecora	Kokipurat	Lobok	Training farmers on soil/water conservation	50
			Iriiri	Nabwal	Kodike		

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures
2.8.3	New irrigation schemes: Undertake feasibility studies of identifies areas	Napak	Matany	Nakicumet	Arecheck	Feasibility study to identify schemes	4 areas
			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
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
2.8.6	Construction of new irrigation schemes: Simple gravity - fed schemes	Napak	Iriiri	Nabwal	Kodike Amedele	Sprinkler irrigation for small scale farming	2 schemes
2.8.7	Construction of new irrigation schemes: Type A Formal Irrigation	Napak	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
2.9.1	Water efficiency evaluation and recommendations	Napak	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
2.11.1	Promote additional and alternative sources of energy including low cost solar panels to be used for LED lighting, radois and cell phones	Napak	Lotome	Moroungor	St. Andrews SS	Windturbins for 2 schools	5 schools, 3 health centres
			Matany	Lokuwas	St. Daniel Kombony		
			Lorengecora	Lorengecora TC	Lorengecora PS	Biogas for 2 schools	
			Iriiri	Iriiri	Kapwat PS		
			Matany	Nakicumet	Nakichumet HC	Solar panels for 3 HCs and 1 PS; radios, cell phones to be given to catchment community members, sensitisations	
				Tepeth	Naturumurum HC		
			Iriiri	Iriiri	Namendera HC		
Lotome	Lomuno	Lomuno PS					
2.11.2	Promote use of energy efficient woodstoves by making the technology readily available	Napak	Iriiri	Iriiri	Kapuat P/S	Construct energy saving stoves in 4 schools to reduce on the fuel wood consumption	4 schools
			Lorengecora	Cholicholi	Cholicol P/S		
			Lorengocora TC	Lorengecora A	Lorengecora P/S		
			Matany	Lokuwas	Matany P/S		
2.12.1	Develop a manual on aquaculture techniques (building on available material)	Napak	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	Kalokengel West	Naitakwae	Construction of fish ponds	2
			Matany	Nakicumet	Nakicumet		
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
2.13.1	Create an ecological tourism organisation, train it and provide the necessary starting equipment e.g a boat	Napak	Iriiri	Nabwal	Micoko	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
					Kodike		
					Dwol		
					Nacoria		

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures
2.13.2	Promote horticulture	Napak	Matany	Nakicumet	Arecheck	Provision of green houses, seeds and technical assistance to farmers	3 green houses, 20 farmers in each village
			Lotome	Moruongor	SC HQ		
			Lorengecora	Lolet	Lolet TC		
2.13.3	Promote bee keeping and processing	Napak	Lotome	Naramaregae	Nakale	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
			Irii	Tepeth	Naturumurun		
			Matany	Nakicumet	Kaeselem		
3.1.1	Demarcate areas considered unsafe for habitation or other use and warn inhabitants	Napak	Lotome	Kalokengel East	Korisae	Wildlife reserves, forest reserves, road reserves, mineral rich areas, wetlands, hills, flood prone areas	11 areas
					Nabwal		
					Nakayot		
					Dwol		
			Irii	Nabwal	Alakas		
					Poron		
					Natirae		
			Matany	Nakicumet	Komuturunyo		
					Lomorucubai		
			Lorengecora	Cholicol	Lokeru		
		Lopuke					
			Nachuka				
			Akwapua Loluk				
			Koititi				
		Kalokengel East	Angarab				
			Naitakwae				
			Lobeei				
			Naregae				
			Loroo				
			Lominit				
Lotome	Kalokengel West	Nakoreto					
			Nasinyonoit				
			Kogete				
			Naachuka				
			Naro Kokweta				
			Naro Apaotiyarwo				
		Morulinga	Namukure				
			Kokorio				
			Naligoi				
			Lorengkungin A				
			Lorengkungin B				
			Moruongor				
			Lokupoi T C				
			Chelele				
			Lomariamomg				
			Namoruongora				
		Lokupoi	Nakoelelei				

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures		
3.1.2	Develop an early flood warning system	Napak	Matany	Nakichumet	Kokeris	Development of early warning systems / signs, community consultations	44 villages		
					Losidongor				
			Cholicholi	Kanaura					
				Lokwakais					
				Komo					
				Nawatom					
				Cholichol					
				Lorikitao					
				Lomasenik					
				Lokupoi					
			Lorengecora	Kokipurat	Kokikpurat				
					Nakwakwa				
					Lobok				
					Kocito				
Iriru	Iriru	Rapada							
		Alekilek							
		Lomaratoit							
		Namendera							
3.1.3	Development / Compilation of hazard / risk map for landslides / sedimentation / floods	Napak	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	Napak	N/A	N/A	N/A	N/A	N/A		
					Naitakwae				
					Lobei				
					Naregae				
					Loroo				
					Kalokengel West			Lominit	
								Nakoreto	
								Nachuka	
					Kalokengel East			Akwapua Loluk	
								Koititi	
								Angarab	
					Lomuno			Natapar apalemu	
								Lolet bita	
								Lopuu	
								Naoyaminit	
								Aduaramukuny	
					Moruongor			Naitakosowan	
								Loolim	
								Angaro	
								Naronit	
								Naooi	
					Lotome			Nariamaregae	Kaingolejek
									Lolet
									Longaroi
		Nakale							

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures
					Matany TC East		
					Matany TC West		
					Lolain		
					Kololo		
					Napeipelu		
					Logolei		
					Locholi		
					Kongkwa		
					Nasiloit		
					Nakanikan		
					Kooriaba		
					Lorukumo		
				Lokuwas	Kalopajak		
					Kokorio		
					Naligoi		
					Lorengkungin A		
					Lorengkungin B		
					Moruongor		
					Lokupoi TC		
					Chelele		
					Lomariamomg		
					Namoruongora		
				Lokupoi	Nakoelele		
					Kokeris		
					Losidongor		
					Kanaura		
				Nakichumet	Lokwakais		
					Nasinyonoit		
					Kogete		
					Naachuka		
					Naro Kokweta		
					Naro Apaotiyarwo		
				Morulinga	Namukure		
					Lorupayo		
					Morualoyete		
					Logurukochio		
					Lokitela Keemun		
					Nangatunyo		
			Matany	Lokali	Lopopongo		

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures
3.3.2	Livestock improvement programme	Napak	Iriiri	Nabwal	Apwanga	Restocking with local breeds, cross breeding, veterinary services incl. vaccination, cattle dips, fodder grass	98 villages
					Makok		
					Micoko		
					Kodike		
					Nabwal		
					Naminit		
					Lokacikit		
					Dwol		
					Natap Apalom		
					Nacoria		
					Tepeth		
				Naturumurum			
				Lobulepeded			
				Naminit			
				Lojom			
				Lolet			
				Nakwanamoru			
				Nakilet			
				Losikait			
				Akore			
				Nakoyot Camp			
				Iriiri TC	Alakas Camp		
					Iriiri TC		
					Lomaratoit		
					Namendera		
					Alekilek		
				Iriiri	Kasile		
Go down							
Moru sapir							
Kaurikiakine							
Kalepedinga							
Iriiri	Lobulio						
	Loyep Camp						
	Ariamoakot						
Iriiri	Loyep Toto						
	Nakayot						
3.3.3	Promote dairy farming	Napak	Lorengecora	Cholicholi	Lokeru	Promotion of high milk yielding livestock, value addition of milk products, promotion of fodder grass like alfalfa	2 villages
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
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
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

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures
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
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
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
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	Lorengecora TC	Lorengecora TC	Equipment of rubbish skips, awareness raising and training of communities, empower 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
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
			Lorengecora	Kokikpurat	Kokikpurat P/S		
			Matany	Lokupoi	Namoruongora P/S		
			Iriiri	Iriiri	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
			Lorengecora	Kokikpurat	Kokikpurat P/S		
			Matany	Lokupoi	Namoruongora P/S		
			Iriiri	Iriiri	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
4.4.2	Enhance and strengthen the capacity of BMUs	Napak	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
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

INTERVENTION SITES FOR THE OPTIONS

District: NGORA

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures
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
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
				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
			Kobwin	Kodike	Agule		
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
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
			Kobwin	Kodike	River Kodike		
1.1.8	Ecological water requirements: Revisiting legislation and catchment assessment	Ngora	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
			Mukura	Ariet	Puna		
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	
				Agu wetland			
				Omadito wetland			
				Abuya wetland			
				Adiesa wetland			
				Orisai wetland			
			Kapir	Kokong wetland			
				Agule wetland			
				Aciisa wetland			
			Kobwin	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

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures
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
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
1.2.3	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
			Ngora	Ngora	Tididiek		
1.2.4	Planting trees in degraded areas	Ngora	Ngora	Tididiek	Okorom	Planting trees on degraded areas	2.000 trees
1.3.1	Regular updating of district wetland inventories by districts	Ngora	Ngora		Kopeke wetland	Extract inventory from Kumi district and establish it, update regularly afterwards	
					Oduarat wetland		
					Agu wetland		
					Omadito wetland		
					Abuya wetland		
					Oledai wetland		
			Kapir	Adiesa wetland			
				Orisai wetland			
				Kakor wetland			
				Kokong wetland			
				Agule wetland			
			Kobwin	Atapar wetland			
				Aciisa wetland			
				Okape wetland			
				Oshera wetland			
				Aswara wetland			
				Kodike wetland			
Mukura	Agule wetland						
	Nyaguo wetland						
	Nyasala wetland						
	Opot wetland						
	Morukokise wetland						
Mukura	Kamadokima wetland						
	Puna wetland						
	Kagamaka wetland						

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures					
1.3.2	Updating of demarcated protection zones and acceptable utilization of wetlands, producing GIS maps of wetlands at various levels	Ngora	Mukura	Kobwin	Aciisa wetland	Complete demarcation of wetlands and their utilisation, produce GIS maps						
					Okape wetland							
					Oshera wetland							
					Aswara wetland							
					Kodike wetland							
					Agule wetland							
					Nyaguo wetland							
					Nyasala wetland							
					Opot wetland							
					Morukokise 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					
					1.3.4	Review and update the wetland management / action plans	Ngora	Mukura	Kobwin	Kopeke wetland	Review and update action plan	
										Adiesia wetland		
1.3.4	Review and update the wetland management / action plans	Ngora	Mukura	Kapir	Orisai wetland	Review and update action plan						
					Kakor wetland							
					Kokong wetland							
					Agule wetland							
					Atapar wetland							
					Aciisa wetland							
					Okape wetland							
					Oshera wetland							
					Aswara wetland							
					Kodike wetland							
Agule wetland												
					Nyasala wetland	Restoration of fish and vegetation, protection of birds, Aciisa, Aswara, Kamadokima, Kagamaka: sensitisation due to encroachment through rice cultivation and create by-						
					Opot wetland							
					Morukokise wetland							
					Kamadokima wetland							
					Puna wetland							
					Kagamaka wetland							
					Kopeke wetland							
Agule wetland												
					Omadio wetland	Restoration of fish and vegetation, protection of birds, Aciisa, Aswara, Kamadokima, Kagamaka: sensitisation due to encroachment through rice cultivation and create by-						
					Abuya wetland							
					Adiesia wetland							
					Orisai wetland							
					Kokong wetland							
					Agule wetland							

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures
1.3.5	Restoration of vital (unique) critical (subject to on going degradation) wetlands	Ngora	Kobwin		Aciisa wetland	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	
					Aswara wetland		
					Kodike wetland		
					Agule wetland		
					Nyaguo wetland		
					Opot wetland		
					Kamadokima wetland		
Mukura	Kagamaka wetland						
1.4.1	Mapping, demarcation of riparian and roadside protection zones and identify and implement source protection measures	Ngora	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	
2.1.1	Improve sanitation technology and building materials, support and implement them	Ngora	Ngora	Kopeke	Kopeke	Ecosan toilets (with sensitisation) for the community	2 per village
					Agule		
					Kees		
			Kobwin	Akarukei	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
2.2.2	Refurbish valley dams and tanks	Ngora	Ngora	Omadito	Omadito	Refurnishing of valley dams	3
			Kapir	Akisim	Alondo		
			Mukura	Mukura	Kajamaka		
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
2.3.2	Soroti treatment and distribution - expand in stages (NWSC)	Ngora	N/A	N/A	N/A	N/A	N/A
2.6.1	Feasibility studies and design of priotised sand dams. Construction with co operation and input from local communities	Ngora	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	Omadito	Omadito	Identification of dams	3
			Mukura	Mukura	Kajamaka		
			Kapir	Akisim	Akisim		
2.7.2	Feasibility and design of priotised dams for stock watering and human needs. Construction with cooperation and input from local communities	Ngora	Ngora	Omadito	Omadito	Dams for stock watering and human needs	3
			Mukura	Mukura	Ajamaka		
			Kapir	Akisim	Akisim		
2.8.2	Enhancement of rain fed agriculture	Ngora	Kapir	Omitto	Kakor	Rain water harvesting in tanks for gardens, use of improved seeds	1
2.8.3	New irrigation schemes: Undertake feasibility studies of identified areas	Ngora	Mukura	Puna	Puna	New irrigation scheme feasibility studies	3
			Kapir	Omitto	Kakor		
			Kobwin	Ojere	Ojere		
2.8.4	Construction of new irrigation schemes: Improved (seasonal) wetland scheme	Ngora	Ngora	Agu	Agu	Construction of new irrigation schemes	2
			Mukura	Agogomi	Agogomi		
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	Treadle pumps, hose pipes	1
2.8.6	Construction of new irrigation schemes: Simple gravity - fed schemes	Ngora	N/A	N/A	N/A	N/A	N/A

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures													
2.8.7	Construction of new irrigation schemes: Type A formal irrigation	Ngora	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													
2.9.1	Water efficiency evaluation and recommendations	Ngora	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													
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	Ngora	Kobwin	Ngora	Ngora (Ngora New P/S)	Solar panels	8 schools													
				Ngora	Odwarat (Odwarat P/S)															
				Mukura	Puna (Puna P/S)															
				Mukura	Olilim (Kumel P/S)															
				Kapir	Atapar (Atapar P/S)															
				Kapir	Agule (Agule Omitto P/S)															
				Kapir	Kodike (Kodike P/S)															
2.11.2	Promote use of energy efficient woodstoves by making the technology readily available	Ngora	Kobwin	Kobuku	Institutional complex A(Ngora girls Sch.)	10 households trained per village	10													
2.12.1	Develop a manual on aquaculture techniques (building on available materials)	Ngora	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	Aciisa	Aciisa	Rehabilitation of ponds	2			
																		Ngora	Kopege	Kopege
																		Mukura	Akeit	Akeit
																		Ngora	Tididiek	Tididiek
																		Kapir	Omitto	Kakor
						Kobwin	Atiesa											Atiesa		
Kapir	Mukakise	Ariet																		
2.12.3	Train and assist farmers on the appropriate fishing techniques and equipment as well as the protection of breeding grounds	Ngora	Kobwin	Aciisa	Nyajuo	10 fishermen in each village trained and equipped	10 fishermen per village													
								Ngora	Agule	Agule										
								Kapir	Omitto	Kakor										
								Kapir	Omitto	Kakor										
2.13.1	Create an ecological tourism organisation, train it and provide the necessary starting equipment e.g a boat	Ngora	Mukura	Kamodokima	Kamodokima	Create and train 3 ecological tourism organisations, training of communities, 3 binoculars, 3 motor boats, 12 life jackets, 3 cameras	3													
								Ngora	Kopeke	Kopeke										

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures
2.13.2	Promote horticulture	Ngora	Kobwin	Aciisa	Aciisa	Train farmers in horticulture, provide inputs (seeds, equipment)	2 farmers per village
			Kapir	Orisai	Orisai		
2.13.3	Promote bee keeping	Ngora	Mukura	Mukura	Mukura	Training of 3 groups, packaging, marketing, processing, harvesting gear, material for making beehives	3 groups of 10 - 20 members
				Apama	Apama		
			Ngora	Tididiek	Tididiek		
3.1.1	Demarcate areas considered unsafe for habitation or other use and warn inhabitants	Ngora	Ngora	Ngora	Kees		7
				Kopege	Kopege		
				Omadito	Kopelu		
			Orisai	Orisai			
			Orisai	Orit			
			Kapir	Akarukei	Akarukei Ajesa		
			Mukura	Puna	Puna		
3.1.2	Develop an early flood warning system	Ngora	Ngora	Ngora	Kees	Develop early flood warning system in each village	7
				Kopege	Kopege		
				Omadito	Kopelu		
			Orisai	Orisai			
			Orisai	Orit			
			Kapir	Akarukei	Akarukei Ajesa		
			Mukura	Puna	Puna		
3.1.3	Development/compilation of a hazard/risk map for landslides/sedimentation/floods	Ngora	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
3.3.2	Livestock improvement programme	Ngora	Ngora	Agu	Agu	Sensitisations, artificial insemination, establishment of improved pasture	5 farmers per village
				Kodike	Kodike		
			Kobwin	Atoot	Atoot		
3.3.3	Promote dairy farming	Ngora	Ngora	Agu	Agu	Improved pasture, upgrade breeds, cooling plants, milk testing kit, transport equipment for milk, create dairy farmer's association and train them	3
				Kodike	Kodike		
			Kobwin	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
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
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
4.2.1	Train a committed cadre of extension service providers to render interdisciplinary, integrated extension service to include CMCs, CDOs etc.	Ngora	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

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures	
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	
4.3.2	Introduction of a community radio programme dedicated to environmental matters	Ngora				1 programme on all environmental subjects		
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	market, Kaluke market, Mukakise TC, train people in management, operation and maintainance of latrines	3 VIP latrines established, 9 people trained per village on management and O & M	
			Kobwin	Akaruke	Kaluke			
			Mukura	Mukakise	Mukakise			
4.3.4	Implement demonstration projects - schools, model farms etc. (capital costed elsewhere)	Ngora	Kapir	Kapir	Okape High School	Demonstrations of agroforestry	2	
			Kobwin	Kobwin	Kobwin Sec. School			
4.3.5	Introduction of awareness raising programmes in schools	Ngora	Ngora	Agu	Agu (Agu P/S)	Awareness raising on environmental matters	9 schools	
				Kalengo	Agolium (Agolium P/S)			
				Oteteen	Oteteen (Peace Sec. Sch)			
				Koloin	Koloin (Koloin P/S)			
				Kapir	Akisim			Akisim (St. Stephen SS)
				Kaler	Kaler (Mukura Mem. SS)			
				Mukura	Akubwi			Akubwi (Akubwi P/S)
				Kobwin	Kobwin			Kobwin (Kobwin Sec. Sch)
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	
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	
			Mukura	Kamodokima	Kamodokima			
			Kobwin	Kodike	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	
4.5.1	Strengthen enforcement bodies with capacity	Ngora	N/A	N/A	N/A	N/A	N/A	

INTERVENTION SITES FOR THE OPTIONS

District: Serere

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures	
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	
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	Kyerere	Kamurojo	Abuket	Capacity building, seedlings for 2 nursery beds per village, sensitization on landuse management	14 nurseries	
				Kangodo	Moru			
				Atiira	Asilang			Asilang
					Okaalen			Okaalen
					Aisin			Aisin
Kateta	Kateta	Olupe						
1.1.3	Identification and regular (annually) eradication of floating islands / invasive alien plants	Serere	Kyerere	Kamurojo	Abuket	1 boat, 1 tractor, equipment	Twice a year eradication of 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 and implement it	Serere	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	Kyerere	Kamurojo	Abuket Agu	Riparian vegetation, gabions	5 km each in each village	
1.1.8	Ecological water requirements: Revisiting legislation and catchment assessment	Serere	N / A	N / A	N / A	N / A	N / A	
1.1.8.1	Introduce improved farming practices	Serere	Kyerere	Kamurojo	Abuket	Agroforestry, animal husbandry, organic manure, soil management, zero grazing	3 farmers per village	
				Kangodo	Moru			
				Atiira	Asilang			
1.1.9	Build the capacity on conservation methods, especially for wetlands	Serere	Pingire	Agonyo	Agonyo 1	Form and train 2 wetland users associations, training on suitable use of wetlands for 10 farmers per village	20 farmers	
					Agonyo 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	Serere	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	
1.2.2	Establish nurseries for provision of seedling and establish distribution, training and management systems in all districts - pilot projects	Serere	Kyerere	Kyerere HQ	Kyerere HQ	Establish 3 nurseries	3 nurseries	
				Atiira	Atiira HQ			
				Kateta	Kateta HQ			
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	Kyerere	Akuja	Akuja	Sensitisation, woodlots and agroforestry, establishment of 2 nurseries per village	12 nurseries (6 for woodlots and 6 for agroforestry)	
				Kelim	Omagoro			
				Atiira	Apokol			
				Asilang	Asilang			
				Kateta	Kateta Olupe			
				Olupe	Olupe			
1.2.4	Planting trees in degraded areas	Serere	Kateta	Owiny	Owiny	1 tree nursery per village	6 nurseries	
				Agule	Agule			
				Ojetenyang	Alos			
				Kyerere	Kyerere			
				Omulio	Obala			
				Opuure	Otaaba			
				Otaaba	Otaaba			

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures
1.3.1	Regular updating of district wetland inventories by districts	Serere	Kyere	Kamurojo	Abuket (Abuket wetland)	Provide a GPS per village and relevant software, update wetland inventory regularly	8 GPSs
				Kelim	Omagoro (Omagoro wetland)		
				Kangodo	Ojama (Aminit wetland)		
			Kateta	Kamusala	Kamusala (Kamusala wetland)		
				Ojetenyang	Owiny (Owiny wetland)		
				Kanyangan	Awoja (Owiny wetland)		
			Atiira	Opuure	Opuure (Akwang Kituke wetland)		
				Osilang	Opiin (Opiin wetland)		
1.3.2	Updating of demarcated protection zones and acceptable utilization of wetlands, producing GIS maps of wetlands at various levels	Serere	Kyere	Kamurojo	Abuket (Abuket wetland)	Demarcations, production of GIS maps, software	
				Kelim	Omagoro (Omagoro wetland)		
				Kangodo	Ojama (Aminit wetland)		
			Kateta	Kamusala	Kamusala (Kamusala wetland)		
				Ojetenyang	Owiny (Owiny wetland)		
				Kanyangan	Awoja (Owiny wetland)		
			Atiira	Opuure	Opuure (Akwang Kituke wetland)		
				Osilang	Opiin (Opiin wetland)		
1.3.3	Study for economic valuation of wetland resources and disseminate the results	Serere	N / A	N / A	N / A	N / A	N / A
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	
				Kelim	Omagoro (Omagoro wetland)		
				Kangodo	Ojama (Aminit wetland)		
			Kateta	Kamusala	Kamusala (Kamusala wetland)		
				Ojetenyang	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
				Kelim	Omagoro (Omagoro wetland)		
				Kangodo	Ojama (Aminit wetland)		
			Kateta	Kamusala	Kamusala (Kamusala wetland)		
				Ojetenyang	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		Abuket Agu	Mapping, demarcation pillars, riparian vegetation, gabions	5 km each in each village
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)
				Kangodo	Ojama PS		
2.1.2	Improve faecal sludge management (collection, transportation, treatment and re-use) through clustering of small towns (Kumi Sironko, Kapchorwa, Nakapiripirit)	Serere	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
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
2.3.2	Design and construct River Agu / Abuket scheme to supply Kyere, Ocapa and surrounds - water and waste water works	Serere	Kyere	Abuket	Abuket	2 pipelines	2
			Kateta	Akoke	Ocapa		
2.3.2	Soroti treatment and distribution - expand in stages (NWSC)	Serere	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

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures
2.7.1	Needs identification for location and type of dams and associated abstraction facilities	Serere	Kyere	Kangodo	Ojama	Valley dam	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	Kateta	Dams	2 dams
2.8.2	Enhancement of rain fed agriculture	Serere	Atiira	Okodo	Abili	Rain water harvesting structures, cover crops, treadle pumps, mulching for 2 farmers per village	10 farmers
				Opuure	Akisim		
				Orupe	Oburiekori		
			Kyere	Kamurojo	Kamurojo Central		
2.8.3	New irrigation schemes: Undertake feasibility studies of identified areas	Serere	Katete	Ojetenyang	Owiny	Irrigation scheme	1
2.8.4	Construction of new irrigation schemes: Improved (seasonal) Wetlands Schemes	Serere	Katete	Ojetenyang	Owiny	Irrigation scheme	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
2.8.6	Construction of new irrigation schemes: Simple gravity - fed schemes	Serere	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
2.8.8	Construction of new irrigation schemes: Type B Formal Irrigation	Serere	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
2.10.1	Investment and implementation in hydropower installations and grid distribution	Serere	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
			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
			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
2.12.2	Assist farmers with rehabilitation of viable aquaculture ponds and in the construction of new ponds - allowance made for a pilot	Serere	Kateta	Kamusala	Pokor B	Construct new ponds	3 ponds
					Abuket		
			Kyere	Kamulojo	Akoke		
2.12.3	Train and assist farmers on the appropriate fishing techniques and equipment as well as the protection of breeding grounds	Serere	Kateta	Kamusala	Pokor B	Training of 10 farmers per village on appropriate fishing techniques	30 farmers
				Orupe	Akoke		
			Kyere	Kamulojo	Abuket		
2.13.1	Create an ecological tourism organisation, train it and provide the necessary starting equipment e.g a boat	Serere	Kyere	Abuket	Abuket around Lake Adois	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
			Kateta	Ojetenyang	Onyara		
2.13.2	Promote horticulture	Serere	Kateta	Omagara	Omagara	Promote vegetable growing (tomatoes, cabbage, water melon) for 5 farmers per village	15 farmers
			Atiira	Atiira	Apokor		
			Kyere	Kyere	Alilimo		
2.13.3	Promote bee keeping	Serere	Atiira	Atiira	Apokor	Modern bee hives, honey harvesting gear, packaging materials, processing plant for 5 farmers per village including training	20 farmers
				Atiira	Atiira		
			Kyere	Kangodo	Ojama Amor		
			Kateta	Owiny	Kyamuliki		

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures
3.1.1	Demarcate areas considered unsafe for habitation or other use and warn inhabitants	Serere	Kyere	Omagero	Kakinga	Demarcations	
					Moru		
					Agule		
				Kamurojo	Amase		
					Atoi		
				Kakuja	Obare		
3.1.2	Develop an early flood warning system	Serere	Kyere	Omagero	Kakinga	Early warning systems	7 villages
					Moru		
					Agule		
				Kamurojo	Amase		
					Atoi		
				Kakuja	Obare		
3.1.3	Development / compilation of hazard / risk map for landslides / sedimentation / floods	Serere	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
3.3.2	Livestock improvement programme	Serere	Kyere	Abutek	Abutek	Improved breeds through artificial insemination, spraying, cattle dips, fodder, zero grazing	6 farmers per village
			Atiira	Opuure	Opuchet		
			Kateta	Kanyangan	Awoja		
3.3.3	Promote dairy farming	Serere	Kyere	Abutek	Abutek	Milk processing plants (coolers), diary breeds, spraying for pests and diseases control	6 farmers per village
			Atiira	Opuure	Opuchet		
			Kateta	Kanyangan	Awoja		
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
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	Serere	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	Serere	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.	Serere	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)	Serere	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)	Serere	N / A	N / A	N / A	N / A	N / A
4.3.2	Introduction of a community radio programme dedicated to environmental matters	Serere			Serere TC	1 programme on environmental matters	1 per 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	Serere	Atiira	Opuure	Akisim / Oukot landing site	3 stance ecosan toilets including awareness raising in each village	10
				Asilang	Okaalen		
			Kyere	Omagero	Kakinga		
					Moru		
					Agule		
				Kamurojo	Amase		
					Atoi		
				Kakuja	Obare		
			Kateta	Owiny	Owiny		

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures
4.3.4	Implement demonstration projects - schools, model farms etc. (capital costed elsewhere)	Serere	Kyere	Kangodo	Ojama P / S	1 model farm of approximately 1 ha in each school	3 model farms
			Atiira	Atiira	Atiira P / S		
			Kateta	Owiny	Ogetenyang P / S		
4.3.5	Introduction of awareness raising programmes in schools	Serere	Kyere	Kangodo	Ojama P / S	Awareness creation	3 schools
			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
4.4.2	Enhance and strengthen the capacity of BMUs	Serere		Ojetenyang	Onyara (Onyara BMU)	Training of BMU executive members on management roles, establishment of shelters	4 BMU shelters
			Kateta	Kanyangan	Olupe (Olupe BMU)		
			Atiira	Opuure	Opuchet (Opuchet BMU)		
			Kyere	Kamurojo	Moru (Moru BMU)		
4.4.3	Enhance and strengthen the capacity of rice grower associations	Serere		Kelim	Omagoro	Create and train rice grower associations, 1 mill per village, 1 storage facility per village	30 farmers per association
			Kyere	Kamurojo	Abuket		
				Kamusala	Kamusala		
			Kateta	Ojetenyang	Onyara		
4.5.1	Strengthen enforcement bodies with capacity	Serere	N / A	N / A	N / A	N / A	N / A

INTERVENTION SITES FOR THE OPTIONS

District: Sironko

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures		
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		
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	Masaba	Bumuluwe	Kiguli	Contour bands (grass and agroforestry trees planted along contours), drains and water way layout esp. in homesteads 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		
					Bumulani			Bugube	Bumugoli
									Muluwe A
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		
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		
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 recouring 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 Budadiri-Gombe-Bugiboni road (at bridges and at Budeda where River Sironko runs parallel to the road). 2 sections along river Sironko recoured (to save the road and bridge)		
			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		

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures		
			Zesui	Simuma	Muluti Namasanzalala Bumazaki Nabukyi Majenga	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		
					Nabusofu Muluwe Lusola Masbasi Lugongo Madingo				
			Masaba	Bumuluwe	Nalusuba				
					Nashuwu Nambekye Bunasufwa Masubi Bumanza Nakwira				
			Busulani	Bumawosa					
					Birala Nadisi Bukagosi Bumagombe Kitangalile				
			Bumasifwa	Bundagala					
					Namahalu Lugongo Kisoyo Nabuzo Makuyu Shembe Makyele				
1.1.8.1	Introduce improved farming practices / climate smart agriculture	Sironko	Bugitimwa	Bugitimwa					
1.1.9	Build the capacity on conservation methods, especially for wetlands	Sironko	Carried out by Jica						
1.1.10	Monitoring the impacts of sustainable land and environmental management in terms of improved farming practices (individual benefits) and downstream water management	Sironko	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	Sironko	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 (Maintaining existing nursery)	Sironko	Budadiri TC	Nakiwonwe Ward	Nakiwondwe LFR			Various seedlings both indigenous and exotics	At least 100.000 seedlings raised p.a. Provide support to private nursery operators of coffee seedlings

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures
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	Sironko	Busulani	Bugube	Kiguli	Provide support, to private nurseries (i.e. coffee) to raise esp. agroforestry tree seedlings, identify, map and restore degraded landscapes, needs assessments	2 woodlots in each SC (50 households in each parish), at least 10 ha of degraded land reforested in each parish and increased adoption of agroforestry practices
					Bumugoli		
			Bumasifwa	Bunagami/Gabende	Zanzasi		
					Gabende		
			Bumalimba	Nandere	Nandere		
					Namatodolo		
		Zesui	Nabweya	Kyesha			
				Bulugona			
			Masaba	Buboolo	Buwodeya		
					Majenga		
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
					Namasanzalala		
					Bumazaki		
					Nabukyi		
					Majenga		
			Masaba	Bumuluwe	Nabusofu		
					Muluwe		
					Lusola		
					Masbasi		
					Lugongo		
					Madingo		
			Busulani	Bumawosa	Nalusuba		
					Nashuwu		
					Nambekye		
					Bunasufwa		
					Masubi		
					Bumanza		
			Bumasifwa	Bundagala	Nakwira		
					Birala		
					Nadisi		
					Bukagosi		
					Bumagombe		
					Kitangalile		
Bugitimwa	Bugitimwa	Namahalu					
		Lugongo					
		Kisoyo					
		Nabuzo					
		Makuyu					
		Shembe					
1.3.1	Regular updating of district wetland inventories by districts (25 critical wetlands, 3 major systems: Sironko, Namatala, Lwere)	Sironko	For all wetlands				A wetland inventory was developed in 2009. An updated wetlands inventory after every 2 years

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures		
1.3.2	Updating of demarcated protection zones and acceptable utilization of wetlands, producing GIS maps of wetlands at various levels (under Jica which is interested in rice growing)	Sironko	Bukiise	Busate		Riverbank protection zone and wetlands demarcated (Nalugugu wetland demarcated as a pilot from Jica to start with)	Nature conservation 20 m, woodlots 20 m, other crops 60 m to create a protection zone of 100 m		
				Busiu					
				Nalugugu					
				Bukiise					
				Nandago					
1.3.3	Study for economic valuation of wetland resources and disseminate the results	Sironko	N / A	N / A	N / A	N / A	N / A		
1.3.4	Review and update the wetland management / action plans	Sironko	All SWAPs and DWAPs in place with support from Jica	All 21 Lower Local Governments		Review and update existing WAPs after every 2 years	All the 21 SWAPs and DWAPs updated every 2 years		
1.3.5	Restoration of vital (unique) critical (subject to on - going degradation) wetlands	Sironko	Bukiise	Busiu Busate Nalugugu	Nalugugu wetland	Demarcate zones and protection areas	Nalugugu wetland restored		
1.4.1	Mapping, demarcation of riparian and roadside protection zones and identify and implement source protection measures	Sironko	Zesui		In all villages traversed by River Sironko and its tributaries in the 14 Sub-counties.	Along River Sironko and its tributaries and road sides: protection zone demarcations, apiculture promoted, grass and trees planted.	At least a 30 m protection zone demarcated and mapped on River Sironko and a 10 m protection zone on the tributaries with source protection measures such as tree and grass planting (1 ha per village)		
			Masaba						
			Bumasifwa						
			Busulani						
			Bugitimwa						
			Buhugu						
			Bukyambi						
			Bumalimba						
			Bukiise						
			Sironko TC						
			Buteza						
			Buyobo						
			Nalusala						
			Bukiyi						
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		
				Bumawosa	Nakwira (Mwalo)				
				Namwejje	Namwejje				
				Bundagala	Nadisi				
				Bugimunye	Bumanza				
				Bumasifwa	Bunasekye				
					Bumasola (Manda)				
				Bunamahande	Mahapa				
				Zesui	Simuma			Makyelele	
				Bugitimwa	Bugiboni			Kipande	
				Bukiise	Busate			Mayumba (Bugiboni TC)	
				Buhugu	Bumatofu			Salirira	
								Miwu TC	
2.1.2	Improve faecal sludge management (collection, transportation, treatment and re-use) through clustering of small towns (Kumi Sironko, Kapchorwa, Nakapiripirit)	Sironko	Bumalimba	Mutufu	Prison farmland	Faecal treatment lagoon	1 central faecal sludge treatment site for public institutions in the District (since the district has shifted to construction of lined pit latrines which have to be periodically emptied)		
2.2.2	Refurbish valley dams and tanks	Sironko	N / A	N / A	N / A	N / A	N / A		

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures
2.3.1	Design and construct river Agu scheme to supply Kumi and surroundings - water and wastewater works	Sironko	N / A	N / A	N / A	N / A	N / A
2.3.2	Soroti treatment and distribution - expand in stages (NWSC)	Sironko	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	Sironko	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	Sironko	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	Sironko	N / A	N / A	N / A	N / A	N / A
2.8.2	Enhancement of rain fed agriculture	Sironko	Zesui	Simuma	Bumazaki	Treadle pumps (45), training of farmers (5 per village) on irrigation and soil / water conservation	Treadle pumps (45), training of farmers (5 per village) on irrigation and soil / water conservation
			Masaba	Bumuluwe	Madingo		
			Bumasifwa	Bundagala	Birala		
			Busulani	Namwejje	Namwejje		
			Bugitimwa	Bugitimwa	Shembe		
			Buhugu	Bumatofu	Miwu TC		
			Bumalimba	Nandere	Nandere		
			Bukiise	Busiu	Kibembe		
		Nalusala	Buyaya	Namwenge			
2.8.3	New irrigation schemes: Undertake feasibility studies of identifies areas	Sironko	Nalusala	Buyaya	Wasekese	In lowland areas of the district	
					Mayama		
					Busate		
					Mayenze		
					Nalusalo		
					Masaba		
					Nalugugu		
					Kisenyi		
					Bukiende		
					Dorcus		
					Nabirende		
					Kibembe		
					Bunambutye		
					Busiu		
					Bumasikye		
					Bulukyeke		
					Busukuya		
					Bukuma		
					Bunyakelo		
					Nalukhuba		
Mulalu							
Butsongola							
Bumalema							
Namili							
Napyo							
Jewa							
Kirongo							
Namwege							
Bumanganga							

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures
2.8.4	Construction of new irrigation schemes: Improved (seasonal) Wetlands Schemes	Sironko	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
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
2.8.7	Construction of new irrigation schemes: Type A Formal Irrigation	Sironko	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
2.9.1	Water efficiency evaluation and recommendations	Sironko	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 Dirigana and Sironko rivers	Already EIAs have been conducted for the two projects
			Masaba	Buboolo			
				Simuma	Makyelele	Extend electricity lines	Extend electricity grid lines to the 4 centres
			Zesui	Bumumulo	Bumumulo HC III		
			Busulani	Bugube	Kiguli		
2.11.1	Promote additional and alternative sources of energy including low cost solar panels to be used for LED lighting, radois 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)
					Majenga		
			Bugitimwa	Bugitimwa	Kisoyo		
					Shembe		
			Bumasifwa	Bundagala	Bukagosi		
					Kitangalile		
			Busulani	Bumawosa	Bunasufwa		
		Masubi					
2.11.2	Promote use of energy efficient woodstoves by making the technology readily available	Sironko			Namasanzalala	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
			Zesui	Simuma	Bumazaki		
					Lugongo		
			Masaba	Bumuluwe	Muluwe		
			Busulani	Bumawosa	Bumanza		
					Nakwira		
			Bumasifwa	Bundagala	Birala		
Bugitimwa	Bugitimwa	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
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, establish fish breeding centre in Sironko TC	Fish ponds rehabilitated and restocked in 4 parishes, 1 fish breeding centre established
			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
2.13.1	Create an ecological tourism organisation, train it and provide the necessary starting equipment e.g a boat	Sironko	Bumasifwa	Bumasifwa	Bunasekye	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
			Bugitimwa	Elgon	Kisawe		
			Butandiga	Butandiga	Miwu		

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures
2.13.2	Promote horticulture	Sironko	N / A	N / A	N / A	N / A	N / A
			Buwalasi			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
			Nasala				
			Bukhulo				
			Bakyiri				
2.13.3	Promote bee keeping	Sironko	Bukiise				
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
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
				Bukhulo	Bukhulo	Restock with local breeds for an improved stock over time, cattle dips and crushes, artificial insemination, improved fodder, zero grazing units, improved vetenairy services: vaccination, tick control, spraying chemicals	Improved breeds incl. bulls, cattle dips and crushes, artificial insemination, improved fodder, zero grazing units, improved vetenairy services: vaccination, tick control, spraying chemicals
				Mpogo	Mpogo		
				Mafudu	Mafudu		
					Bumasikye		
					Bulukyeke		
			Kirombe		Busukuya		
					Bukuma		
					Bunyakelo		
			Bukhulo		Nalukhuba		
					Mulalu		
					Butsongola		
			Bukhulo	Sironko	Bumalema		
				Busate	Busate		
				Nandago	Nalusalo		
				Nalugugu	Buliende		
			Bukiise	Busio	Busio		
			Nalusala	Namili	Namili		
				Bukumbale	Bukumbale		
				Nabudisilu	Nabudisilu		
				Bukigalabo	Bukigalabo		
				Nampanga	Nampanga		
3.3.2	Livestock improvement Programme	Sironko	Bukiyi				
					Busate	Busate	Promotion of artificial insemination, train 2 practitioners per village and equip them (kits for transportation and storage, motorcycle)
					Nandago	Nalusalo	
			Bukiise		Busio	Busio	
					Mpogo	Mpogo	
					Mafudu	Mafudu	
					Bulukyeke	Bulukyeke	
					Bumasikye	Bumasikye	
			Kirombe		Bulukyeke	Bulukyeke	
					Bukuma	Bukuma	
					Nalukhuba	Nalukhuba	
					Bunyakelo	Bunyakelo	
3.3.3	Promote dairy farming	Sironko	Bukhulo	Bukhulo	Bukhulo		

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures
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	Sironko	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	Sironko	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	Sironko	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.	Sironko	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)	Sironko	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)	Sironko	N / A	N / A	N / A	N / A	N / A
4.3.2	Introduction of a community radio programme dedicated to environmental matters	Sironko				1 radio programme together with Bulambuli	
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	Sironko	Budadiri T.C	Kalawa	Budadiri Girls P/S	Ecosan toilets, awareness raising	1 block
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
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
			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
4.4.2	Enhance and strengthen the capacity of BMUs	Sironko	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
4.5.1	Strengthen enforcement bodies with capacity	Sironko	N / A	N / A	N / A	N / A	N / A
	Promote rainwater harvesting systems	Sironko					
			Bukhulo	Bukhulo	Bukhulo Primary School		
			Mpogo	Mpogo	Mpogo SC HQ		
			Mafudu	Mafudu	Mafudu Primary School		
		Sironko	Nampanga	Nampanga	Nampanga Primary School		4 schools

INTERVENTION SITES FOR THE OPTIONS

District: Sironko

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures
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
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 Bumugoli Muluwe A	Contour bands (grass and agroforestry trees planted along contours), drains and water way layout esp. in homesteads 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
			Masaba	Bumuluwe	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
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
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 recouring 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 Budadiri-Gombe-Bugiboni road (at bridges and at Budeda where River Sironko runs parallel to the road). 2 sections along river Sironko recoured (to save the road and bridge)
			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

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures		
			Zesui	Simuma	Muluti Namasanzalala Bumazaki Nabukyi Majenga	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		
					Nabusofu Muluwe Lusola Masbasi Lugongo Madingo				
			Masaba	Bumuluwe	Nalusuba				
					Nashuwu Nambekye Bunasufwa Masubi Bumanza Nakwira				
			Busulani	Bumawosa					
					Birala Nadisi Bukagosi Bumagombe Kitangalile				
			Bumasifwa	Bundagala					
					Namahalu Lugongo Kisoyo Nabuzo Makuyu Shembe Makyele				
1.1.8.1	Introduce improved farming practices / climate smart agriculture	Sironko	Bugitimwa	Bugitimwa					
1.1.9	Build the capacity on conservation methods, especially for wetlands	Sironko	Carried out by Jica						
1.1.10	Monitoring the impacts of sustainable land and environmental management in terms of improved farming practices (individual benefits) and downstream water management	Sironko	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	Sironko	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 (Maintaining existing nursery)	Sironko	Budadiri TC	Nakiwonwe Ward	Nakiwondwe LFR			Various seedlings both indigenous and exotics	At least 100.000 seedlings raised p.a. Provide support to private nursery operators of coffee seedlings

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures
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	Sironko	Busulani	Bugube	Kiguli	Provide support, to private nurseries (i.e. coffee) to raise esp. agroforestry tree seedlings, identify, map and restore degraded landscapes, needs assessments	2 woodlots in each SC (50 households in each parish), at least 10 ha of degraded land reforested in each parish and increased adoption of agroforestry practices
					Bumugoli		
			Bumasifwa	Bunagami/Gabende	Zanzasi		
					Gabende		
			Bumalimba	Nandere	Nandere		
					Namatodolo		
			Zesui	Nabweya	Kyesha		
					Bulugona		
					Buwodeya		
					Majenga		
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
					Namasanzalala		
					Bumazaki		
					Nabukyi		
					Majenga		
			Masaba	Bumuluwe	Nabusofu		
					Muluwe		
					Lusola		
					Masbasi		
					Lugongo		
					Madingo		
			Busulani	Bumawosa	Nalusuba		
					Nashuwu		
					Nambekye		
					Bunasufwa		
					Masubi		
					Bumanza		
			Bumasifwa	Bundagala	Nakwira		
					Birala		
					Nadisi		
					Bukagosi		
					Bumagombe		
					Kitangalile		
Bugitimwa	Bugitimwa	Namahalu					
		Lugongo					
		Kisoyo					
		Nabuzo					
		Makuyu					
		Shembe					
1.3.1	Regular updating of district wetland inventories by districts (25 critical wetlands, 3 major systems: Sironko, Namatala, Lwere)	Sironko	For all wetlands				A wetland inventory was developed in 2009. An updated wetlands inventory after every 2 years

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures
1.3.2	Updating of demarcated protection zones and acceptable utilization of wetlands, producing GIS maps of wetlands at various levels (under Jica which is interested in rice growing)	Sironko	Bukiise	Busate		Riverbank protection zone and wetlands demarcated (Nalugugu wetland demarcated as a pilot from Jica to start with)	Nature conservation 20 m, woodlots 20 m, other crops 60 m to create a protection zone of 100 m
				Busiu			
				Nalugugu			
				Bukiise			
1.3.3	Study for economic valuation of wetland resources and disseminate the results	Sironko	N / A	N / A	N / A	N / A	N / A
1.3.4	Review and update the wetland management / action plans	Sironko	All SWAPs and DWAPs in place with support from Jica	All 21 Lower Local Governments		Review and update existing WAPs after every 2 years	All the 21 SWAPs and DWAPs updated every 2 years
1.3.5	Restoration of vital (unique) critical (subject to on - going degradation) wetlands	Sironko	Bukiise	Busiu Busate Nalugugu	Nalugugu wetland	Demarcate zones and protection areas	Nalugugu wetland restored
1.4.1	Mapping, demarcation of riparian and roadside protection zones and identify and implement source protection measures	Sironko	Zesui		In all villages traversed by River Sironko and its tributaries in the 14 Sub-counties.	Along River Sironko and its tributaries and road sides: protection zone demarcations, apiculture promoted, grass and trees planted.	At least a 30 m protection zone demarcated and mapped on River Sironko and a 10 m protection zone on the tributaries with source protection measures such as tree and grass planting (1 ha per village)
			Masaba				
			Bumasifwa				
			Busulani				
			Bugitimwa				
			Buhugu				
			Bukyambi				
			Bumalimba				
			Bukiise				
			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
				Bumawosa	Nakwira (Mwalo)		
				Namwejje	Namwejje		
				Bundagala	Nadisi		
				Bugimunye	Bumanza		
			Bumasifwa	Bunasekye			
				Bumasola (Manda)			
				Mahapa			
				Makyelele			
			Zesui	Simuma	Kipande		
			Bugitimwa	Bugiboni	Mayumba (Bugiboni TC)		
			Bukiise	Busate	Salirira		
			Buhugu	Bumatofu	Miwu TC		
2.1.2	Improve faecal sludge management (collection, transportation, treatment and re-use) through clustering of small towns (Kumi Sironko, Kapchorwa, Nakapiripirit)	Sironko	Bumalimba	Mutufu	Prison farmland	Faecal treatment lagoon	1 central faecal sludge treatment site for public institutions in the District (since the district has shifted to construction of lined pit latrines which have to be periodically emptied)
2.2.2	Refurbish valley dams and tanks	Sironko	N / A	N / A	N / A	N / A	N / A

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures	
2.3.1	Design and construct river Agu scheme to supply Kumi and surroundings - water and wastewater works	Sironko	N / A	N / A	N / A	N / A	N / A	
2.3.2	Soroti treatment and distribution - expand in stages (NWSC)	Sironko	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	Sironko	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	Sironko	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	Sironko	N / A	N / A	N / A	N / A	N / A	
2.8.2	Enhancement of rain fed agriculture	Sironko	Zesui	Simuma	Bumazaki	Treadle pumps (45), training of farmers (5 per village) on irrigation and soil / water conservation	Treadle pumps (45), training of farmers (5 per village) on irrigation and soil / water conservation	
			Masaba	Bumuluwe	Madingo			
			Bumasifwa	Bundagala	Birala			
			Busulani	Namwejje	Namwejje			
			Bugitimwa	Bugitimwa	Shembe			
			Buhugu	Bumatofu	Miwu TC			
			Bumalimba	Nandere	Nandere			
			Bukiise	Busiu	Kibembe			
Nalusala	Buyaya	Namwenge						
2.8.3	New irrigation schemes: Undertake feasibility studies of identifies areas	Sironko	Nalusala	Buyaya	Wasekese	In lowland areas of the district		
					Mayama			
					Busate			
					Busate			Mayenze
					Nalusalo			
					Masaba			
					Nalugugu			
					Nandago			Kisenyi
					Bukiende			
					Dorcus			
					Nalugugu			Nabirende
					Kibembe			
					Bunambutye			
					Busiu			
					Bumasikye			
					Bulukyeke			
					Busukuya			
					Kirombe			Bukuma
					Bunyakelo			
					Bukhulo			Nalukhuba
Mulalu								
Butsongola								
Bumalema								
Namili								
Napyo								
Jewa								
Kirongo								
Namwege								
Buyaya	Bumanganga							

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures
2.8.4	Construction of new irrigation schemes: Improved (seasonal) Wetlands Schemes	Sironko	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
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
2.8.7	Construction of new irrigation schemes: Type A Formal Irrigation	Sironko	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
2.9.1	Water efficiency evaluation and recommendations	Sironko	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 Dirigana and Sironko rivers	Already EIAs have been conducted for the two projects
			Masaba	Buboolo			
			Zesui	Simuma	Makyelele	Extend electricity lines	Extend electricity lines to the 4 centres
				Bumululo	Bumumulo HC III		
Busulani	Bugube	Kiguli					
2.11.1	Promote additional and alternative sources of energy including low cost solar panels to be used for LED lighting, radois and cell phones	Sironko	Zesui	Simuma	Muluti		
			Bugitimwa	Bugitimwa	Majenga		
			Bumasifwa	Bundagala	Kisoyo		
			Busulani	Bumawosa	Shembe		
			Masaba	Bumuluwe	Bukagosi		
					Kitangalile		
					Bunasufwa		
2.11.2	Promote use of energy efficient woodstoves by making the technology readily available	Sironko	Zesui	Simuma	Namasanzalala	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
			Masaba	Bumuluwe	Bumazaki		
			Busulani	Bumawosa	Lugongo		
			Bumasifwa	Bundagala	Muluwe		
			Bugitimwa	Bugitimwa	Bumanza		
					Nakwira		
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
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, establish fish breeding centre in Sironko TC	Fish ponds rehabilitated and restocked in 4 parishes, 1 fish breeding centre established
			Buwasa	Bukimali	Bugashali		
			Bumasifwa	Bulwala	Kidumi		
			Bumalimba	Nandere	Nandere		
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

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures	
2.13.1	Create an ecological tourism organisation, train it and provide the necessary starting equipment e.g a boat	Sironko	Bumasifwa	Bumasifwa	Bunasekye	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	
			Bugitimwa	Elgon	Kisawe			
			Butandiga	Butandiga	Miwu			
2.13.2	Promote horticulture	Sironko	N / A	N / A	N / A	N / A	N / A	
2.13.3	Promote bee keeping	Sironko	Buwalasi			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	
			Nasala					
			Bukhulo					
			Bakyiri					
			Bukiise					
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	
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	
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 vetenairy services: vaccination, tick control, spraying chemicals	Improved breeds incl. bulls, cattle dips and crushes, artificial insemination, improved fodder, zero grazing units, improved vetenairy services: vaccination, tick control, spraying chemicals	
				Mpogo	Mpogo			
				Mafudu	Mafudu			
				Kironbe	Bumasikye			
					Bulukyeke			
					Busukuya			
				Bukhulo	Bukuma			
					Bunyakelo			
					Nalukhuba			
				Sironko	Mulalu			
					Butsongola			
					Bumalema			
				Bukiise	Busate			Busate
					Nandago			Nalusalo
					Nalugugu			Buliende
Nalusala	Busio	Busio						
	Nalusala	Namili						
	Bukumbale	Bukumbale						
Bukiye	Nabudisilu	Nabudisilu						
	Bukigalabo	Bukigalabo						
	Nampanga	Nampanga						

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures
3.3.3	Promote dairy farming	Sironko	Bukhulo	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)
				Nandago	Nalusalo		
				Busio	Busio		
				Mpogo	Mpogo		
				Mafudu	Mafudu		
				Kironbe	Bulukyeke		
					Bumasikye		
					Bulukyeke		
Bukuma							
Bukhulo	Nalukhuba						
	Bunyakelo						
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	Sironko	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	Sironko	N / A	N / A	N / A	N / A	
4.1.3	Monitor surface and ground water use and levels to prevent over-exploitation	Sironko	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.	Sironko	N / A	N / A	N / A	N / A	
4.2.2	Develop support materials for use by extension officers (building on currently available materials)	Sironko	N / A	N / A	N / A	N / A	
4.3.1	Develop training guidelines and awareness raising materials (building on currently available materials)	Sironko	N / A	N / A	N / A	N / A	
4.3.2	Introduction of a community radio programme dedicated to environmental matters	Sironko				1 radio programme together with Bulambuli	
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	Sironko	Budadiri T.C	Kalawa	Budadiri Girls P/S	Ecosan toilets, awareness raising	1 block
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
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
			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	
4.4.2	Enhance and strengthen the capacity of BMUs	Sironko	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	
4.5.1	Strengthen enforcement bodies with capacity	Sironko	N / A	N / A	N / A	N / A	

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures
	Promote rainwater harvesting systems	Sironko	Bukhulo	Bukhulo	Bukhulo Primary School		4 schools
				Mpogo	Mpogo SC HQ		
				Mafudu	Mafudu Primary School		
			Nampanga	Nampanga Primary School			

INTERVENTION SITES FOR THE OPTIONS

District: SOROTI

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures	
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	
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	Arapai	Asuret	Mukura	Adacar Abango Okunguro Oregia Opalai - Odelai Otejia - Okunguru Mukura Opolai - Adala	Woodlots, agroforestry	9 ha together for all villages
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	
1.1.4	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	
1.1.5	River bank protection and stabilisation - gabions, management of cattle access points, protection of riparian vegetation	Soroti	Asuret	Otatai	Orimai and Omulala	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 16 cattle access points, 40 km of river side pegged and 40 km of riparian vegetation managed 10 cattle access points, 42 km of river side pegged and 42 km of riparian vegetation managed 8 cattle access points, 26 km or river side pegged and 26 km of riparian vegetation managed 23 cattle access points, 16 km of river side pegged and 16 km of riparian vegetation managed	
1.1.8	Ecological water requirements: Revisiting legislation and catchment assessment	Soroti	N/A	N/A	N/A	N/A	N/A	
1.1.8.1	Introduce improved farming practices	Soroti	Arapai	Awoja	Abelet Agule Aukot Ariet Okunguro	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	

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures
1.1.9	Build the capacity on conservation methods, especially for wetlands		Gweri	Dokolo Awoja	Ookai Odukurun	Community sensitization meetings, preparation of community wetland action plans (CWAPs)	6 community meetings in each village, 2 CWAPs
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
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
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
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 Arapai Asuret	Aukot Arabaka Mukula	Awoja Abelet P/S Agule, Opar P/S Aukot Health Centre II Ariet 80 farmers Arabaka P/S Okunguro	100,000 seedlings	10,000 seedlings 10,000 seedlings 30,000 seedlings 20,000 seedlings 20,000 seedlings 10,000 seedlings
1.2.4	Planting trees in degraded areas	Soroti	Gweri Arapai Asuret	Awoja Omugenya Aukot Aloet Otatai Adacar	Awoja Mugenya Agule Aloet Omulala Akisim	100,000 trees	100,000 trees
1.3.1	Regular updating of district wetland inventories by districts	Soroti	Gweri Arapai Asuret	Gweri Awoja Dakabela Agirigiroi Odudui Amoru Arabaka Aloet Agule Adachar Mukura Otatai	Angopet Opucet Amodoima Alere Gweri Olelai Arubella Damasiko Ooka Abiya Ariet Mugenya Agule Awoja Anganya Arabaka Agirigiroi Angai Amoru Ogolo Aloet - Akum Ongoro Akisim Ochoru Omulala Omulala Otatai central Oriamai	Field visits, data collection equipment	28 wetland inventories, 28 field visits, 1 GPS

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures		
1.3.2	Updating of demarcated protection zones and acceptable utilization of wetlands, producing GIS maps of wetlands at various levels	Soroti	Gweri	Gweri	Angopet	GPS, camera, capacity building for 5 district staff, GIS software, demarcation pillars	1 GPS, 1 camera		
					Opucet				
					Amodoima				
					Alere				
					Gweri				
					Olelai				
Asuret	Mukura	Omulala							
	Otatai	Oriamai							
Arapai	Dakabela	Arabaka							
	Aloet	Aloet - Akum							
1.3.3	Study for economic valuation of wetland resources and disseminate the results	Soroti	N/A	N/A	N/A	N/A	N/A		
1.3.4	Review and update the wetland management / action plans	Soroti	Gweri	Arapai	Awaliwal	Arubella	Develop wetland action plans for the 3 SCs, 1 stakeholder workshop	3 wetland management plans (1 per SC)	
					Dokolo	Ooka			
					Gweri	Ariet			
					Omugenyia	Mugenyia			
					Awoja	Awoja			
					Aukot	Agule			
					Dakabella	Arabaka			
					Aloet	Aloet - Akum			
					Asuret	Mukura			Omulala
						Otatai			Otatai central
1.3.5	Restoration of vital (unique) critical (subject to on - going degradation) wetlands	Soroti	Gweri	Arapai	Agirigiroi	Agirigiroi	Situation analysis, replant vegetation, peg off open access areas for animals, sensitisations		
					Odudui	Angai			
					Amoru	Amoru			
					Arabaka	Ogolo			
					Asuret	Mukura			Ochoru
						Agule			Ongoro
					Adachar	Akisim			
					Otatai	Omulala			
					Aukot	Agule			
					Awaliwal	Damasiko			
Dokolo	Abiya								
Awoja	Anganya								
1.4.1	Mapping, demarcation of riparian and roadside protection zones and identify and implement source protection measures	Soroti	Gweri	Arapai	Awoja	Awoja	Roadside tree planting	3 roads (Gweri - Asuret road, Apujan - Gweri road, Soroti - Mbale road)	
					Omugenyia	Mugenyia			
					Aukot	Agule			
					Asuret	Tukum			
						Ajjimbalang			
					Dakabella	Akaikai			
					Aloet	Aloet			
Awoja	Awoja								
Arapai	Awoja	Awoja TC							
	Aukot	Osimiling TC							
2.1.1	Improve sanitation technology and building material support and implement them	Soroti	Asuret	Mukura	Okunguro TC	Incinerators for non biodegradable materials, lined VIP latrines in schools, churches, trading centres	3 incinerators, 3 lined VIP latrines of 5 stances each (1 per village)		
2.1.2	Improve faecal sludge management (collection, transportation, treatment and re-use) through clustering of small towns (Kumi, Sironko, Kapchorwa, Nakapiripirit)	Soroti	N/A	N/A	N/A	N/A	N/A		

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures
2.2.2	Refurbish valley dams and tanks	Soroti	Asuret	Asuret	Asuret Omodoi dam	De-silting, construction of embankments, spill ways, remove vegetation growth, set up and train management committees	3 dams, 3 management committees of 9 members each
			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
2.3.2	Soroti treatment and distribution - expand in stages (NWSC)	Soroti	Gweri	Awoja	Awoja	Reservoirs, pipeline extension	2 reservoirs of 200 cubic meters and approx. 500 km of pipeline extension
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
2.7.1	Needs identification for location and type of dams and associated abstraction facilities	Soroti	Gweri	Awaliwal	Okolonga	Feasibility study	1 feasibility study
2.7.2	Feasibility & design of prioritized dams for stock watering and human needs. Construction, with cooperation and input from local communities	Soroti	Gweri	Awaliwali	Okolonga	Feasibility study	1 feasibility study
2.8.2	Enhancement of rain fed agriculture	Soroti	Gweri	Dokolo	Dokolo	Rock harvesting, runoff harvesting into underground tanks, pumps and pipes	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
			Gweri	Dokolo	Dokolo		
2.8.4	Construction of new irrigation schemes: Improved (seasonal) Wetlands Schemes	Soroti	Arapai	Arabaka	Arabaka	2 schemes	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
			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
2.8.7	Construction of new irrigation schemes: Type A Formal Irrigation	Soroti	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
2.9.1	Water efficiency evaluation and recommendations	Soroti	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
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
			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
			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
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	Abia	Construct 1 pond per village	2 ponds
			Awoja	Anganya			
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	Abia	Farmer identification and training	20 farmers per village
			Awoja	Anganya			
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
2.13.2	Promote horticulture	Soroti	Arapai	Aloet	Aloet	Water pumps, train 50 farmers on organic farming, management of agro - chemicals, improved seed varieties	25 farmers per village
			Asuret	Otatai	Omulala		
2.13.3	Promote bee keeping	Soroti	Gweri	Dokolo	Naberet	Bee hives, harvesting kits, capacity building on improved methods	600 bee hives and kits, train 200 farmers (50 farmers per village)
			Awoja	Awoja	Awoja		
			Asuret	Awariwari	Amusia		

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures	
3.1.1	Demarcate areas considered unsafe for habitation or other use and warn inhabitants	Soroti	Gweri	Awoja	Awoja		6 areas	
				Omugenya	Mugenya			
				Aukot	Agule			
				Arapai	Aloet			
				Asuret	Otatai			Omulala
					Adacar			Akisim
3.1.2	Develop an early flood warning system	Soroti	Gweri	Awoja	Awoja	Community and scientific / telemetry EFWS, communication linkage between Entebbe and Soroti, feedback to radio stations	6	
				Omugenya	Mugenya			
				Aukot	Agule			
				Arapai	Aloet			
				Asuret	Otatai			Omulala
					Adacar			Akisim
3.1.3	Development / compilation of hazard / risk map for landslides / sedimentation / floods	Soroti	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	
3.3.2	Livestock improvement programme	Soroti	Gweri	Aukot	Aukot	Extension service, artificial insemination, construction of cattle cruches, capacity building, improved breeding stock, pest control structures	20 livestock farmers per village	
				Arapai	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	
				Arapai	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	
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	
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	
4.2.1	Train a committed cadre of extension service providers to render interdisciplinary, integrated extension service to include CMCs, CDOs etc.	Soroti	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	
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	
4.3.2	Introduction of a community radio programme dedicated to environmental matters	Soroti	Soroti Municipality			1 environmental programme	2 per 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	Soroti	Gweri	Omugenya	Mugenya	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	
				Arapai	Aloet			
				Dokolo	Amusia			
4.3.4	Implement demonstration projects - schools, model farms etc. (capital costed elsewhere)	Soroti	Gweri		Awoja P/S	Woodlots	2 acres per school	
					Awoja Bridge P/S			
				Dokolo	Dokolo P/S			
				Arapai	Aukot			Opar P/S
4.3.5	Introduction of awareness raising programmes in schools	Soroti	Gweri		Awoja P/S	Awareness creation	3 schools	
					Awoja Bridge P/S			
				Dokolo	Dokolo P/S			

Ref. No.	Options	District	Sub-county	Parish	Village	Type of structure	No.of structures
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
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
				Omugenya	Mugenya		
				Awaliwal	Takaramiem		
4.4.3	Enhance and strengthen the capacity of rice grower associations	Soroti	Gweri		Amodoima	Create and train associations	1 association per village
					Acuma		
				Awoja	Awoja		
4.5.1	Strengthen enforcement bodies with capacity	Soroti	N/A	N/A	N/A	N/A	N/A

SUMMARIZED IMPLEMENTATION PLAN

Ref. No.	Options	Districts concerned	Type and No. of structure	Indicator	Responsibility	Period of Intervention					Costs in US\$
						2015 / 16	2017	2018	2019	2020	
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 cylos, 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, Nakapiripirit, 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	985,911	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	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
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	rivers: 230 km, recourse of river: 10km, river pegging: 260 km, weirs: 15, bridges: 15, stone pitching of cattle access points: 7 km2, 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, 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)	Number and type of activities carried out by the trained committees	Kyoga WMZ, CMC, DNRO, DEO		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, Bukedea, 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
Reforestation											
1.2.2	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, Nakapiripirit, Amudat, Kumi, Ngora	36 nurseries, 9 tree nurseries, 1 greenhouse, 1 training of farmers, 5 trainings for nursery managers	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				175,240
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 plus trees for 12 km boundary, woodlots for 239 ha, seedlings 650.000 plus for 20 ha, 18 tree nurseries, 12 nurseries, 18 sensitisations, 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	886,886	221,721	221,721		2,217,215

1.2.4	Planting of trees in degraded areas	Bukwo, Kween, Bukambuli, 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	163,989
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	Number and type of activities carried out by the persons trained	Kyoga WMZ, CMC, DNRO, DEO, DAO, DFO, consultant	22,545		22,545		22,545	67,634
Lakes and Wetlands Management											
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, 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	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 x wetlands management committees	Kyoga WMZ, CMC, DNRO, DEO			368,085	276,064	276,064	920,212
Buffer Zone Set - asides											

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	Demarcate 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, road side tree planting for 453 km, 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	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
Development for socio-economic growth											
Sanitations Systems											
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 3stance, 24 lined pit latrines 4 stance, 40 VIP latrines 5stance, 10 VIP latrines 2stance, 57 ecosan toilets, awareness creation in 45 villages, 3 incinerators. All toilets shall be equipped with a urinar and handwashing facilities.	Number of toilets according to the type of improved technology constructed and used	Kyoga WMZ, CMC, DNRO, DEO, DWO		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
Refurbishment of infrastructure											
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
Piped Water Schemes (Surface Water)											
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
Sand Dams											

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
Dams											
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
Enhancement of Irrigation											
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	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
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	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
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	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
2.8.3	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

2.8.7	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
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 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
Water Use Efficiency											
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	Evaluation report	Kyoga WMZ, CMC, consultant				62,857		62,857
Small Hydropower											
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 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
Alternative Energy Supply											
2.11.2	Promote use of energy efficient woodstoves by making the technology readily available	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	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, Nakapiripirit, 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
Aquaculture											
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	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 ponds4	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	54,464.29				108,929
Socio-economic Strengthening											
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 25 ecological tourism 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	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	34,893	348,929
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
Mitigation and Adaptation											
Flood and Landslide Management and Preparedness for Floods and Landslides											
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 ha demarcated unsafe 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, instal 40 traditional early warning systems, form and train 34 early warning committees	Availability of x 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, improved vetenairy 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 vetenairy staff and health workers, train 668 farmers on improved modern management of livestock	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	Kyoga WMZ, CMC, DNRO, DEO, Dvet	1,171,416	1,004,071	836,726	334,690		3,346,903
3.3.3	Promote dairy farming	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripirit, Amudat, Kumi, Ngora	Provide 505 high breed diary 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 making yoghurt, ghee etc., plant 2 ha of fodder grass, improve vetenairy sevice, carry out 2 vaccination campaigns, carry out tik, tsetse and worm controls, tagging of animals	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
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	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	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	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	Reviewed and expanded monitoring network is in place	Kyoga WMZ, DWRM, CMC	25,893	19,420	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	64,732
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	Number of persons trained, number and type of activities carried out by the persons trained	Kyoga WMZ, CMC, consultant			27,232	27,232		54,464
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	Number and kind of support materials readily developed and disseminated to each district	Kyoga WMZ, CMC, consultant		30,112				30,112
Awareness Raising											
4.3.5	Introduction of awareness raising programmes in schools	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	Number and type of activities carried out in x schools	Kyoga WMZ, CMC, DNRO, DEO, DEdO		339,643	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, Nakapiripirit, 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, 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	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	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, DEdO			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 collapsable 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
Institutional Capacity Building											
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	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	220,107		1,100,536
Legislation and Enforcement											

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 police in environmental affairs, increase of no. of environmental police in Napak	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	Availability of by - laws, ordinances on water and environmental management and protection, 20 % reduction of environmental related offences	Kyoga WMZ, CMC, consultant	39,286					39,286

Explanations:

2.3.1	Design and construct river Agu scheme to supply Kumi and surroundings - water and wastewater works		Construction plans are under way	no action stated
2.8.8	Construction of new irrigation schemes: Type B Formal Irrigation			no action stated
2.7.1	Needs identification for location and type of dams and associated abstraction facilities	Bulambuli, Napak, Nakapiripirit, Soroti, Serere, Ngora, Bukedea	4 valley dams, 17 dams, 4 abstraction facilities for livestock watering and 4 for irrigation with treadle pumps	2.7.1 has been incorporated into 2.7.2
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

- 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.
- 3 The number of committees has been increased as all sand dams should have a committee.
- 4 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.

PD = Project duration

Technical staff index (TSI)			
Activity Level	Description	Technical staff duration	TS Index
TSI1	Very high Activity project	TSD = 100% of PD	1
TSI2	High activity project	TSD = 75% of PD	0.75
TSI3	Low activity project	TSD = 50% of PD	0.5
TSI4	Very Low activity project	TSD = 25% of PD	0.25
Cost - Technical employee per month		UGX 3,000,000	\$1,071
Consultant index (CI)			
Activity Level	Description	Consultant duration	C Index
CI1	Very high level of consultant engagement	CD = 100% of TSD	1
CI2	High level of consultant engagement	CD = 75% of TSD	0.75
CI3	Low level of consultant engagement	CD = 50% of TSD	0.5
CI4	Very Low level of consultant engagement	CD = 25% of TSD	0.25
Consultants per month		UGX 15,000,000	\$5,357
Travel index (TI)			
Activity Level	Description	Travel duration	T Index
T11	Very high - Field activities	TD = 40% of TSD	0.5
T12	High - Field Activities	TD = 30% of TSD	0.4
T13	Low - Field Activities	TD = 20% of TSD	0.3
T14	Very Low - Field Activities	TD = 10% of TSD	0.2
Travel cost per month		UGX 10,000,000	\$3,571

Workshops/conferences		
Session with 100 participants	UGX 50,000,000	\$17,857

UNIT COSTING ASSUMPTIONS: INFRASTRUCTURE & OTHER UNIT COSTS		
Sustainable Land & Environmental MGT implementation cost - per HA	\$50	
Reforestation Programme - per hectare	\$700	
Refurbishment of infrastructure per m ³ /d	\$1,500	
Rehabilitation of irrigation schemes per hectare	\$5,500	
Refurbishment of boreholes - average cost	\$8,500	
Piped water per person	\$188	2.3.2
Protected springs (\$/m ³ /d)	\$248	
Deep boreholes (\$/m ³ /d)	\$1,335	2.7.2
Shallow wells (\$/m ³ /d)	\$500	2.7.2
Rainwater tanks, including VAT, installation & overheads per m ³	\$340	
Sand Dams (\$/m ³ /d)	\$2,756	
Sand Dams (\$/m ³ storage)	\$17.2	2.6.1
Valley Tanks (\$/m ³ /d)	\$1,848	
Valley Tanks (\$/m ³ storage)	\$11.50	2.2.2
Valley Dams (\$/m ³ /d)	\$727	
Valley Dams (\$/m ³ storage)	\$4.50	
Managed wetlands (\$/ha)	\$1,161	
Simple Scheme pumping from Lake (\$/ha)	\$5,976	2.8.5
Simple gravity-fed Irrigation Scheme (\$/ha)	\$5,785	2.8.6
Irrigation: Type A, Open Channel, average on-farm costs (\$/ha)	\$5,785	
Irrigation: Type A, Open Channel, average off-farm costs (\$/ha)	\$191	
Irrigation: Type A, Pressurised, average on-farm costs (\$/ha)	\$8,296	
Irrigation: Type A, Pressurised, average off-farm costs (\$/ha)	\$191	
Irrigation: Type B, Open Channel, average on-farm costs (\$/ha)	\$5,785	
Irrigation: Type B, Open Channel, average off-farm costs (\$/ha)	\$1,130	
Irrigation: Type B, Pressurised, average on-farm costs (\$/ha)	\$8,296	
Irrigation: Type B, Pressurised, average off-farm costs (\$/ha)	\$1,130	\$9,426
Micro-hydropower per Kw	\$4,200	
Solar cookers per unit	\$180	
Average cost for the installation of a fish pond for aquiculture per m ³	\$11.50	
Low cost solar panels per unit, including installation	\$150	
Temporary flood retention/harvesting structures on average each	\$50,000	

2.8.2	Enhancement of rain fed agriculture	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripit, Amudat, Kumi, Ngora	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 2 GFS with equipment (20 ha per system) Provide short-term and drought resistant crops for 18 villages Mulching for 5 villages 6 demonstrations 6 sensitisations (100 people per sensitisation) Train 550 farmers on irrigation and soil / water conservation	150 Nos 80 Nos 2 Nos 90 Ls 2 Ls 40 Ha 18 Nos 5 Nos 6 Nos 600 Pple 550 Pple	429 9,426 35,714 10,714 12,857 5,785 7,143 3,571 10,714	64,286 754,080 71,429 964,286 25,714 231,400 128,571 17,857 64,286	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
2.8.5	Construction of new irrigation schemes: Low - power pumped schemes that utilize water from nearby rivers, swamps and lakes	Bulambuli, Amudat, Kapchorwa, Nakapiripit, 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	
2.8.6	Construction of new irrigation schemes: Simple gravity - fed schemes	Bulambuli, Sironko, Napak, Kapchorwa, Nakapiripit, Bukwo, Katakwi, Bukedea, Kween	Construct 24 GFS (5 ha per scheme) Construct 2 sprinkler irrigation schemes (10 ha per scheme) Construct 2 rock catchment based schemes (5 ha per scheme)	120 Ha 20 Ha 10 Ha	5,785 8,296 8,296	694,200 165,920 82,960	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	
2.8.3	New irrigation schemes: Undertake feasibility studies of identifies areas	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripit, Amudat, Kumi, Ngora	Carry out feasibility studies for 82 irrigation schemes	82 Nos			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	\$368,560	\$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, Nakapiripit, Soroti, Serere, Ngora, Kumi, Katakwi, Bukedea	Construct 36 irrigation schemes Construct 1 GFS Construct 4 valley dams Construct irrigation channels for 6 km	720 Ha 5 Ha 40000 m ² 6 Km	5,976 5,785 5 500	4,302,720 28,925 180,000 3,000	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	
Water Use Efficiency																											
2.9.1	Water efficiency evaluation and recommendations	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripit, 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	
Small Hydropower																											
2.10.1	Investment and implementation in hydropower installations and grid distribution	Bulambuli, Sironko, Kapchorwa, Nakapiripit, Ngora, Kumi, Katakwi, Kween	Construction of 8 dams Extensions of electricity lines for 149 km	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	
Alternative Energy Supply																											
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, Nakapiripit, Amudat, Kumi, Ngora	Train 1,430 persons on woodstove making and equip them Construct 21 woodstoves Carry out 29 sensitisations / demonstrations (100 people per sensitisation)	1430 Pple 21 Nos 2900 Pple		0 7,500	18	4.5	3.6	43.3	\$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	
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	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripit, Amudat, Kumi, Ngora	392 solar panels, incl distribution 26 windturbins 40 radios 40 cellphones Train 42 persons in biogas digester making Construction of 42 biogas units 4 sensitisations, 100people sensitisation	392 Units 26 Units 40 Nos 40 Nos 42 Pple 42 Units 400 Pple	150 600 321 179 357 15,000	58,800 15,600 12,857 7,143	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	
Aquaculture																											
2.12.1	Develop a manual on aquaculture techniques (building on available material)	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripit, 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, Nakapiripit, Amudat, Kumi, Ngora	Construct 39 new fish ponds (5 x 5 x 2 m) Rehabilitate 27 fish ponds Establish 1 fish breeding centre Pilot 1 fish cage farming Train 66 farmers on the management of fish ponds	3900 m ³ 2700 m ³ 1 Nos 1 Nos 66 Nos	12 6 17,857 25,000	44,850 15,525 17,857 25,000	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	
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	
Socio-economic Strengthening																											
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, Nakapiripit, Amudat, Kumi, Ngora	Form and train 23 ecological tourism organisations (10 people per organisation) 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 Procure 53 life jackets Procure 7 cameras Procure 4 guide books Procure 15 boats Procure 1 abseiling equipment	230 Nos 23 Nos 39 Nos 9 Nos 17 Nos 7 Lots 3 Lots 31 Nos 53 Nos 7 Nos 4 Nos 15 Nos 1 Nos	10,714 7,143 28,571 28,571 21,429 170 357 200 50 17,857 17,857	246,429 64,286 485,714 200,000 64,286 5,270 18,929 1,400 200 267,857 17,857	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
2.13.2	Promote horticulture	Bulambuli, Amudat, Napak, Kapchorwa, Nakapiripit, 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	1 Lot 1 Lot	17,857 35,714	17,857 35,714	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
2.13.3	Promote bee keeping	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi	Train 1,054 farmers on modern bee keeping Procure 6,490 beehives Procure 864 harvesting gear	1054 Nos 6490 Nos 864 Nos		695,357 92,571	27	6.75	8.1	10.54	\$841,500	\$28,929	\$36,161	\$28,929	\$188,214	\$1,123,732			\$449,493	\$337,120	\$337,120	Number of farmers trained in bee keeping, amount of income from bee keeping	Kyoga WMZ, CMC, DAO	36	0.75	0.25	0.3

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, Nakapiripit, 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, Nakapiripit, Amudat, Kumi, Ngora	Establish 4 radio stations Establish environmental programmes: 3 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 provision of IEC material for dissemination	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
4.3.4	Implement demonstration projects - schools, model farms etc.	Bukwo, Kween, Bulambuli, Kapchorwa, Sironko, Bukedea, Soroti, Serere, Katakwi, Napak, Nakapiripit, Amudat, Kumi, Ngora	Establish 84 model farms Establish woodlots in 16 schools (2 ha per woodlot) Nurseries in 22 schools (0.2 ha per nursery) Rehabilitate a poultry and piggy in 1 school Form and train 43 young farmers associations (20 people per association)	84 Nos 32 Ha 4.4 Ha 1 Ls 860 Pple	7,143 3,372 1,733 3,571	600,000 107,888 7,625 3,571	27	13.5	8.1	8.6	\$719,085	\$28,929	\$72,321	\$28,929	\$153,571	\$1,002,835		\$501,417	\$300,850	\$200,567	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	
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, Nakapiripit, Amudat, Kumi, Ngora	Construct 61 5stance VIP latrines 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) 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 system	61 Nos 34 Nos 16 Nos 2200 Nos 800 Nos 320 Nos 360 Nos 345 Nos 1 Ls	6,000 3,600 714 11,429	366,000 122,400 11,429	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	
Institutional Capacity Building																											
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, Nakapiripit, 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) Train 227 BMU members Sensitize 23 communities (50 people per community) Establish 4 BMU shelters	460 Nos 227 Nos 1150 Nos 4 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	
4.4.3	Enhance and strengthen the capacity of rice grower associations	Bulambuli, Nakapiripit, Soroti, Serere, Ngora, Kumi, Katakwi, Bukedea, Kween	Form 39 rice grower associations (15 people per association) Train 500 rice grower association members Carry out 12 awareness raising campaigns (50 people per campaign) 2 exchange visits to established associations (25 people per visit) Construct processing centres with rice mills, storage facilities, rice haulers Provide seeds Develop training material	585 Nos 500 Nos 600 Nos 50 Nos 10 Lot 1 Lot 1 Lot			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	
Legislation and Enforcement																											
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 Train police in environmental affairs, increase of no. of environmental police in Napak	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	
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, Nakapiripit, 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	
Total											\$87,337,247	\$965,893	\$2,778,348	\$1,066,071	\$9,528,750	\$101,676,309	\$15,256,960	#####	\$18,550,860	\$27,389,109	\$20,081,538						

