

# CATCHMENT MANAGEMENT PLAN

## LOKOK CATCHMENT



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**Catchment Management Plan**

Location	Lokok Catchment	Abim, Amuria, Kaabong, Kotido and Napak Districts of Karamoja and Teso Regions	
Commissioned by	Republic of Uganda Ministry of Water & Environment (MWE) Directorate of Water Resources Management (DWRM) Kyoga Water Management Zone (KWMZ)		
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**Project information**

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<b>Project partners</b>	<b>Organisation</b>	<b>Activities</b>	
	Cordaid	Project management Stakeholder assessment & engagement strategy Catchment Management and Implementation Plan	
	Acacia Water	Water Resources Assessment Catchment Management and Implementation Plan Map development	
	RAIN	Options & Scenarios Analysis Catchment Management and Implementation Plan	
	Wetlands International	Strategic Social & Environmental Assessment Catchment Management and Implementation Plan	
	Caritas Kotido	Local partner supporting CMP planning process Implementation of no-regret IWRM measures in Kotido and Kaabong Districts (Dopeth Sub-Catchment – Lokok Catchment)	
	Caritas Moroto	Local partner supporting CMP planning process	
	Socadido	Local partner supporting CMP planning process Implementation of no-regret IWRM measures in Amuria District (Lokok and Lokere Catchments)	
	TPO Uganda	Local partner supporting CMP planning process Implementation of no-regret IWRM measures in Katakwi District (Lokere Catchment)	









# EXECUTIVE SUMMARY

The present document provides the Catchment Management Plan (CMP) for Lokok Catchment, in Karamoja and Teso regions, in north-eastern Uganda. Lokok Catchment covers an area of 5,521 km<sup>2</sup> and has an approximate population of 390,000 (2016 approximation based on Census 2002 and 2014).

## ***Catchment-based water resources management in Uganda***

As part of its water resources management reform the Ministry of Water and Environment (MWE), through its Directorate of Water Resources Management (DWRM), is implementing Catchment Based Water Resources Management (CBWRM). This process deconcentrates water resources management (WRM) along catchment boundaries. Catchments are hydrological areas independent of administrative units where surface water converges to a single exit point at a lower elevation level. CBWRM links WRM to the management of land, ecosystems, and socio-economic systems, and allows to plan towards using water resources effectively and efficiently to achieve long-term sustainable development by balancing growing water demands with limited water resources. The country has been divided into four Water Management Zones (WMZs): Upper Nile, Albert, Victoria and Kyoga. Lokok Catchment is in Kyoga Water Management Zone (KWMZ), and covers parts of Karamoja and Teso Regions in north-eastern Uganda.

## ***Methodology***

CBWRM in Uganda is based on the Integrated Water Resources Management (IWRM) approach, recognises that many water use and management issues are interrelated, and is founded on early, open and inclusive stakeholder involvement. The Uganda Catchment Management Planning Guidelines (MWE 2014) guide the planning process. Following these guidelines, the development of this plan started with the delineation of the catchment, the development of a catchment information system, and the building of a catchment knowledge base. Thereafter three assessments were undertaken:

- Water Resources Assessment, which is a study into the status of the water resources, the water balance and water demand now and in the future;
- Stakeholder Assessment, which identified and characterized stakeholders and their relations in order to design a stakeholder engagement strategy, both for the development and the implementation of the plan;
- Strategic Social and Environmental Assessment (SSEA), which analysed the fragility of economically and socially important natural assets, and identified the main issues today and the potential issues in future.

Based on the results of the assessments the stakeholders developed the vision and strategic objectives for the catchment, which guided the development of options and scenarios. Multi-criteria analyses of these options and scenarios resulted in the consensus Catchment Management Plan (CMP). Subsequently, an Implementation Plan was developed, which is an integral part of this CMP and provides practical guidance regarding locations, prioritization, costing and stakeholder involvement.

Stakeholders were involved throughout the process to understand the different interests, to find common solutions for often competitive uses of resources and to facilitate buy-in into the final plan. Stakeholders meet on catchment management in the Catchment Management Organisation (CMO). The CMO comprises of the Catchment Stakeholder Forum (CSF), Catchment Management Committee (CMC), Catchment Technical Committee (CTC) and the Catchment Management Secretariat (CMS). During the development of this CMP stakeholders were informed about the process and its objectives, were consulted on their issues and needs and collaborated in four CSF meetings and two CMC meetings. The Kyoga Water Management Zone provides the CMS services at an interim basis. The CTC is not (yet) established for Lokok Catchment.

The development of the CMP was an iterative process in which findings from literature reviews, field surveys, interviews, focus group discussions, questionnaires, remote sensing analyses and hydrological modelling were combined. Further, as part of the planning process, a number of no-regret IWRM interventions was implemented in Kaabong, Kotido and Amuria Districts to pilot measures for further uptake in the CMP.

## ***Uganda institutional environment***

Although there exist gaps in relation to the management of water (and related) resources at catchment level, there are sufficient legal provisions in place to manage water resources sustainably. Together the Constitution, acts and statutes



establish that, amongst others, water sources must be protected, environmental impact assessments are required for the construction of infrastructure, there is the need to consider natural conservation areas when developing policies and regarding commercial exploitation, and water abstraction and waste water discharge are regulated through permits. Also, several policies and strategies mention the need to improve safe water supply, extend and modernize agricultural production, improve equal participation in water management, link water, sanitation and hygiene, support self-help initiatives in communities and at household level, advocate for domestic rainwater harvesting, and promote community-based maintenance of rural water supply systems.

MWE is the lead agency for all aspects of water resources management and development, setting the standards to manage and regulate all water resource developments, and monitoring and evaluating all the sector development programs. MWE operates through three directorates. The Directorate of Water Resources Management (DWRM) is responsible for the development, maintenance and enforcement of national water laws, policies and regulations, and manages, regulates and monitors national water resources through issuance of water use permits, abstraction and wastewater discharge permits. DWRM is the lead in developing the agenda for CBWRM. The Directorate of Water Development is responsible for the development of water for production infrastructure including water supply and sanitation for urban and rural services. The Directorate of Environmental Affairs (DEA) is the lead agency for environmental issues.

Other relevant institutions in the context of catchment management planning are the Water and Sanitation Development Facility East (WSDF-E), Karamoja Umbrella of Water and Sanitation (KUWS), Umbrella of Water and Sanitation East (UWS-E), National Environment Management Authority (NEMA), National Forest Authority (NFA), Ugandan Wildlife Authority (UWA), The National Water and Sewerage Corporation (NWSC), the districts technical offices, local governments, Non-Governmental Organizations (NGOs), private sector, Uganda Water and Sanitation NGO Network (UWASNET), communities (with their representative committees), and other ministries, such as Ministry of Agriculture Animal Industry and Fisheries (MAAIF), Ministry of Tourism, Trade and Industry (MTTI), Ministry of Energy and Mineral Development (MEMD), Ministry of Local Government (MLG), Ministry of Works and Transport (MWT).

### ***Description of the catchment***

Lokok Catchment covers an area of 5,521 km<sup>2</sup> located in the districts of Kaabong, Kotido, Abim, Napak and Amuria. River Lokok (Okok in Teso), its tributaries and the downstream Amuria Wetlands define Lokok Catchment. The river system is set on a large inland plateau, 400 m above ASL, underlain by Precambrian crystalline basement rocks. The hills of Timu Forest in the northeast, Toror Hills southeast of Kotido Town, and the Nyakwai Hills in Abim District are the most noticeable topographic features. Soils are in general fertile, but sensitive to soil erosion. In the downstream areas, the occurrence of soils with a very low infiltration capacity causes waterlogging.

The total average annual rainfall in the Lokok Catchment varies between 550 mm/year in Upper Lokok and 1,250 mm/year in Lower Lokok. The precipitation pattern is classified as bimodal, but is highly variable in space and time, with high peak events and long dry periods. On average, the short, but intense rainy season runs from April to July with typically a 2-week dry spell at the beginning of June. The long rainy season runs from September till December/January, but is less intense. In Upper Lokok the long rainy season is often inexistent. Actual evapotranspiration in Lokok Catchment varies between 300 mm/year around Kotido and Kaabong towns and about 1400 mm/year in Timu Forest, and is strongly related to land cover, presence of open water, rainfall, temperature and wind. Climate change projections indicate that temperatures, rainfall intensity and frequency of extreme events will increase.

Approximately 1/6 of the land in Lokok Catchment is currently covered by croplands. The rest of the catchment is covered by forest, woodlands, grasslands and shrublands. Extensive wetland systems are present in Lower Lokok. Most lands are communally owned, except in the town centres of Kotido and Kaabong, and in Lower Lokok where individuals possess title deeds. Approximately 1/4 of Lokok Catchment has a protected status and is either under the auspices of National Forest Authority (NFA) or the Uganda Wildlife Authority (UWA). The forest reserves along the western and northern border - Timu, Alerek, Nangolowel and Alungamosiomos - are managed by NFA. The Bokora Corridor and Iriri wildlife reserves are managed by UWA.

Settlements in Lokok Catchment are scattered with concentrations around productive agricultural areas, trading centres, and water sources. Regionally important hubs are the towns of Kotido and Kaabong. The region is among the poorest in Uganda. Recent studies suggest that nearly 80% of the total population live below the poverty line (WFP, 2015). This poverty translates into high levels of food and nutrition insecurity and underdevelopment. Root causes of poverty are reported to



be adverse weather conditions, illiteracy, marginalisation, corruption, high prevalence of livestock and human diseases, crop pests and prolonged years of conflict. The catchment is mainly inhabited by pastoralists and agro-pastoralists. Livestock rearing occurs throughout the catchment with cattle, goats and sheep being grazed in open grassland, scrub, thicket and forest margins and on agricultural lands after crops have been harvested. Rain fed crop production of mainly sorghum, millet and maize, and paddy rice (flood irrigation) complement livestock rearing, while (mainly artisanal gold) mining is increasingly becoming an important source of income in Kaabong District. There is no large-scale industry.

Security has long been an issue in large areas of Lokok Catchment, but since the Karamoja Integrated Disarmament and Development Programme (KIDDP) security has improved greatly.

### ***Water resources, demand and balance<sup>1</sup>***

Lokok Catchment is well drained with a dense network of meandering seasonal rivers and streams. In Upper Lokok rivers are characterized by large variations in low and peak flow, by a large sediment load and by a quick response to rainfall events. Flows cease within one to two days after a rainfall event. The rivers are deeply incised and filled with sand and silt. In Middle and Lower Lokok river discharge is more dominated by a base flow component. The extended wetlands and the thick pack of sedimentary material absorb part of the peak flows in the rainy season and release water slowly in the months that follow. The wetlands of Lokok Catchment have a storage capacity of over 241 Mm<sup>3</sup>, which is sufficient to store 45 mm of rainfall. Groundwater is concentrated in fractured rock and in a top-layer of loose material covering solid rock (regolith) and in the alluvium of riverbeds and floodplains. Chemical groundwater quality is in general good, although in Kotido and Kaabong districts locally high salinity, hardness and fluoride values are found. Microbiological contamination, on the contrary, is a major concern, also in deep groundwater wells due to poor design, construction, operation and maintenance.

Safe water coverage in Lokok Catchment is low, and varies between 29% in Kaabong and 86% in Abim. To cover current domestic water demand an absolute minimum of 4,353 m<sup>3</sup>/d of extra potable water needs to be supplied. Water demand for livestock is high throughout the catchment. Incoming livestock from Turkana and South Sudan aggravates the shortages. Indicative calculations for Lokok and Lokere Catchments<sup>2</sup> indicate that currently there is a combined shortage of 4 Mm<sup>3</sup> of water for livestock in normal years (3-month dry season) and of 28 Mm<sup>3</sup> in extremely dry years (9-month dry season). Currently -2016- water volumes required for irrigation are negligible, but the National Irrigation Master Plan for Uganda 2010 – 2035 found approximately 6,000 ha suitable for irrigated crop production. Considering that irrigated citrus, mango and vegetables on the soils and with the climate of Lokok Catchment on average need 6,000 m<sup>3</sup>/ha/year of irrigation water, making full use of that potential would require 35 Mm<sup>3</sup> of water for irrigation. Apart from productive uses, estimates indicate that 66 Mm<sup>3</sup>/year have to be ensured as a so-called environmental flow, a volume of water that has to remain untouched to safeguard the adequate functioning of ecosystems in the catchment (e.g. support fish life and wetland vegetation, avoid stagnant waters that may increase the incidence of water related diseases).

A SWAT hydrological model was run for 30 years (1984–2013), simulating daily time steps, while writing monthly output data for Lokere (and Lokok) Catchment(s) to analyse the water balance. Calibration proved challenging, also because it is unclear how reliable the available data is. The modelling experts estimate that average annual rainfall estimates could deviate as much as +/-20% from reality, peak river outflow estimates up to +/-50, and the average annual river outflow estimates +/-30%. The model results indicate that on average 333 Mm<sup>3</sup> of water leaves the catchment as surface outflow, but that it varies between 70 Mm<sup>3</sup> and 920 Mm<sup>3</sup>. Almost 11% of the average annual precipitation is (temporarily) stored in shallow (10.4%) and deep (0.5%) groundwater aquifers. With 345 Mm<sup>3</sup> of recharge shallow aquifers are at least as important in terms of storage as wetlands. Less than 6 Mm<sup>3</sup> is currently abstracted from the catchment for domestic, livestock and agricultural use. In general, in Lokok Catchment a higher annual rainfall results in a higher annual discharge and a lower annual rainfall results in a lower discharge, but the relation is non-linear. Below average rainfall often leads to very low outflows, while above average rainfall results in very high outflows. This effect is strongly linked to the status and the antecedent conditions of the storage systems (i.e. shallow groundwater systems, wetlands, valley tanks and dams) in the catchment. The model also shows that runoff-rainfall ratios are high, particularly in the agricultural lands around Kotido and Kaabong.

<sup>1</sup> On a general note it is important to stress that the project team made an effort to be as accurate as possible. Due to the lack of data, however, the uncertainty associated with the figures is high. It is important to keep this in mind throughout the planning and implementation processes.

<sup>2</sup> Herders use Lokok and Lokere catchments as a combined resource when watering livestock. Hence the water demand for livestock calculations were combined.



### **Main issues**

Based on assessments the main issues and trends in the catchment were identified. Three categories of issues were identified: institutional, related to water resources, and socio-environmental.

The district structures have well laid out development plans, but have capacity gaps at different levels. Funding is limited, staffing inadequate, there is a lack of harmony of structures and sector coordination is inadequate. Policies are poorly popularized among stakeholders and law enforcement is difficult and conflicts with livelihood activities of communities. The responsibility over operation and maintenance of water infrastructure is unclear, water users have limited influence on decision making and gender remains a contentious issue.

Regarding water resources, environmental degradation is leading to high surface runoff rates, and consequently to a low water retention capacity and siltation of dams and valley tanks. The storage capacity is being undermined by agricultural encroachment. Monitoring of weather, surface flows, groundwater levels, groundwater abstractions, water quality and climate is not institutionalized. Access to data is difficult. Safe water coverage is low. Boreholes are the predominant source of safe water supply, but many are non-functional because of poor site selection, design, operation and maintenance. There is insufficient water to cover livestock demand, particularly in the dry season, as a consequence of which livestock migrates downstream destroying farmlands. Hydrological and agricultural droughts are recurrent and intense in Lokok Catchment, mainly due to a combination of dry spells, environmental degradation and a high dependency on natural resources. Flooding seems to be linked, at least in part, to the antecedent conditions of wetlands and the fact that communities are increasingly moving into what were originally floodplain areas. Locally in Lower Lokok, water logging occurs due to high intensity rainfall on soils with a low infiltration capacity. Flooding of dams and valley tanks is related to flash floods in ephemeral streams are, at least in part, related to poor source protection, design, construction, operation and maintenance.

Overarching challenges to the catchment are population growth, high poverty, low literacy levels, land ownership which is not backed by formal documentation, poor access to basic services, weak enforcement of protection in nature conservation areas, and major disruption of the norms and values due to the implementation of affirmative action, the disarmament and the encouragement of crop farming to the detriment of livestock rearing. On environmental note, the vulnerability to natural disasters is high, land degradation and soil erosion are severe, particularly around Kotido and Kaabong, bush burning is not controlled, deforestation due to charcoal production is problematic, conflicts over natural resources abound, and artisanal mining resulting in the clearance of vegetation and degradation of river banks.

### **Vision and strategic objectives**

The Catchment Management Plan contributes to the vision for the catchment as developed by the stakeholders in line with the Uganda Vision 2040<sup>3</sup>:

### ***A sustainably managed Lokok Catchment that supports livelihoods and development by 2040.***

To achieve this common vision, the CMP addresses the following strategic objectives which were formulated by the stakeholders:

- Strengthen natural resources management systems and structures.
- Restore degraded natural resources.
- Ensure sustainable access to water of adequate quality and quantity for domestic use and production.
- Ensure that farming and animal husbandry systems are productive, drought and climate change proof, and improve household income.

### **Options and scenarios**

Options and scenarios were developed along three main lines of intervention: 1) ecosystem protection and restoration, 2) improved water and sanitation services for people, and 3) water for production and agricultural productivity. Options were discussed and evaluated with stakeholders, where after a simulation was done to assess the implementation of only one category of interventions at a time.

<sup>3</sup> In 2015 Uganda's Vision 2040 for "A Transformed Ugandan Society from a Peasant to a Modern and Prosperous Country within 30 years" was developed.



Ecosystem protection and restoration focuses on improving the sustainability of cattle herding, protection of woodlands and wetlands and application of soil and water conservation measures in agricultural zones. The options under this scenario are oriented towards the revival of ecosystem functions, collaborative management of ecosystems and restrictions on natural resources exploitation. The strength of this scenario is in water regulation: water is retained upstream reducing the impact of meteorological droughts, and contributing to the mitigation of flooding downstream. The disadvantage of this scenario is that it will limit access to natural resources that currently provide an important source of income to the population.

Improved water and sanitation services for people is purely oriented on increasing safe water coverage. This scenario is projected to impact local groundwater sources, but to have little influence on runoff-rainfall rates and thereby on the water balance. Improved water supply increases the well-being of the people on the short term, but does not ensure reliable supply in future.

The scenario on water for production and agricultural productivity focuses on economic development, whereby the area of agricultural lands is increased with mono-cropping and mechanized agriculture. The analysis foresees that climate change and resettlement at marginal lands with variable rainfall threatens the productivity of agricultural land and rangelands. Furthermore, the surface runoff models in the next section show the dramatic increase of surface runoff should large tracks of grassland be turned into farmland. The scenario typically provides support for their people's livelihoods. However, from a catchment perspective, this scenario will, in the end, result in a lowering of the agricultural productivity, high soil erosion rates and an aggravation of droughts and floods.

The scenario analysis shows that only a combination of interventions from the three different categories can address the water resources use and management issues in a manner that has benefits to the people on the short term and is sustainable in the long run. Interventions of the category of ecosystem restoration and protection, water and sanitation and economic development must be combined. Only then can effective and equitable economic development, protection of water resources, and disaster and climate resilience be achieved in the catchment. Hence a combined maximum benefit scenario was formulated by the CMP Planning Team, based on discussions with the CSF in November 2016, the CMC in January 2017 and KWMZ in January-February 2017.

In the maximum benefit scenario environmental protection and restoration is spearheaded. The forest managed by NFA are recovered, wetlands are protected and restored, and rangeland and woodland management improved the condition of these lands. Instead of expanding farmlands, crop production is intensified in the existing areas whereby soil and water conservation measures are applied to increase both the water retention capacity of the soils, and the productivity. Water for production reservoirs are built. Simulations with a hydrological model show that that runoff-rainfall rates are lowered as compared to the benchmark, particularly on agricultural lands. When taking into consideration changing climate conditions, average river outflow increases greatly, but much less than in any of the other scenarios.

Under the maximum benefit scenario, the T10-lowest annual river outflow (i.e. dry year) equals 154 Mm<sup>3</sup>/year, hence the minimum environmental flow of 20% of annual average river outflow (66 Mm<sup>3</sup>/year) is guaranteed. However, there is a period of almost four months during which there is no-flow. Currently, there are no indications that this is a problem, but it is important to monitor the impacts of the changes closely.

The maximum benefit scenario seems suitable for Lokok Catchment. It enhances the productivity of rain fed agriculture, provides the opportunity to expand irrigated agriculture, increases safe water coverage, while at the same time ensure the availability of water resources in the long term. Yet it remains important to stress that the model includes a great number of uncertainties and focuses on the impacts at catchment level, while the effect of interventions at local level maybe considerable and it is unclear how the biological system will react to the changes in water flow. When planning, designing and constructing interventions (whether it is about protection, restoration or water infrastructure) it is essential to assess also these changes. In addition, the figures show how important it is to establish a functioning and reliable (surface water, groundwater, water quality and biological) monitoring systems on the short term, while at the same time investing in the further calibration of the hydrological model.



### **Interventions**

To ensure access to water of sufficient quantity and quality, and mitigate floods water retention and storage in the catchment is fundamental. Conservation and restoration of wetlands and forests, and improved management of agricultural land and rangelands, is hence critical. Large areas of the wetlands in Lower Lokok have already been irreversibly lost, but an effort must be made to avoid further degradation. For the wetlands in Middle Lokok (Aduko Wetlands and wetlands of Okok around Napak) applies that everything needs to be done to conserve the wetlands that are still intact and restore what is degraded. No longer agriculture should be allowed into these areas. Tree cover in Timu Forest Reserve should be recovered and expanded together with NFA, and the strict environmental protection measures by UWA in the Bokora Corridor should be perpetuated. Improved soil and water conservation management of all agricultural lands should be pursued, but especially those in but especially those in Upper Lokok (Kaabong agricultural zone and Kotido agricultural zone). The vegetation of rangelands must be protected and enhanced, which can best be achieved through smaller (<50 000 m<sup>3</sup>) and better distributed water for production facilities in the catchment to reduce the concentration of cattle, and improved rangeland management practices (e.g. controlled grazing, exclosures, farmer managed tree regeneration). Provision of sufficient surface water for livestock at strategic points will also reduce the pressure on boreholes.

To support sustainable economic development which does not undermine the natural resource base. Intensification of rain-fed crop production should be promoted, through improved supply of inputs, application of soil and water conservation measures, and strengthened market linkages. Existing water for production facilities should be rehabilitated and there use extended, particularly towards micro- and small scale irrigation, which will prove an important contribution to food security, nutrition and health status, and economic development. Also new water for production facilities have to be built. At least to cover the water for livestock shortages in normal years (4 Mm<sup>3</sup> in Lokok and Lokere combined), and preferably also moving towards coverage of the gap in dry years (28Mm<sup>3</sup>). Alternative sources of income should be studied and promoted towards reducing the pressure on the natural resources base. On the short-term water availability for domestic use and small-scale irrigation can best be improved through low-cost techniques, such as subsurface and sand dams, rooftop rainwater harvesting, compound water harvesting and rock water harvesting.

Site selection, design, construction, operation and maintenance of water infrastructure (including valley dams, valley tanks and boreholes) must be optimized as failure, non-functionality and poor water quality are often the result of inexistent or insufficient (hydrological) assessments, in part due to the limited availability of adequate professional expertise. Locally shallow groundwater should supplement costly and high maintenance boreholes. Sanitation should be improved throughout the catchment and piped water supply asserted to all rural and urban growth centres but primarily to Kaabong, Kotido and Nakapelimoru towns.

To implement these measures, it is first and foremost needed that the enabling environment is strengthened. There is a dire need for policy enforcement, regulatory measures, stakeholder involvement, access to information and data, coordination and dialogue, and integration of traditional management practices into governmental guidelines. Climate, water resources quantity and quality, and water infrastructure must be monitored in more detail, in a more reliable manner, and to the advantage of more stakeholders (i.e. the data should be accessible). Lower priority, but not less important in the long run, is the establishment of financial instruments which aim at reducing the dependency on external funding and promote economic development in the catchment.

This CMP presents the interventions that are specific to Lokok Catchment and which can be implemented in Lokok Catchment (Table 1). However, from the assessments, identified issues and options several interventions have been identified which exceed the borders of Lokok Catchment and are more applicable to water resources management in Uganda in general or deal with issues that are not the responsibility of a Catchment Management Organization, but rather of a higher-level institution within the Ministry of Water and Environment and other ministries. Examples of issues to be addressed at this higher level, include the limited IWRM-expertise at country level, the limited human resources at district level, the difficulty for stakeholders to access data, the poor functionality of WUCs, and the charcoal production.



**TABLE 1: OVERVIEW OF INTERVENTIONS LOKOK CATCHMENT**

<b>Institutional strengthening</b>	<b>Ecosystem protection and restoration</b>	<b>Water and sanitation</b>	<b>Economic development, particularly agriculture</b>
<ul style="list-style-type: none"> <li>■ Implementation of CMO governance system</li> <li>■ Support and strengthen the CMC</li> <li>■ Establish the CMS</li> <li>■ Support and strengthen the CSF</li> <li>■ Establish and support the CTC</li> <li>■ Prepare districts for CMP implementation</li> <li>■ Cross-sectoral district operations</li> <li>■ Guide lower level CMP implementation</li> <li>■ Guide development partners</li> <li>■ Awareness raising on CBWRM and CMP</li> <li>■ Capacity building</li> <li>■ General stakeholder learning</li> <li>■ Knowledge management</li> <li>■ CMP review</li> <li>■ Policy development</li> <li>■ Sub-Catchment management</li> <li>■ Micro-catchment management</li> <li>■ Proposal and partnership development</li> <li>■ Innovation fund (basket fund)</li> </ul>	<ul style="list-style-type: none"> <li>■ Request NEMA to establish regional office in Mbale</li> <li>■ Improve management of Central Forest Reserves</li> <li>■ Improve tree cover in degraded areas</li> <li>■ Regulate charcoal production and firewood use</li> <li>■ Promote use of alternative sources of energy</li> <li>■ Promote collaborative rangeland management with traditional rangeland management institutions and other stakeholders</li> <li>■ Protect and rehabilitate rangelands</li> <li>■ Sensitize and create awareness on the value of wetlands</li> <li>■ Develop and implement community based wetland management plans</li> <li>■ Restore degraded wetlands</li> <li>■ Promote riverbank management</li> <li>■ Construct flood and water logging management infrastructure</li> <li>■ Support enforcement of regulations</li> <li>■ Regulate gold and sand mining</li> <li>■ Regulate marble mining</li> </ul>	<ul style="list-style-type: none"> <li>■ Promote capacity building</li> <li>■ Support extension services</li> <li>■ Improve knowledge management</li> <li>■ Reinstate climate monitoring</li> <li>■ Establish groundwater monitoring</li> <li>■ Strengthen surface water monitoring</li> <li>■ Establish water quality monitoring</li> <li>■ Establish sediment monitoring</li> <li>■ Establish flood monitoring</li> <li>■ Enforce the water abstraction permit system</li> <li>■ Extend and rehabilitate water supply systems</li> <li>■ Construct new water supply systems</li> <li>■ Rehabilitate and close non-functional water points</li> <li>■ Improve operation and maintenance</li> <li>■ Promote water harvesting for domestic use</li> <li>■ Improve deep borehole drilling</li> <li>■ Promote shallow groundwater development</li> <li>■ Upscale sanitation programmes</li> <li>■ Promote waste management</li> </ul>	<ul style="list-style-type: none"> <li>■ Research into livestock value chains</li> <li>■ Develop and implement a plan to improve access to water for livestock</li> <li>■ Improve access to pasture and work on rangeland management</li> <li>■ Promote sustainable and productive rain fed farming</li> <li>■ Promote micro and small-scale irrigation</li> <li>■ Feasibility study medium-scale irrigation</li> <li>■ Demos medium scale irrigation</li> <li>■ Implement road water management and harvesting</li> <li>■ Promote alternative economic activities</li> </ul>

### **Implementation plan**

The Implementation Plan is available as a separate document to guide the Lokok Catchment stakeholders in realising the Catchment Management Plan. The Implementation Plan is organised as a practical tool indicating interventions per thematic area, steps or sub-activities, locations (where applicable), project lead, possible partners for implementation, priority and budget for implementation as well as for structural operation and maintenance.

In the Implementation Plan interventions are prioritised per the urgency of implementation. The priority does not indicate the relevance, but rather an order of implementation in time. The priority is indicated as “critical”, “high”, “medium” and “low”. Critical are activities for which implementation should start immediately, which are conditional to any further implementation and key for sustainable catchment management. High prioritised are those activities of high relevance to key issues and with expected high impact on improving water resources management and stopping harmful practices. The activities should be implemented at short term, meaning within 3 years from CMP approval. Medium priority is set for activities that are planned to be implemented at intermediate term, within 3-5 years from CMP approval. Activities with priority set at “low”, can be implemented at the longer term, meaning within 5 to 23 years<sup>4</sup> from CMP approval.

The CMP is implemented by the Lokok Catchment Management Organization (CMO) in close collaboration with KWMZ. In the implementation plan the roles of project leads and implementing partners are differentiated. A project lead takes the initiative or guides an activity that will be implemented. The project lead is not necessarily the funder or the actual implementer on the action. KWMZ and the CMC are the only possible project leads; however, many other actors can be

<sup>4</sup> The CMP objectives are aligned to the Uganda vision 2040.



involved for implementation and support. Project implementers are implementing partners contributing to the implementation of the activity. Project implementers can again be KWMZ, the CMC, the district councils, but also other stakeholders. All stakeholder groups, from the water users as primary stakeholders up to development partners and corporate sector, can collaborate or contribute resources to the implementation of specific interventions included in the CMP.

Implementation of the CMP requires financial resources. Potential sources for the finances include district budgets (particularly if the district development plans are aligned with the CMP), line ministries and agencies, NGOs, UN agencies, local taxes and Local Economic Development (LED). The Implementation Plan provides guidance on the budget for implementation of the interventions as well as structural funding for so called “running costs” and operation and maintenance. In this section an indication of the total budget required to implement this CMP is given. Categories of costs included are staff, consultancies, travel, offices, meetings/conferences/trainings, as well as construction or so-called “hardware”.

As indicated before, the CMP is a living document and part of a continuous management process. The CMP should be reviewed and updated periodically as described under the monitoring & evaluation activities and at least every 5 years in line with national and district planning cycles.



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# ACRONYMS AND ABBREVIATIONS

ACF	Action Contre le Faim (Action Against Hunger)
ARC2	African Rainfall Climatology model version 2
ASL	Above Sea Level
ASM	Artisanal and small-scale mining
BOD	Biochemical oxygen demand
CAO	Chief Administrative Officer
CBWRM	Catchment Based Water Resources Management
CCU	Climate Change Unit
CFM	Collaborative Forest Management
cm	Centimetre
CMC	Catchment Management Committee
CMO	Catchment Management Organisation
CMP	Catchment Management Plan
CMS	Catchment Management Secretariat
CSF	Catchment Stakeholder Forum
CTC	Catchment Technical Committee
DDP	District Development Plan
DEA	Directorate of Environmental Affairs
DHD	District Health Department
DIO	District Information Officer
DOCAHWA	Dodoto Community Animal Health Workers Association
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
GIS	Geo-Information System
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
ha	Hectare
IWRM	Integrated Water Resources Management
JIECAHWA	Jie Community Animal Health Workers Association
KIDDP	Karamoja Integrated Disarmament and Development Programme
KWMZ	Kyoga Water Management Zone
KUWS	Karamoja Umbrella of Water and Sanitation
l	Liter
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
MEMD	Ministry of Energy and Mineral Development
MLG	Ministry of Local Government
mm	Millimetre



Mm3	Million cubic meters
MOFED	Ministry of Finance, Planning and Economic Development
MoU	Memorandum of Understanding
Mt	Metric ton
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
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
SSEA	Strategic Social and Environmental Assessment
SWAT	Soil and Water Assessment Tool
TSU	Technical Support Unit
UBOS	Uganda Bureau of Statistics
UGX	Ugandan Shilling
UNMA	Uganda National Meteorological Authority
UNRA	Uganda National Roads Authority
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
WASH	Water, Sanitation and Hygiene
WfP	Water for Production
WMZ	Water Management Zone
WSDF-E	Water Sector Development Facility East
WSS	Water Supply Scheme
WUC	Water Users Committee



# GLOSSARY

3R-interventions	3R stands for Recharge, Retention and Reuse interventions. 3R presents interventions for storing and buffering water using small systems. Examples are sand and subsurface dams.
Agricultural drought	Prolonged period with a below average crop production as a consequence of water shortages
Agroforestry	A land use management system in which trees or shrubs are grown around or among crops or pastureland. It combines shrubs and trees in agricultural and forestry technologies to create more diverse, productive, profitable, healthy, ecologically sound, and sustainable land-use systems.
Antecedent condition	Antecedent conditions represent a temporary state within dynamic natural and social systems that precedes and influences the onset and magnitude of a hazard and its consequences.
Biodiversity	A measure of the variety of organisms present in different ecosystem.
Benchmark model	A base model to assess the relative change of a scenario or parameter change. Benchmarking is normally done by running a number of different parameters and trials against it.
By-laws	A rule or law established by an organization or community to regulate itself, as allowed or provided for by some higher authority.
Catchment	A drainage basin or catchment basin is an extent or an area of land where all surface water from precipitation converges to a single point at a lower elevation, where the stream joins another body of water, such as a river, lake, reservoir, estuary, wetland, sea, or ocean.
Catchment management	Environmental planning concept that approaches sustainable resource management from a catchment perspective and integrates land and water management
Catchment Management Committee	A committee composed of representatives of all relevant stakeholder groups, which collaborates with the water management zone during the formulation of a catchment management plan and plays a steering role during its implementation.
Catchment Management Secretariat	A secretariat providing support to the Catchment Management Committee, Catchment Stakeholder Forum and Catchment Technical Committee in coordination, planning, implementation and monitoring of activities in the catchment.
Catchment Stakeholder Forum	A forum bringing together all actors on catchment management to define key issues related to water resources, to provide input to and to review the Catchment Management Plan and to monitor the levels of commitment.



Catchment Technical Committee	A committee composed of technical staff from key stakeholders in the catchment and technical staff of other government ministries and agencies, providing technical expertise in planning, implementation and monitoring of activities in the catchment.
Collaborative forest management	A dynamic approach to promote sustainable and equitable forest resource management.
Community Based Organisation	A group of individuals organised by and for a particular community of people based on shared interests and/or attributes. The community could be defined geographically (e.g. a neighbourhood), could contain members from diverse backgrounds, and/or could be defined based on something like religious beliefs or a shared condition. Members may include various stakeholders, such as the public, elected officials, advocacy groups, and business leaders.
Community led total sanitation	An innovative methodology for mobilizing communities to completely eliminate open defecation. Communities are facilitated to conduct their own appraisal and analysis of open defecation and take their own action to become open defecation free.
Contour trenching	An agricultural technique where trenches are artificially dug along contour lines. A technique that can be easily applied in arid areas to allow for water, and soil conservation, and to increase agricultural production.
Curve number (SWAT)	Empirical parameter for predicting surface runoff based on slope, soil, vegetation cover and land use management practices.
Dam (or Valley Dam)	Embankment build in a concave location, perpendicular on the stream in a valley, where with one (earth or concrete) wall a big reservoir is made to store water. In the context of catchment management planning in northern Uganda dams are considered small if volume < 50000 m <sup>3</sup> . All dams between 50000 m <sup>3</sup> and 5 Mm <sup>3</sup> are (in this plan) classified as medium-sized dams.
Deconcentration	The responsibilities and authorities of the central government is transferred to lower level government.
Dendritic pattern	A dendritic pattern is a pattern of growth that resembles a tree.
Drip-irrigation	A form of irrigation that saves water and fertilizer by allowing water to drip slowly to the roots of many different plants, either onto the soil surface or directly onto the root zone, through a network of valves, pipes, tubing, and emitters.
Drainage	Downward flow of surface and sub-surface water from an area.
Ecosystem	A community of living organisms in conjunction with the non-living components of their environment (air, water and mineral soil), interacting as a system. These biotic and abiotic components are regarded as linked together through nutrient cycles and energy flow.
Environmental quality objectives	Documented limits and tolerances on measured ratios and levels of pollutants allowed in water.



Exclosure	Degraded area in (semi-) arid environment from where livestock is excluded to allow native vegetation to regenerate to control soil erosion, increase rain water infiltration and increase the availability of fodder and biomass, Typical examples of exclosures feature fences that prevent animals from entering the area. Sometimes only targeted species are excluded while allowing other animals to move freely.
Extension services	The application of scientific research and new knowledge to certain practices through education.
Fanya juu	A terracing technique where the stones from rocky slopes are used to build bunds or terrace walls, often on very steep slopes. The terraces are constructed by throwing soil up slope from a ditch to form a bund along a contour.
Farmer Managed Natural Regeneration	Low-cost, sustainable land-restoration technique used to combat poverty and hunger amongst poor subsistence farmers in developing countries by increasing food and timber production, and resilience to climate extremes. It involves the systematic regeneration and management of trees and shrubs from tree stumps, roots and seeds.
Fault (geology)	A fault is a planar fracture or discontinuity in a volume of rock, across which there has been significant displacement as a result of rock-mass movement.
Focus Group Discussion	A focus group is a small, but demographically diverse group of people whose open discussions are analysed to determine the opinion that can be expected from a larger population.
Geo-Information System	A system designed to capture, store, manipulate, analyse, manage, and present spatial or geographic data.
Grass strip	An area of land maintained in permanent grass vegetation.
Groundwater	The water present beneath Earth's surface in soil pore spaces and in the fractures of rock formations.
Gully	A landform created by running water, eroding sharply into soil. Typically triggered off by surface runoff from compacted soil surfaces that limit infiltration of rain water and hence often starting from roads, cattle tracks and other denuded soils.
Habitat	An ecological or environmental area that is inhabited by a particular species of animal, plant, or other type of organism. The term typically refers to the zone in which the organism lives and where it can find food, shelter, protection and mates for reproduction.
Heavy metals	Metals with relatively high densities, atomic weights, or atomic numbers. Examples are iron, copper, cadmium, mercury, lead, and gold.
Hydrological drought	Prolonged period with a below average water availability from rivers, lakes and groundwater
Hydrological modelling	Hydrologic models are simplified, conceptual representations of a part of the hydrologic cycle which are primarily used for hydrologic prediction and for understanding hydrologic processes.



Infiltration capacity	The maximum rate at which water can enter a soil in a given condition depending on soil structure and texture, organic matter content, actual soil moisture, and vegetation cover.
Literacy	The ability to read, write, and use arithmetic to understand, communicate and gain useful knowledge.
Metamorphism	The change of minerals or geologic texture in pre-existing rocks, without melting into liquid magma. The change occurs primarily due to heat and pressure.
Meteorological drought	Below average amount of rainfall during a certain period of time. In this study, a timespan of one month was used.
Micro-catchment	A small sub division of a sub-catchment area.
Mulching	A mulch is a layer of (often organic) material applied to the surface of an area of soil. Its purpose is any or all of the following: to conserve moisture, to improve the fertility and health of the soil, to reduce weed growth, to enhance the visual appeal of the area.
No-regret measure	Activities that always yield certain benefits.
Orographic influences	The effect of topographic elevation, mainly used in relation to precipitation inducing processes
Regolith	A layer of loose, heterogeneous superficial material covering solid rock. It includes dust, soil, broken rock, and other related material.
Resilience	Resilience is the ability of a system, society, community, or individual exposed to hazards to resist, absorb, accommodate to and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions (UNISDR, 2007).
Road water harvesting	Water can be harvested directly from road surfaces; the runoff can be diverted to recharge areas or storage ponds.
Safe water coverage	Percentage of the population that has access to a source of safe water supply (borehole, piped water supply or protected spring) within walking distance (1500 m)
Sand dam	A reinforced wall that reaches above the sand bed. The river is cascaded, hence reducing river speed and increasing infiltration. When it rains, the dam captures soil laden water behind it filling the reservoir over time and a sandy aquifer is created.
Scenario	Combination of options, external factors that influence their performance (climate, economic conditions, etc.), projections or forecasts of the future (population growth rate, urbanization rate, agricultural productivity, water use or demand rates, economic parameters, etc.), and government policy affecting either their performance (priority, funding, regulations, institutional arrangements, etc.).
Shallow groundwater	Relatively young water stored in local overburden (regolith) aquifers.



Sheet erosion	The uniform removal of soil in thin layers by the forces of raindrops and overland flow
SME	SME stands for small and medium-sized enterprise. SMEs are businesses whose personnel numbers fall below certain limits.
Soil and water conservation	The practice of sustainable use of soil and water resources
Stakeholder	Any individual, group of people, institution (government or non-government) or company that may have a relationship with management of the catchment.
Sub-catchment	A hydrologically defined first-level sub division of a catchment area.
Subsurface dam	A dam constructed within the existing riverbed sediment, anchored on an impermeable layer.
Valley dam	(see Dam)
Valley tank	(synonyms: water pan, hafir, water harvesting tank) large excavation in a depression or low lying area, where surface runoff is stored in an open reservoir, usually off-stream (away from the main stream), the reservoir bottom can be sealed with compacted clay or plastic lining material. NB: although the term is very common in Uganda the term may be misleading since there is no dam or tank constructed (like, for example, the berkads in Somalia)
Village savings and loan association	A group of people who save together and take small loans from those savings. The purpose of a VSLA is to provide simple savings and loan facilities in a community that does not have easy access to formal financial services.
Water balance	The comparison of the quantities of water supplied, drained and removed that affect the change in storage over a certain period of time and within a given area.
Water demand	Amount of water required to cover the needs of specific users or uses, including the environment.
Water logging	Store of water above the surface as due to the existence of an (almost) impermeable layer. Soil may be regarded as waterlogged when the water table is too high to conveniently permit an anticipated activity, such as for example agriculture.
Water user committee	A committee set up by the community that is responsible for maintenance and operation of water access points.







# 1. INTRODUCTION

The Ministry of Water and Environment (MWE) through its Directorate of Water Resources Management (DWRM), is implementing Catchment Based Water Resources Management (CBWRM) as part of its water resources management reform process initiated upon the Water Sector Reform Study of 2005 (MWE 2005). The reform involves the deconcentration of water resources management along catchment boundaries to ensure government functions and services are more responsive to local issues. In this regard, the country has been divided into four Water Management Zones (WMZs): Upper Nile, Albert, Victoria and Kyoga (Figure 1). Within each WMZ, there are smaller hydrological units called catchments. Lokok Catchment is one of the 11 catchments in Kyoga Water Management Zone (KWMZ). To the east Lokok Catchment borders with Lokere Catchment which is also part of the KWMZ; to the west is Aswa Catchment which is part of the Upper Nile Water Management Zone (see Annex G for a map with all catchments in KWMZ). Lokok Catchment covers an area of 5,521 km<sup>2</sup> and has an approximate population of 390,000 (2016).

The present document provides the Catchment Management Plan (CMP) for Lokok Catchment, in Karamoja and Teso regions, in north-eastern Uganda. It provides a consensus strategy and common framework to support stakeholders of Lokok Catchment in their planning towards using water resources effectively and efficiently and achieving long-term sustainable development by introducing a concept for balancing growing demands with limited resources. This CMP was developed based on an Integrated Water Resources Management (IWRM) approach, following the Uganda Catchment Based Water Resources Planning Guidelines developed by MWE (2014). The CMP has been developed in close collaboration with the stakeholders of Lokok Catchment.

The catchment management plans for Lokok and Lokere were developed in parallel under the project titled “Support to Integrated Water Resources Management in Karamoja for Increased Community Resilience” co-funded by German Development Cooperation and DFID (under its “Enhancing Resilience in Karamoja Project”), implemented by Deutsche Gesellschaft für International Zusammenarbeit (GIZ) GmbH.

## 1.1 Catchment management

A catchment is a hydrological area where all surface water converges to a single exit point at a lower elevation, which in the case of Lokok Catchment is the convergence between Lokok and Lokere rivers. Only within catchment boundaries it is possible to determine how much surface and groundwater is available for the environment and human usages. Catchments are independent of existing administrative boundaries, such as districts, sub-counties and parishes and consist of natural and human-modified ecosystems with a characteristic configuration of topography, geology, soils, land use and vegetation. This mix, its interaction, its spatial arrangement, and the norms and modalities of its governance contribute to its functionality, challenges and opportunities. Analysis and intervention at catchment level can



Figure 1: Lokok Catchment in Kyoga Water Management Zone in north-eastern Uganda.



support the development of synergistic outside-the-box solutions to complex challenges (Landscapes for people, food and nature 2015).

This CMP deals with issues of the natural system of land, water and ecosystems as well as the social and economic systems that depend on natural resources. This CMP addresses the problems of protecting, conserving and managing water and other related resources in a sustainable manner considering the social and economic system by a) using water for economic and social development; b) protecting the resource base that supports these economic and social benefits; and c) conserving the catchment's resources.

This CMP is implemented by the Lokok Catchment Management Organization (CMO) in close collaboration with KWMZ. The CMO is the institutional framework at catchment level that facilitates collaborative water resources management and plays a key role in developing, coordinating and monitoring the implementation of the CMP. The CMO acts as an advisor to mediate the needs and plans of the local districts, with its different stakeholders, and the implementation of policies from the line ministries.

## 1.2 Integrated water resources management (IWRM)

Uganda Catchment Based Water Resources Management is based on Integrated Water Resources Management (IWRM). IWRM is a problem-focused and needs-driven holistic approach that recognises that many water use and management issues are interrelated and thus cannot be solved in isolation. The approach recognises spatial dependencies, the need to think across temporal scales, the existence of knowledge gaps and uncertainties, and the need to link research and policy (Jakeman and Letcher 2003). IWRM considers, recognizes and synergizes interests and activities related to water resources use and management. *Integrated* in IWRM refers to the integration of (Vos and Gerbrandy 2006):

- Uses (e.g. drinking water, industry, agriculture, livestock and environment)
- Analytical perspectives (e.g. technical, socio-economic, institutional and planning)
- Organizations and users (e.g. governments, users, managers and CBOs)
- Geographic areas (e.g. upstream-downstream)
- Development (e.g. IWRM as part of wider rural transformation)

IWRM is founded on early, open and inclusive stakeholder engagement, and enables all those with an interest in water resources to communicate, liaise and work more effectively together (Tweed Forum 2010). The aim is to achieve resource sustainability, to deliver cross cutting improvements to water environments and secure future access to water to all users and simultaneously promote development. In this sense, IWRM is based on partnerships, facilitates change rather than dictating it, promotes visioning and planning, recognizes the importance of local knowledge, fosters learning and adaptive management and concentrates both on people and their natural resources base (Frost et al. 2006).

A Catchment Management Plan founded on IWRM-principles includes interventions in terms of (based on Vos and Gerbrandy 2006) administrative changes and regulatory frameworks, research, technology and infrastructure, ecosystem protection and restoration, economic investment and financial instruments, social change, investment and financial propositions, and capacity building. But foremost a catchment management plan is iterative and adaptive, and hence should be updated regularly following the developments of the complexities between the natural and human environments.

## 1.3 The catchment management planning process

The catchment planning process in Uganda is presented in the Uganda Catchment Management Planning Guidelines (MWE 2014). The schematic diagram outlines the planning process in a series of steps, which each contain a varying number of tasks (Figure 2). According to the guidelines the process begins with delineating the catchment and the sub-catchment boundaries, development of a catchment information system and building the basis of the catchment knowledge base. Subsequently, different parallel assessments are undertaken:

1. The Water Resources Assessment analyses the water balance based on mapping and assessing of the water resources availability and projecting future water use.
2. The Stakeholder Assessment is undertaken to develop the framework for stakeholder participation. This includes the engagement strategy for various stakeholders' groups in the different steps of the catchment management planning



process. Furthermore, stakeholders will be mobilised to participate in the Catchment Management Organisation (CMO).

3. The Strategic Social and Environmental Assessment (SSEA) identifies potential adverse consequences of development and the fragility of many economically and socially important natural assets. At a strategic level the major social and environmental issues are assessed for the catchment today and the potential issues in the future that the plan should foresee and attempt to mitigate, considering the resource base, development opportunities, and the goals and direction that stakeholders desire.

Based on the information from the Water Resources Assessment and the SSEA and with the CMO in place, a framework for further planning is developed. This includes the catchment's natural resources, their status, the water balance, the opportunities for development, and the potential constraints and limitations as they have emerged from the study and analysis carried out. Subsequently the stakeholders develop their vision and objectives for the catchment to guide further development of options and scenarios of what the catchment could be like in the future.

With the vision and objectives for the catchment in place and with a set of options and interventions further analysis is undertaken including the design of the options, assessment of the sustainability and compatibility of a larger number of different types of development options and management actions simultaneously and a so-called scenario analysis. The scenario includes a set of assumptions about the options and how they perform influenced by external factors and under projection of future trends. The results of this process of assessment and analysis lead to a consensus Catchment Management Plan. Additionally, the Implementation Plan guides the actors involved to get into action and includes priorities, phasing and contributing partners.

A description of the methodology used by the Catchment Planning Team in the development of the Lokok CMP is presented in Chapter 2. Please refer to the methodology in the respective assessments for more details (Annex A).

## 1.4 Reader's guide

Chapter 2 explains the manner in which the project team operationalized the Uganda Catchment Based Water Resources Management Planning Guidelines. It specifies the different steps in the catchment planning process, and the methods and tools used in each of the steps.

Chapter 3 provides an overview of the institutional environment in Uganda regarding water resources management. It specifies the relevant acts, policies and strategies, the way different actors are involved in water resources management, and the composition of the Catchment Management Organization, the entity in charge of decision making on water resources at catchment level.

Chapter 4 describes the main characteristics of the catchment, including the location, its main features, climate conditions and socio-economic aspects. The chapter also gives the details of and main issues resulting from the stakeholder assessment, the water resources assessment and the strategic social and environmental assessment. The results of this chapter provide the information needed to understand the functioning of the catchment.

Chapter 5 links the main trends and issues in water resources management to options. Options are then combined into scenarios to assess their impact on the environment, livelihoods and water balance of the catchment. The chapter concludes

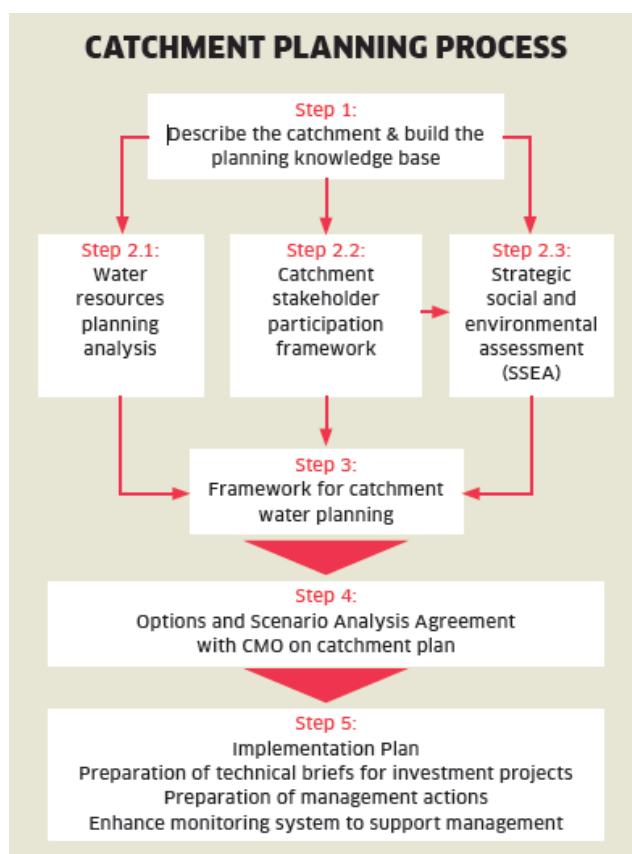


Figure 2: Catchment planning process (MWE)



with the maximum benefit scenario in which options from the different scenarios are combined and balanced to address all main current and projected water resources management issues, while minimizing negative side-effects.

Chapter 6 draws the intervention plan. The maximum benefit scenario is developed into a consensus plan agreed on by all the stakeholders, which specifies all interventions, including the reasoning behind them, projected effects, and important considerations to consider during implementation. Interventions are organized along four thematic areas: 1) institutional strengthening, 2) ecosystem protection and restoration, 3) water and sanitation and 4) economic development, particularly in agriculture. Furthermore, the catchment transcending interventions are described.

Chapter 7 describes sources of funding that could be tapped into to finance implementation.

Chapter 8 gives guidance on implementation of the Catchment Management Plan. It specifies the set-up of the implementation plan, prioritization of interventions, roles and responsibilities, and the total budget needed for implementation, and for operation and maintenance.











## 2. METHODOLOGY

The methodology used by the Catchment Planning Team in the development of the Lokok CMP is derived from the Uganda Catchment Management Planning Guidelines (MWE 2014) and followed the steps as shown in Figure 2. The planning process started with an inception phase which laid the basis for the subsequent assessments on water resources, stakeholders and socio-economic and environmental context. The assessment phase was followed by an analysis and design phase in which the different interventions were identified and designed. The final step included the development of the Catchment Management Plan and the Implementation Plan. The Catchment Planning process was further enriched by the implementation of several so-called no-regret IWRM measures in 3 districts of the Catchment. The methodology of each step of the process is described in detail in the respective reports and summarized here.

At some places the Catchment Planning Team slightly deviated from the guidelines. For example, the inception and assessment phases together also captured Step 1 of the guidelines “Describe the catchment & build the planning knowledge base”. During the assessment phase, also the vision and objectives were developed by the stakeholders. Furthermore, step 3 “Framework for catchment water planning”, which includes several interactions with the Catchment Management Organisation, was combined with the other steps. Development of technical briefs for investment projects, preparation of management actions and the development of a monitoring system are part of the implementation plan.

Different meetings with the CSF and CMC were used to:

- Present an overview of the catchment: the major issues, problems, trends and the opportunities and options identified by the planning team in the inception and assessment phases.
- Review and agree on the major issues, problems and trends in the catchment that need to be addressed by the catchment plan. This would include the aspirations and needs for water expressed by stakeholders.
- Review and agree on planning objectives and indicators, which further guided formulation and evaluation of options and scenarios.
- Review and agree on the range and scope of options to be considered.

### 2.1 Inception phase

To obtain a good understanding of the initial situation and to plan activities and resources effectively, an inception phase was undertaken. Available data was reviewed to identify gaps. The Planning Team familiarized herself with relevant legislations including the framework for CBWRM.

As the Catchment Management Organisation (CMO) was envisioned from the start to play an important role and was planned to be set-up during the CMP planning process, the inception phase was used to undertake an initial identification and to refine the stakeholder participation strategy.

### 2.2 Stakeholder analysis and engagement (Step 2.2)

Catchment Management Planning is a multi-stakeholder process in which government agencies together with local stakeholders, including community based organisations and private sector parties form a “platform” and work together in a complex and intense process that takes time, but which is key for a sustainable process. During the preparation of the catchment management plan, stakeholder participation first aims at understanding the different interests (including the environment) of all stakeholders and finding common solutions for often competitive uses of resources. By discussing different perspectives, causes of problems and ambitions may become clear and thus add to solutions (or change). At the same time, stakeholders develop a greater understanding for CBWRM, facilitate the buy-in and create mechanisms that are institutionalised for conflict resolution, water regulation and enforcement and other water management measures. In the CMP development process stakeholders were engaged by providing them with information about the process, like leaflets, presentations and field visits, consultation in data collection and by obtaining feedback on analysis, and they collaborated by providing the CMP Planning Team with advice, suggestions and recommendations in the identification of preferred options and in decision making.



Stakeholders meet on catchment management in the Catchment Management Organisation (CMO). The CMO comprises of the Catchment Stakeholder Forum (CSF), Catchment Management Committee (CMC), Catchment Technical Committee (CTC) and the Catchment Management Secretariat (CMS). A first step in mobilising the CMO is understanding on who should be part of the CMO by analysing a) the relevant government policies, programs and processes; b) which stakeholders are involved in natural resources management; and c) the key issues for these stakeholders regarding catchment management. Therefore, a stakeholder mapping and analysis was undertaken to identify all relevant actors and potential members of the different CMO bodies. At the time of the development of Lokok Catchment Management Plan the project team was involved in a similar trajectory regarding Lokere Catchment. To make efficient use of resources and as the districts and stakeholders largely overlap, a joint stakeholder analysis was undertaken for Lokok and Lokere Catchments. Data collection methods for the stakeholder analysis included workshops, in-depth interviews, Focus Group Discussions (FGDs), self-administered questionnaires and desk research of relevant documents to support the triangulation with the primary information collected from the respondents. All the districts within the Lokok and Lokere Catchments were sampled for the stakeholder assessment. An attempt was made to interview most of the district technical staff in all districts. The stakeholder assessment resulted in a stakeholder assessment and engagement report including:

- Stakeholder description: details the stakeholder characteristics based on their interventions, geographical scope, mission, funding scenarios, partnerships and networks, resources and expertise.
- Stakeholder characterisation matrix (Annex C): stakeholders per category, sectors of intervention, interests, capacities, network and potential role in Catchment Management.
- Power dynamics matrix: depicts the influencing power and interest dynamics between stakeholders.
- Operational stakeholder engagement plan (Annex E): recommended engagement strategy per stakeholder group and per phase of the Catchment Management Planning process.

The establishment of the CMO in Lokok Catchment was facilitated during the catchment planning process. In September 2016, the Lokok CSF was formally established. In November 2016, the Lokok CMC was formed (see annex E for elected CMC members). Participation of stakeholders throughout the project was achieved through:

- A five-day inception field visit to Moroto and Napak districts in June 2016.
- A three-week field visit to all eight districts in July-August 2016, in which interviews, focus group discussions and field visits with stakeholders were organized.
- A three-week biophysical data collection campaign held in August 2016 in which local stakeholders were involved.
- Four Catchment Stakeholder Forums (May 2016, September 2016, November 2016 and March 2017).
- Two Catchment Management Committee meetings (November 2016 and February 2017).

Though efforts were made by the Catchment Management Planning team supported by KWMZ and GIZ to include all stakeholder groups in the planning process, it should be acknowledged that full interest group representation was not successfully established. Some stakeholder groups remained underrepresented in the various CSF and CMC meetings. Especially primary stakeholders - the water users - are under-represented in the CSF as well as in the CMC. The CSF and CMC are dominated by district technical staff and politicians. Though at government level they represent the citizens of their district, one cannot speak for them. Government and politicians can and will have different opinions and interests than others. As CBWRM is based on stakeholder participation including the primary water users, one should try to bring all stakeholder groups on board, also if they do not come on a first call. It is recommended that KWMZ together with the CMC should try to review the draft CMP with those groups which have not sufficiently been engaged in order to make the right choices and consensus plan. NGOs, CBOs and cultural institutions can play a significant contribution in awareness raising among the primary stakeholders and mobilising them for engagement. Furthermore, MWE should consider to review the national guidelines on the composition of CMCs to better balance the different stakeholder interests.

## 2.3 Water resources assessment (Step 2.1)

The water resources assessment started with a review of existing reports and maps on the catchment's basic characteristics and the water resources of the catchment which resulted in an (internal) desk study report, the preparation of thematic maps and the printing of basic remote sensing imagery. These first products provided a basic understanding of the context. This preliminary database was complemented with data gathered during field surveys on the catchment's geology, soil, water resources, land use and land cover, biodiversity, and its main challenges. The main tools employed for this assessment were screening formats for water resources and soil erosion, formats for secondary data retrieval, and field



observation reporting formats. Finally, geo-information systems (GIS) analysis, hydrological modelling and statistical analysis were performed to assess soil erosion processes, make an inventory of the water infrastructure, map the water resource base, determine water demand and estimate the water balance. Feedback loops and iterations were built into these analyses to ensure that the required level of detail was achieved and that no elements were over-looked.

## 2.4 Strategic social and environmental assessment (Step 2.3)

Table 2 presents the stages followed in conducting the SSEA the Lokok Catchment. The SSEA has been a participatory process that sought to strengthen the integration of socio-economic and ecological aspects of water resource management by:

- Describing the relevant external and in-situ factors influencing water resource use within the Lokok catchment;
- Ensuring integration of stakeholders' and wider public socio-economic and environmental perspectives including measures to address issues and their causes into the Catchment Management Plan (CMP);
- Identifying and mapping out specific habitats, natural resources and land use zones that should be conserved to ensure survival of the fragile ecosystem;
- Assessing the environmental quality objectives that can inform the preferred strategy for the CMP.

The assessment involved desk studies, field data collection (focus group discussions and key informant interviews) and surveys. The assessment aimed analysing all social and environmental issues associated with catchment hazards in Lokok to inform the selection of environmental and social priorities and to assist in developing options and scenarios for the future in order to protect and conserve the water resources.

**TABLE 2: STEPS FOLLOWED IN THE SSEA PROCESS**

SSEA Phases	SSEA Steps	Method/Instrument
Phase A: Scoping (defining the boundaries of investigation, assessment and assumptions required by CMP)	A 1: Defining the scope and objective of the SSEA, spatial and temporal boundaries of the investigations as well as the main impacts to focus on	Document analysis, Experts consultation, including Project Team member consultations, Stakeholder consultations, CSF
	A 2: Preparing and participating in the Catchment Stakeholder Forums (CSF) as well as organizing consultations with interested parties and project team members	
	A 3: Revising the extent and level of detailing of the assessment	
Phase B: Identifying major social and environmental issues and developing Environmental Quality Objectives (EQOs)	B1: Identification and compilation of existing key social and environmental issues in the catchment and/or region that will be affected by the CMP	Document analysis, Experts consultation, including Project Team member consultations
	B2: Analysing their interrelationship with economic and social priority issues and clarification on how socio-environmental priorities are linked to growth and poverty alleviation	
Phase C: Preparing SSEA report including recommendations for way forward	C 1: Formulation of recommendations for way forward	Document analysis, Consultations, including Project Team member consultations, Stakeholder consultations, CSF
	C 2: Preparation of SSEA Report	

## 2.5 Options and scenarios (Step 4)

The options and scenarios phase elaborated on interventions (i.e. the options) that respond to the issues (i.e. the challenges) happening or projected to happen in the catchment, considering the capacities and interests of the stakeholders. A long list of options was developed using input from:

- A literature review;
- The Water Resources Assessment, Stakeholder Assessment and Strategic Social and Environmental Assessment,
- Field visits to identified hotspot sites and district offices, which included a landscape assessment, focus group discussions and a capacity assessment, and;
- CSFs which provided a platform to discuss issues, develop a vision for the catchment, and propose options for an enhanced management of water and related resources.



The project team verified the issues and options with stakeholders during a three week-field visit and the September and November CSFs. Stakeholders appraised and prioritized the options using an assessment framework. Scenarios were developed by the consultant in close consultation with KWMZ. The analysis integrated the options appraisal by stakeholders, expert judgement, and the impact on the water balance using hydrological modelling tools.

## 2.6 Catchment Management Plan (Step 4) and Implementation Plan (Step 5)

This final step focused on the integration of the results of previous steps in the underlying policy document, and consisted of four major stages:

1. Summary, visualization, pooling and integration of key data, findings and recommendations from policy review (inception phase), stakeholder analysis, water resource analysis, strategic social and environmental assessment and option and scenario analysis.
2. Elaboration of the consensus catchment management plan.
3. Review of the draft CMP with MWE, KWMZ and CMC (January 2017) with activities oriented toward the identification of incongruences, confirmation of site selection for different interventions and filling of gaps in the plan.
4. Incorporation of the feedback from the different reviewers and preparation of the final draft for revision and approval and adoption by MWE.

## 2.7 Piloting IWRM measures

Three local NGOs experienced in the implementation of climate resilient livelihoods and IWRM measures were part of the Catchment Management Planning Team for Lokok Catchment. As part of the planning process a number of no-regret IWRM-interventions was implemented in Kaabong, Kotido and Amuria Districts by these local partners (Caritas Kotido for Kotido and Kaabong, Socadido for Amuria) in order to pilot measures for further uptake in the CMP. Ideally the Catchment Management Plan guides the selection and location of measures. With the CMP still under development, these pilot projects were selected, designed and built on existing local knowledge and quick scans by the technical partners.

The following interventions were piloted as no-regret measures:

1. On restoration and management of vulnerable ecosystems:
  - Support the participatory development of wetland management plans and ensure the restoration and demarcation of depleted wetlands.
  - Facilitate the adoption and enforcement of controlled grazing in riverine areas.
2. On agroforestry systems:
  - Establish community managed tree nurseries, creation of wood lots, live fencing and promote planting.
  - Promote, provide training and enable access to information on alternative sources of energy and promote the adoption of energy saving practices/tools (in combination with sensitisation on the negative effects of uncontrolled bush burning and charcoal production).
  - Introduce / promote practices that allow regeneration of natural vegetation.
3. On increased resilience to climate change impacts such as drought and floods:
  - Alternative livelihood activities for vulnerable communities or communities living in hot spot areas such as wetlands.
  - Promote 3R interventions (Recharge, Retention and Reuse) in flood prone areas of selected sites.

With the implementation of these no-regret measures the project reached out to a total of 17.955 direct beneficiaries. The experiences from the no-regret IWRM measures have been used in the selection and design of the interventions included in the CMP. Table 29 in Annex B provides a full overview of the success rate of the implemented measures.

**TABLE 3: BENEFICIARIES NO-REGRET IWRM MEASURES**

District	Partner	Direct beneficiaries	Indirect beneficiaries
Kotido / Kaabong	Caritas Kotido	14.441	24.120
Amuria	Socadido	3.514	5.500
<b>Total</b>		<b>17.955</b>	<b>29.620</b>











### 3. UGANDA INSTITUTIONAL ENVIRONMENT

In Uganda, sufficient legal provisions are in place to manage water resources sustainably. Gaps exist mainly in relation to the management of water (and related) resources at catchment level, or as it is commonly referred to “management beyond administrative boundaries”. The Uganda policy environment does not explicitly include the move towards catchment based management, even though the Constitution and the Local Government Act allow for cooperation among districts. At the end of 2016 catchment management planning in Uganda was underway in 15 catchments out of which only one falls within a single district. This points to the strong need for cooperation between districts, for CBWRM to be effective. However, there are gaps that need to be addressed to support the full operationalization of CBWRM in Uganda. For instance, the need for a certain proportion of sub counties in the district to endorse the formation of a regional government indicates that such a regional government is based on administrative rather than hydrological boundaries, and therefore not adequately supporting the CBWRM agenda.

#### 3.1 Water acts, policies and strategies

Water policy development in Uganda is guided by the IWRM-approach since the Water Action Plan was enacted in 1995. A water sector reform study recommended a paradigm shift from centralized water resources management to catchment based water resources management. Following the Water Sector Reform Study in 2005, a Joint Sector Review, carried out in 2006, identified that the policy cooperation and effectiveness that had been anticipated were not being fully realized. Therefore, the Ministry of Water and Environment (MWE) developed further guidelines in 2009 for delivering water and sanitation at the district level.

The process under which the WMZs and CMOs operate can be found in Operationalization of Catchment-based Water Resources Management Draft Final Report (MWE September 2010) and Uganda Catchment Management Planning Guidelines (MWE 2014). Acts do not yet reflect the catchment-based management approach. Acts do not yet reflect the catchment-based management approach, but are being revised at present e.g. the Water Act. The main documents for water organisations to relate to are:

- Constitution of the Republic of Uganda (1995): The supreme law in the country, to which other legislations and developments must align. Among others it guides on the management of natural resources in Uganda as well as on the governance structures from national to local level.
- The Water Statute (1995) & Water Act (1997): Provide for use, protection and management of water resources and development of water supply and sewerage undertakings. All rights to investigate, control, protect and manage water in Uganda for any use is vested in the government and shall be exercised by the MWE. The act establishes that the MWE may identify any area to be a water supply area and establish a protected zone on land to protect that water supply. Also, The Act guides on permits for water abstraction and waste discharge. The Act is being reviewed to include explicit provisions on CBWRM.
- The National Environment Act (1995) and Tree Planting Act (2003) (including the Wetland protection guidelines and Wildlife protection guidelines): Provides for sustainable management of the environment and imposes protection of catchment areas, requires environmental impact assessment for construction of water infrastructure, and sets that natural conservation areas need to be considered when developing policies for ecosystem management and in regard to commercial exploitation of the areas.
- The National Water and Sewerage Corporation Act: Establishes the NWSC as a Water and Sewerage Authority and gives it the mandate to operate and provide water and sewerage services in areas entrusted to it on a sound commercial and viable basis.
- The Local Government Act (1997, revised 2000): Provides for decentralization of service delivery including water services to local governments and for cooperation between and among districts. Districts are responsible for water supply outside the jurisdiction of NWSC, operation and maintenance of wells, dams and other water supply infrastructure, and protection and restoration of local water resources. The CMP should provide the guidelines to improve the sustainability, effectiveness and efficiency of these tasks, particularly with regards to the alignment of activities of different districts, and between districts and other implementers.



- Water (waste discharge) Regulations (1998): Provides for the regulation of water abstraction and waste water discharge through permits. The permit system ensures that the use of water resources is environmentally friendly and promotes sustainable development. These controls also ensure that water is not treated as a free good but as a good with a value to be paid for.
- Water management is also mentioned in the following policies National Water Policy (1999), National Gender Policy (1997), National Health Policy (1999), Self-Supply Strategy, Rainwater Harvesting Strategy, Bulk Water Supply Strategy, Gender Strategy and the Operation & Maintenance Strategy.

Several other policies and strategies that also mention water (management) focus on the need to improve safe water supply and extending and modernizing agricultural production, stress the need to improve equal participation in water management, emphasize the linkages between water, sanitation and hygiene, support self-help initiatives in communities and at household level, advocate for domestic rainwater harvesting, and emphasize community-based maintenance of rural water supply systems.

These regulations are highly relevant in relation to water use and water quality protection, particularly considering socio-economic development trends. The regulations also provide guidelines to the use of financial instruments to manage and supply water. Policies at national level are translated into Sector Development Plans that are implemented at district level under the Decentralization Policy. All districts in Lokok Catchment 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 government, however this has been done in varying magnitudes due to constraints in resource availability.

## 3.2 Water management structure

The Ministry of Water and Environment (MWE) is the lead agency for formulating national water and sanitation policies, coordinating and regulating the sector. It is nationally mandated to formulate policies for all aspects of water resources management and development, it is responsible for setting the standards to manage and regulate all water resource developments, as well as for monitoring and evaluation of all the sector development programs. The structure of the Ministry of Water and Environment is presented in Figure 3.

MWE operates through three directorates. The Directorate of Water Resource Management (DWRM) has responsibility for the development, maintenance and enforcement of national water laws, policies and regulations. In addition, it manages, regulates and monitors national water resources through issuance of water use permits, abstraction and wastewater discharge permits. DWRM is the lead in developing the agenda for CBWRM. DWRM coordinates the deconcentrated units (water management zones).

The Directorate of Water Development (DWD) is the lead agency for the development of water for production infrastructure including water supply and sanitation for urban and rural services. DWD also did a step in “deconcentration” by having established the Water and Sanitation Development Facilities at zonal level. DWD is mandated to promote and ensure the rational and sustainable utilisation, development and safeguard of water resources, as well as providing overall technical oversight for the planning, implementation and supervision of the delivery of urban and rural water and sanitation services across the country.

The Directorate of Environmental Affairs (DEA) is the lead agency for environmental issues. It consists of departments for Wetlands Management, Forest Sector Support, Environment Support Services, Meteorology and the Climate Change Unit.

Other relevant institutions in the context of catchment management planning are (for details see Annex C – Stakeholder Characterisation Matrix and the Stakeholder Assessment report):

- Technical Support Units (TSUs), Umbrella Organisations (UOs), National Environment Management Authority (NEMA), National Forest Authority (NFA), Ugandan Wildlife Authority (UWA), all under MWE
- The National Water and Sewerage Corporation (NWSC)
- Ministry of Agriculture Animal Industry and Fisheries (MAAIF), Ministry of Tourism, Trade and Industry (MTTI), Ministry of Energy and Mineral Development (MEMD), Ministry of Local Government (MLG), Ministry of Works and Transport (MWT)



- District Natural Resources Department (sometimes including 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. However, the structure varies from district to district according to the natural structures in the district.
- Local governments, District Water and Sanitation Coordination Committees (DWSCCs), Non-Governmental Organizations (NGOs), private sector, Uganda Water and Sanitation NGO Network (UWASNET), and communities (with their Water User Committees and Water and Sanitation Committees).

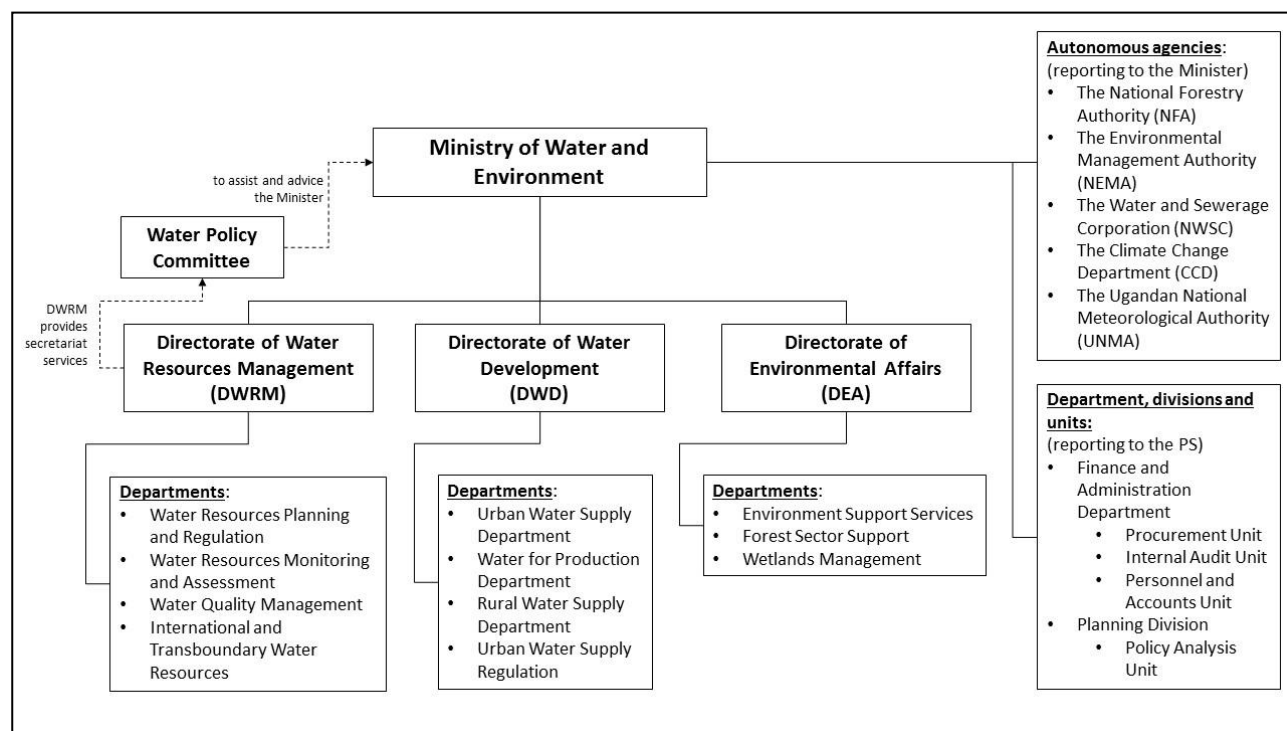


Figure 3: Structure of the Ministry of Water and Environment (adopted from [www.mwe.go.ug](http://www.mwe.go.ug))

### 3.3 Catchment management organizations

Deconcentration of water resources management included an important dialectic between top-down management and community involvement. The challenge has been to find common ground between the bottom up and top down approaches. To bridge these challenges WMZs install Catchment Management Organisations (CMOs) during the catchment management planning process.

Guidance on CMOs and CBWRM is derived from the Catchment Planning Guidelines 2014. The guidelines describe the structure including the different committees (and their roles) responsible for operationalizing CBWRM (Table 4, Figure 4). The Guidelines, however, do not (yet) provide for the mandate, legal status or the process through which the (different) committees should be established. This needs to be included during the revision of the Guidelines.

At present the establishment of the CMOs in Uganda is in an early stage. The exact structure of the CMO and its functioning are subject of discussion based on the first CMOs established. The latest structure is presented in Figure 4 and shows three CMO bodies:

- 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. The CSF provides input to and reviews the CMP for coordinated, integrated and sustainable development and management of water and related resources in the catchment, including their implementation status. The CSF reviews Catchment Management Plans developed and presented by the Catchment



Management Committee and endorses them. Lastly, the CSF reviews the levels of commitment to catchment management by all stakeholders and proposes corrective action.

- The **Catchment Management Committee (CMC)** is composed of representatives of all relevant stakeholder groups (government, politicians, community based organizations, 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, presentation of Catchment Management Plans to the Catchment Stakeholders Forum for endorsement. The CMC acts as an Executive Board for the Catchment Management Organisations (Box 1).
- The **Catchment Management Secretariat (CMS)** provides support to the Catchment Management Committee in coordinating 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.

There is fourth body, not included in the figure but described in Uganda Catchment Planning Guidelines 2014, which is the **Catchment Technical Committee (CTC)** which forms the technical arm of the CMO and supports the CMC in their tasks. The CTC brings technical expertise and knowledge during formulation of the catchment management plan, operationalizes and sometimes implements programs and projects from the plan, and generally ensures that the different districts collaborate to implement the plan. The CTC comprises of technical people from government, NGOs, private sector, development agencies and other relevant organizations in the catchment. Up to the end of 2016 no CTCs were established in Uganda even though several CMCs are already in place and there are no procedures yet for operationalizing CTCs in place.

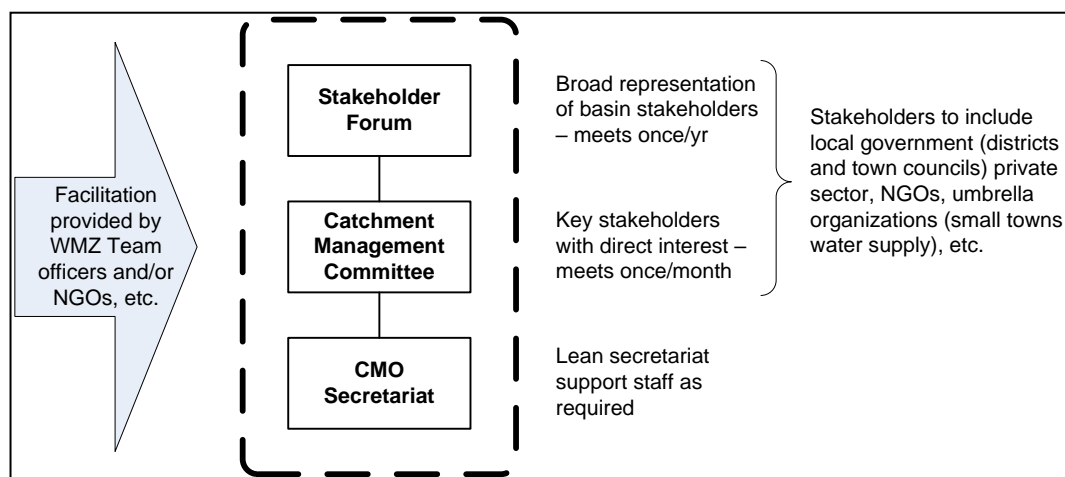


Figure 4: Catchment Management Organisation structure (DWRM 2016)

#### Box 1: Present procedure for selecting CMC members

MWE has developed and employed a procedure of electing CMC members. The number of representatives for a given category of CMC members are based on the number of districts in a catchment as well as the type of stakeholder groups available.

1. All Local Council 5 (LC5) Chairpersons sit and select amongst themselves a chair and a given number of other members that will be part of the CMC
2. The election at CAO level follows the election of LC5s hereby ensuring that a district which is not represented at LC5 level is represented at CAO level.
3. Technical representation is broad enough to ensure that different technical expertise is included. All technical staff from the districts in the catchment sit together and select among themselves a given number of members to represent all offices.
4. Other organisations (Government agencies, NGOs, community based organizations, private sector, academic and research, cultural institutions, media, etc.) elect representatives in their respective group of organisation.

Based on all possible present stakeholders the Catchment Planning Guidelines (2014) envision roles as indicated in Table 4. More specific roles and partnerships are indicated in chapters 6 and 8.

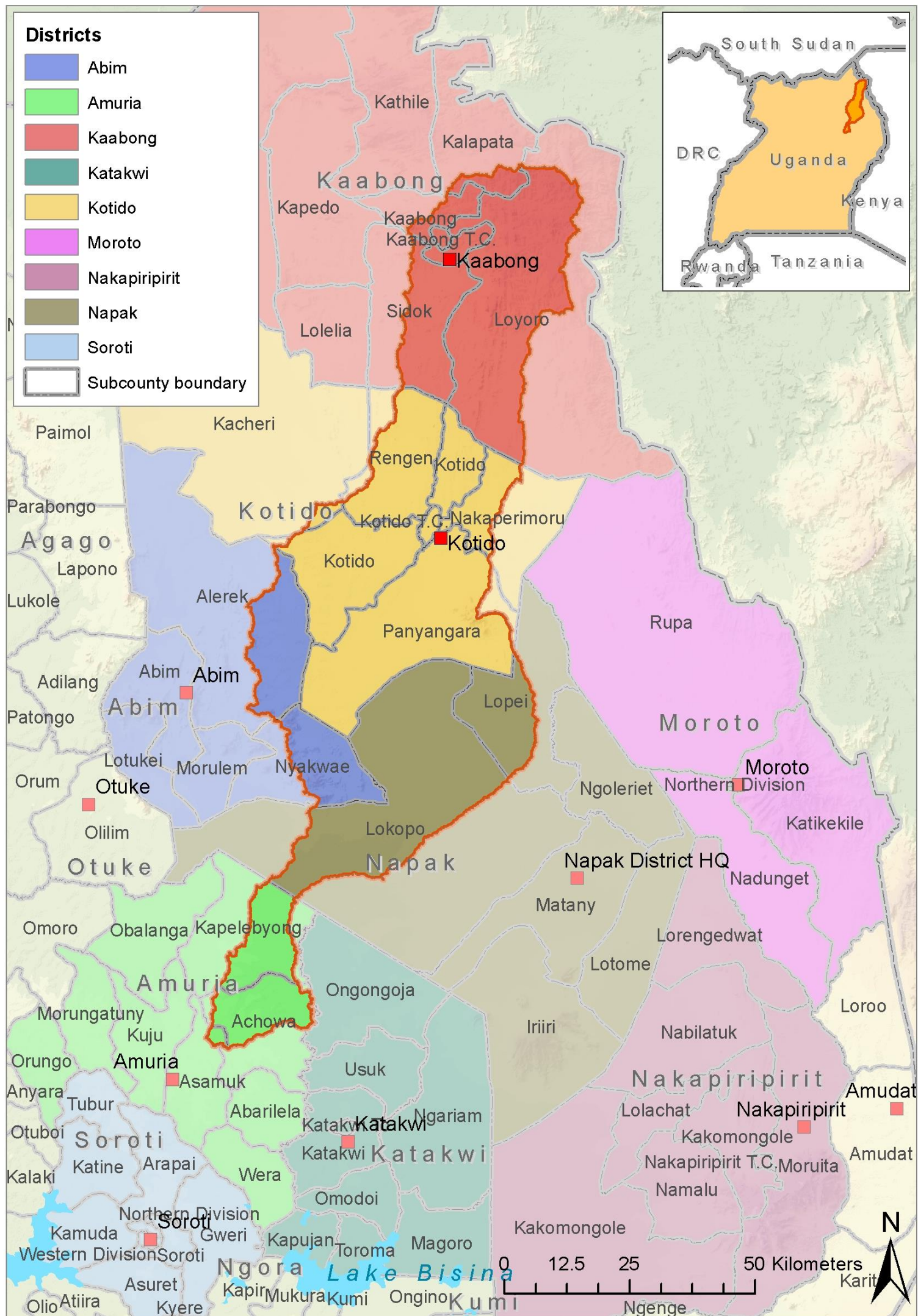


**TABLE 4: ROLES OF STAKEHOLDERS IN CATCHMENT PLAN IMPLEMENTATION**

<b>KWMZ</b>	<ul style="list-style-type: none"> <li>■ Coordinate all implementation activities</li> <li>■ Facilitate and support DWRM coordination of central level implementation and financial resource mobilization</li> <li>■ Facilitate implementation of catchment management plan projects by central departments</li> <li>■ Identify modalities for zonal and catchment level implantation among its public and private sector partners</li> <li>■ Mobilize funds (Medium Term Expenditure Framework, budget, donors, private sector) with the assistance of DWRM for implementation of zonal and catchment level projects</li> <li>■ Coordinate, manage and undertake project preparation for zonal and catchment level plan projects</li> <li>■ Assess water use permit applications under existing regulations</li> <li>■ Facilitate implementation and installation of upgraded and expanded monitoring network and WIS, and operate system within the zone</li> <li>■ Monitor hydrologic and meteorological conditions, compliance with regulations, implementation of catchment plans and source protection plans</li> <li>■ Support and facilitate the increasing role the CMC and other stakeholder groups including keeping all stakeholders informed of implementation progress</li> <li>■ Undertake secretarial functions for the CMC.</li> </ul>
<b>CMC</b>	<ul style="list-style-type: none"> <li>■ Facilitate and promote implementation of catchment management plans</li> <li>■ Coordinate implementations from the CMP</li> <li>■ Include interventions from the CMP into the respective District Development Plans</li> <li>■ Monitor CMP implementation</li> <li>■ Review the CMP regularly</li> <li>■ Mobilise resources for the implementation of the CMP interventions</li> <li>■ Carry out meetings with the CSF</li> </ul>
<b>MWE - DWRM</b>	<ul style="list-style-type: none"> <li>■ Organize and coordinate the technical review of planned project proposals and assign implementation to the appropriate department</li> <li>■ Mobilize funds for the implementation of the CMP and WMZ support</li> <li>■ Review policy, identify needs for legal and regulatory revisions based on plan recommendations and manage the process for updating and revision</li> </ul>
<b>MWE - NEMA</b>	<ul style="list-style-type: none"> <li>■ Review the environmental regulatory needs (actions, new or revised regulations) based on the adopted final CMP</li> <li>■ Issue required regulations, notices, and permits in accordance with legal and regulation requirements</li> </ul>
<b>MWE – Line departments</b>	<ul style="list-style-type: none"> <li>■ Undertake preparation of projects and investments within their area of responsibility that are proposed in the adopted final CMP (feasibility studies)</li> <li>■ Supervise and manage project implementation (designs, tender documents, procurement, construction)</li> <li>■ Operate the completed project in accordance with the permit and operating rules agreed with KWMZ</li> </ul>
<b>Line departments in the concerned sector Ministries</b>	<ul style="list-style-type: none"> <li>■ Undertake preparation of projects and investments within their area of responsibility that are proposed in the adopted CMP (feasibility studies)</li> <li>■ Supervise and manage project implementation (designs, tender documents, procurement, construction)</li> <li>■ Operate the completed project in accordance with the permit and operating rules agreed with KWMZ</li> </ul>
<b>District government</b>	<ul style="list-style-type: none"> <li>■ Facilitate and support implementation of the adopted CMP</li> <li>■ Incorporate priority projects and programs into the District development plans as appropriate</li> </ul>
<b>Donor partners and NGOs</b>	<ul style="list-style-type: none"> <li>■ Implement priority projects and programs in collaboration with KWMZ and other stakeholders in accordance with agreements and Memoranda of Understanding (MOUs)</li> </ul>
<b>Private sector</b>	<ul style="list-style-type: none"> <li>■ Facilitate and support implementation of the adopted CMP</li> </ul>

Source: Uganda Catchment Management Planning Guidelines (MWE/DWRM 2014)







## 4. STATUS OF THE CATCHMENT

Previous page:

Figure 5: Districts and Sub-Counties of Lokok Catchment

### 4.1 Location and biophysical context

Lokok Catchment covers a total area of 5,521 km<sup>2</sup> located in the districts of Kaabong (25.6% of the catchment), Kotido (34.9%), Abim (9.4%), Napak (22.8%) in Karamoja Region and Amuria (7.3%) in Teso Region (Figure 3).

River Lokok (*Okok* in Teso), its tributaries and the downstream wetlands define Lokok Catchment (Figure 8). The river system is set on a large inland plateau, 400 m above ASL, underlain by Precambrian crystalline basement rocks which contain little to no water. With a height of over 2,000 m the hills of Timu Forest in the northern part of Lokok Catchment, Toror Hills, an inselberg 20 km southeast of Kotido Town, and the Nyakwai Hills in Abim District are the most noticeable topographic features.

#### *Upper, Middle and Lower Lokok*

To facilitate geo-referencing during the planning process the catchment was subdivided into Upper, Middle and Lower Lokok (**Error! Reference source not found.**). Upper Lokok is defined by the northern Kotido and Kaabong landscape characterized by an undulating landscape dotted with inselbergs. From there, Middle Lokok with alternating grasslands, woodlands and wetlands extends until the Amuria agricultural zone. Lower Lokok is the small uttermost southern appendage where River Lokok meanders through the Kapelebyong wetlands and merges River Lokere in Amuria District.

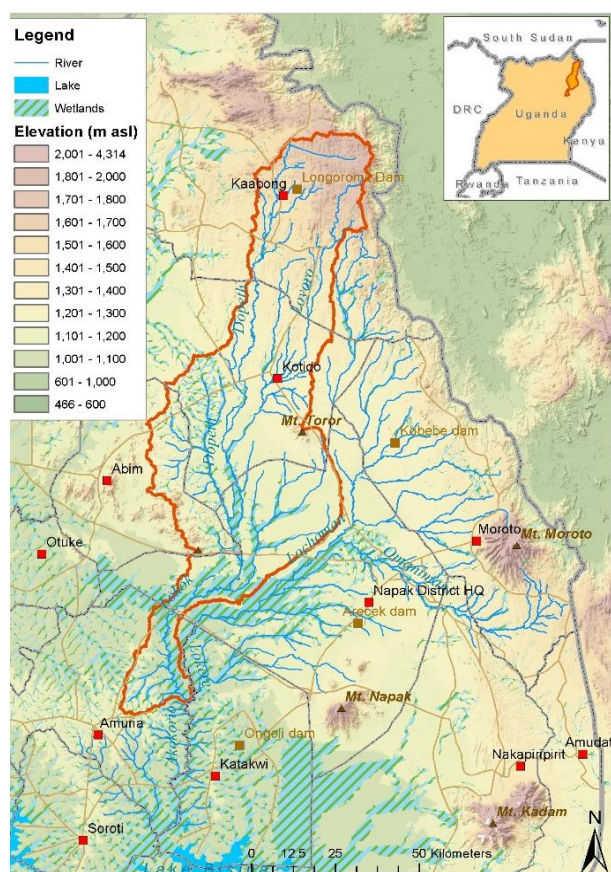


Figure 7: Topographic map of Lokok Catchment



Figure 6: Upper, Middle and Lower Lokok Catchment



#### 4.1.1 Schematization

To have a good initial understanding of the in- and outflows and the main features of the catchment a simple schematization was made. The main streams spring in the North and flow southward, along which several tributaries join these rivers. Downstream of Kotido extensive wetlands dominate the system. Water for production facilities, such as valley tanks and valley dams, large piped water supply systems and concentrations of deep boreholes can be found around Kaabong and Kotido towns. The largest dam in Lokok Catchment is Longoromit with a storage capacity of 1.4 Mm<sup>3</sup>. There are no flow gauges in Lokok Catchment. There are no flow gauges in Lokok Catchment.

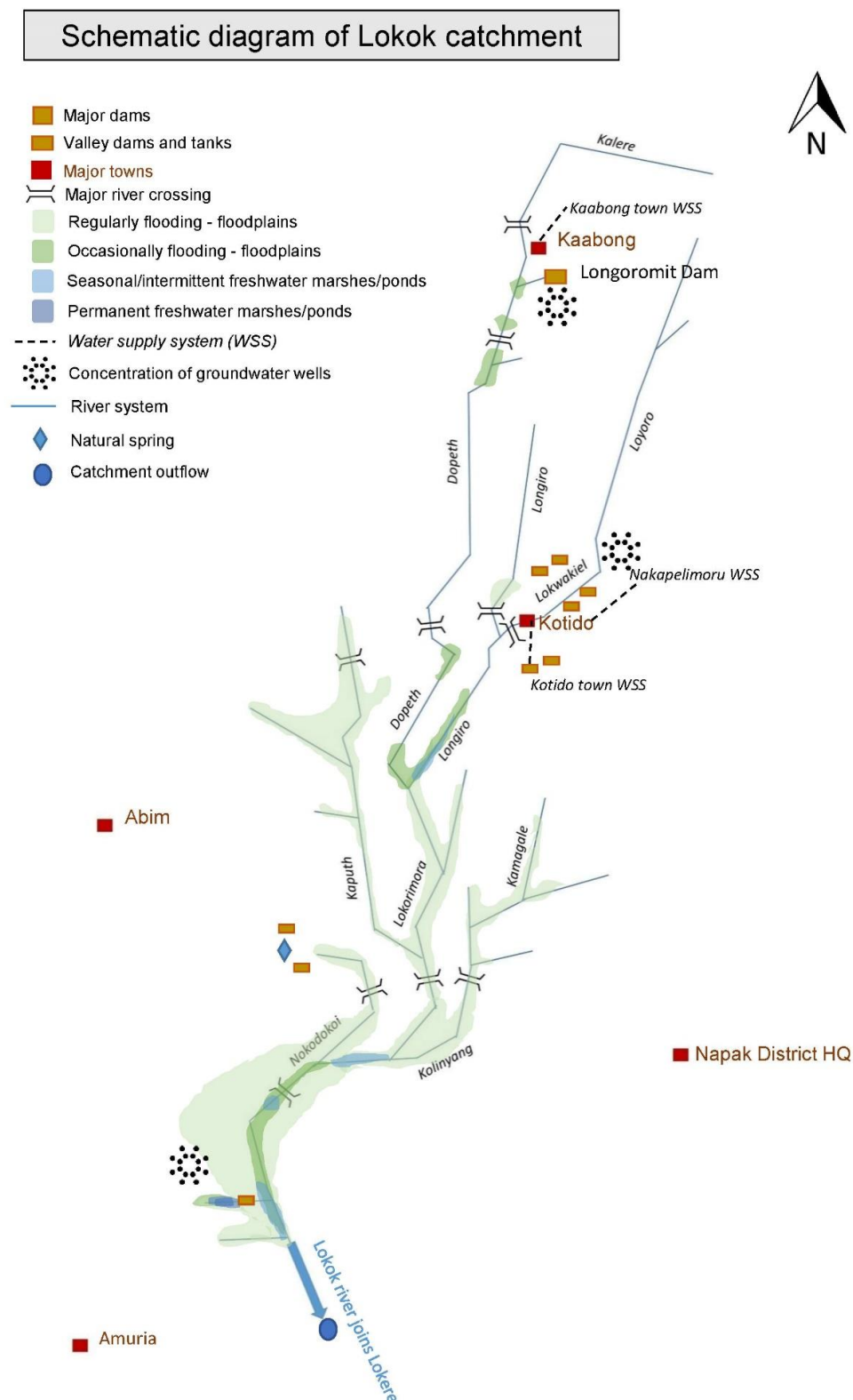


Figure 8  
Schematization  
of Lokok  
Catchment  
indicating its  
main features



#### 4.1.2 Geology and soils

Geologically Lokok Catchment is underlain by Precambrian crystalline basement rocks of the Gneissic Granulitic Complex, which have been modified by high-grade metamorphism, deposition of sediments, volcanic activity and rift faulting (MWE 2013a) (see Figure 9). Gneissic Granulitic Complex rocks include granitoids, highly granitized rocks and gneissic formation, which are metamorphic rocks, and facies rocks of acid gneisses, amphibolites, quartzites and marbles. The basement formations are predominantly consolidated with dispersed localized fracturing, which contain little to no water. Highly metamorphized rocks occur along the Amuria Fault Zone and the Aswa Shear Zone forming subsurface barriers which block groundwater flow. Groundwater is concentrated in fractured rock and in the topping regolith – a layer of loose material covering solid rock originating from weathering and plant growth in situ.

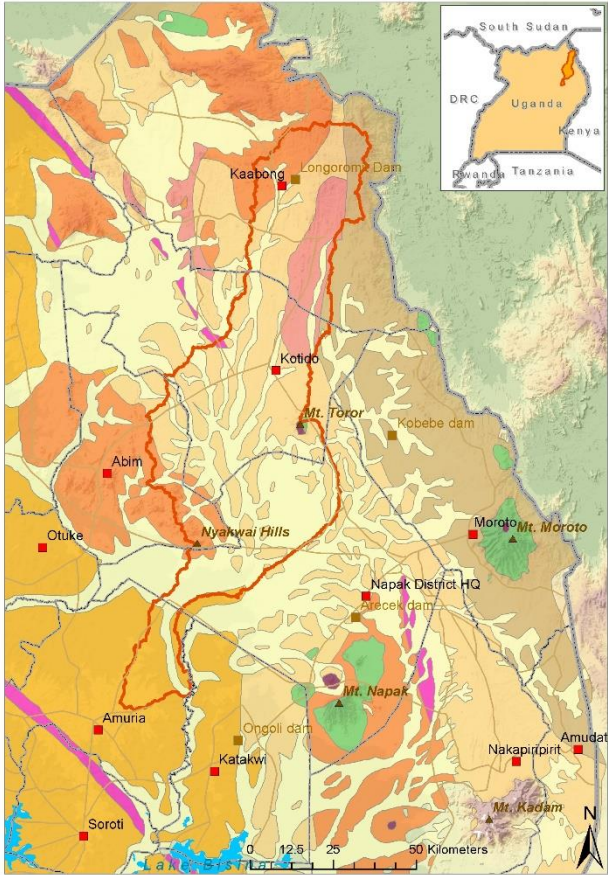
Toror Hills is a tertiary inactive and dormant volcano. These outcrops are chiefly characterized by soda-rich agglomerates, lavas and tuffs, while locally eroded remnants of former volcanoes, such as carbonatite rings and syenite complexes, are present. Some of these sediments are of volcanic origin, while others are associated with earlier depositional episodes (MWE 2013a). Groundwater close to these volcanic rocks is known to be high in fluoride.

The riverbeds and floodplains form a fingered pattern which mainly consists of alluvium, black soils and moraines with inselbergs scattered throughout. Throughout geological time, cycles of soil erosion have acted upon the land surface. The more resistant granites and quartzites are less sensitive to weathering and thus form the outcrops, while the less consolidated materials around them have been eroded. These alluvial sediments and floodplains are locally rich in shallow groundwater and provide fertile grounds for crop production.

The soils in the far northern highlands and in the Nyakwai Hills are mostly sandy gravels and red sandy loams (leptosols), all with a notable very low fertility (Figure 11). These soils support little vegetation and are most suitable for extensive (migrant) pastoral activities. At the foothills of these mountains, on the contrary, highly fertile luvisols can be found. In the plains around Kaabong and Kotido towns cambisols – further away from the streams - and vertisols – closer to the streams – alternate. Cambisols are typically well-drained sandy loams, loams and sandy soils, which are among the better soils for crop production (UN FAO, 2009). Vertisols, also known as black cotton soils, are black and grey strongly swelling and shrinking clay soils with wide and deep cracks when dry. Vertisols are very prone to soil erosion (Jones et al. 2013). In the middle and lower parts of the catchment locally planosols and plinthosols cause waterlogging.



Figure 9: Geological map of Lokok Catchment with a brief description of the different formations (Source: Uganda National Geological Map,



Precambrian (Gneissic Granulitic Complex)	Undifferentiated gneisses	Most common metamorphic rock in north-eastern Uganda
	Acid gneisses	Metamorphic rock with a higher proportion of quartz minerals
	Banded gneisses	Metamorphic rock with crystalline laminar inclusions
	Granitoids	Crystalline rock with granite appearance
	Granulite facies	Crystalline rock with large grain inclusions
Tertiary	Volcanic rocks and sediments	Fine grained crystalline rocks and eroded sediments
	Carbonatite and Syenite	Marble-like limestone and crystalline rocks associated with volcanism
Pleistocene - recent	Alluvium, black soils and moraines	Unconsolidated sediments and soils
Other	Cataclasites	Crystalline rock present in large-scale ancient faults



Figure 10: Extrusion of banded gneisses in Napak District (left) and in Kotido District (Photo Credits: Wildt 2016 and WEConsult 2016)







### 4.1.3 Climate

The total average annual rainfall in the Lokok Catchment varies between 550 mm/year in Upper Lokok and 1,200 mm/year in Lower Lokok (Figure 12 ARC2 FEWS dataset). The precipitation pattern is classified as bimodal, but is highly variable in space and time, with high peak events and long dry periods. On average, the short, but intense rainy season runs from April to July with typically a dry spell at the beginning of June which lasts on average two weeks. The long rainy season runs from September till December/January, but is less intense than the short rainy season. In general, precipitation is concentrated in a few rainy days during the rainy season. Stormy events of over 30 mm in a few hours in Upper Lokok and over 50 mm in a few hours in Lower Lokok are common. Annual rainfall in the direct surroundings of the Nyakwai Hills is 50 to 150 mm higher than in their immediate surroundings due to rain shadows and orographic influences.

In Upper Lokok rainfall is so erratic that the long rainy season between September and January is often inexistent (in fact one should then speak about a unimodal rainfall pattern) (Figure 13). Stakeholders indicate that communities in Upper Lokok do not count on these second rains. If rains come, they are considered as an extra. After the rainy seasons, the hot dry season with strong desert winds takes over. The dry season lasts between 2 to 9 months, depending on the year and the location in the catchment (Figure 14). The long dry season lasts longer the further one moves north in the catchment. During the dry season the Karamojong migrate many kilometres in search of water and pasture for their animals. The uncertainty of rainfall and the difficulty to determine the start of the rainy season at that very moment (is it an incidental shower or the real start) in combination with the inexistence of (supplementary) irrigation schemes limits the possibilities for growing crops that are not tolerant to water stress.

Actual evapotranspiration in Lokok Catchment varies between 300 mm/year around Kotido and Kaabong towns and about 1400 mm/year in Timu Forest, and is strongly related to land cover, presence of open water, rainfall, temperature and wind (based on MODIS database, refer to Annex A Assessment reports: Water Resources Assessment). Most climate change models indicate that temperatures, rainfall intensity and frequency of extreme events will increase in Lokok Catchment as a consequence of climate change.



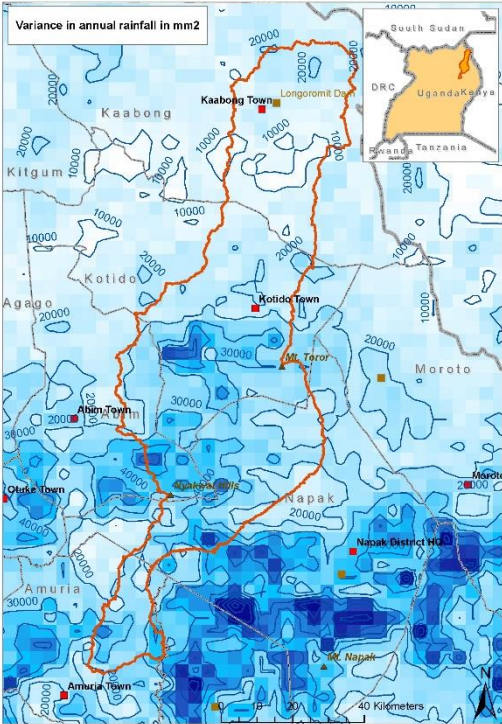
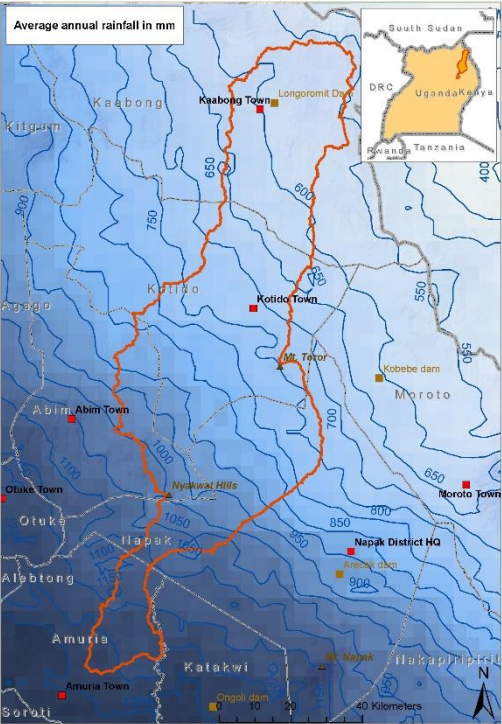


Figure 12: Average rainfall in mm (left) and an indication on the variability of rainfall (statistical variance in mm<sup>2</sup>) (right). (Data source: EARS Environmental Monitoring 2016)

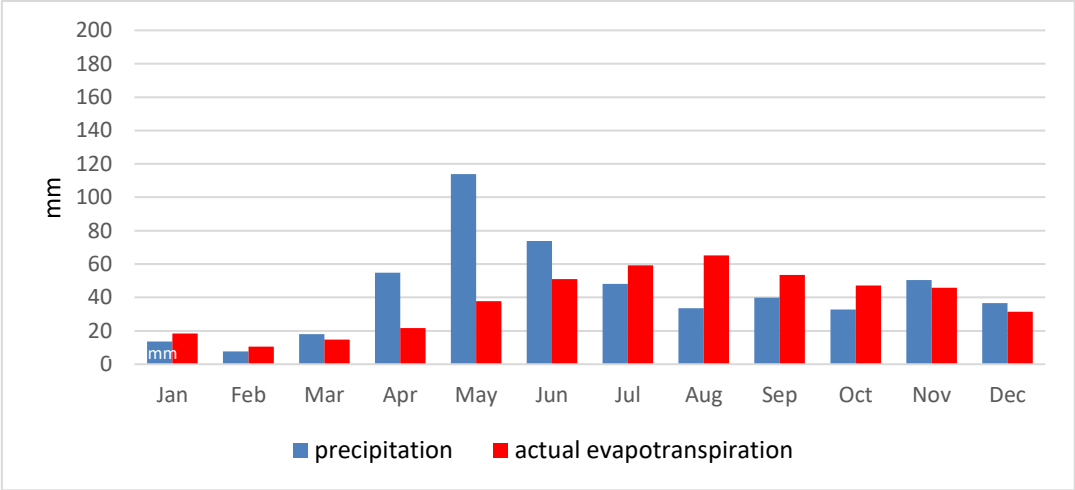


Figure 13: Average rainfall (ARC 2, 1983-2015) and actual evapotranspiration (MODIS, 2000-2014) in Upper Lokok Catchment (Kaabong Town)

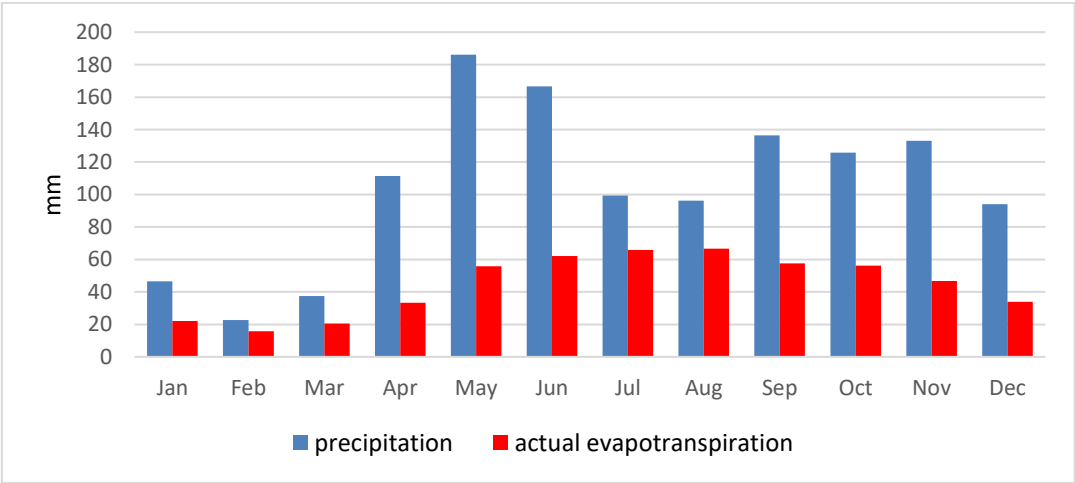


Figure 14: Average rainfall (ARC 2, 1983-2015) and actual evapotranspiration (MODIS, 2000-2014) in Lower Lokok Catchment (Adepari Village)



## 4.2 Stakeholders

Stakeholder participation is an essential part of Catchment Based Water Resources Management and the planning guidelines prescribe the development of a stakeholder participation framework. At the time of the inception and assessment phase the CMO for Lokok Catchment was not yet existing and it was the objective of the project to facilitate the process of the establishment of the Catchment Stakeholder Forum and the Catchment Management Committee. A first step in mobilising the CMO is understanding on who should be part of the different CMO bodies by analysing a) the relevant government policies, programs and processes; b) which stakeholders are involved in natural resources management; and c) the key issues for the stakeholders regarding catchment management. From this stakeholder assessment, we report here on the inventory of stakeholders, the power dynamics and the key issues identified.

### 4.2.1 Inventory of stakeholders

For the stakeholder assessment, stakeholders were grouped according to their organisational types. All have a different interest in Catchment Management, different influencing power, different capacities and different challenges to cope with. The full mapping of stakeholders with all these different characteristics is included in Annex C and provides a snap shot of the current stakeholder spectrum.

<ul style="list-style-type: none"> <li>■ Water users (primary stakeholders): farmers, miners, fishing folk, firewood collectors / charcoal burners, bee keepers, livestock herders, households</li> <li>■ National level government departments</li> <li>■ Government directorates</li> <li>■ Statutory organs</li> <li>■ Zonal institutions</li> </ul>	<ul style="list-style-type: none"> <li>■ Local government departments (district offices)</li> <li>■ Political leaders</li> <li>■ Community Based Organisations</li> <li>■ National NGOs</li> <li>■ International NGOs</li> <li>■ International development (funding) partners</li> </ul>	<ul style="list-style-type: none"> <li>■ Cultural leaders</li> <li>■ Religious leaders</li> <li>■ Private sector</li> <li>■ Media</li> <li>■ Academia</li> <li>■ Research institutions and learning centres</li> </ul>
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Chapter 3 already described the direct and indirect involved stakeholders of water resources management at government level including the ministries, directorates, departments, autonomous agencies, statutory bodies and zonal institutions. The Ministry of Water and Environment with its Directorate of Water Resources Management is the owner of the CBWRM process in general and the Kyoga Water Management Zone is the delegated owner of the process for Lokok Catchment. This section focuses on the stakeholders in Lokok.

The water users are the households, farmers, miners, fishing folk, firewood collectors, livestock herders, bee keepers, etc. As those ultimately directly or indirectly affected by the actions, the water users are the primary stakeholders for CBWRM. As such they have the highest interest in the subject, nevertheless their influence in catchment management is rather low. Their focus will be rather local. They have a good knowledge of the area. Involving the water users in the Catchment Management Planning process will promote the uptake of their prioritised issues and options and contributes to acceptance of the CMP in the community. When their voices are not heard or they don't have the chance to participate in the planning process, the sustainability of the project outcomes are at risk as changes will not easily be adopted. At the same time, the water users appear to have little technical knowledge of CBWRM and are unaware or ignorant about the environmental laws and policies and their contribution to environmental and water conservation. Livelihood-insecure communities usually fear that any activity relating to environmental conservation leads to their eviction. The livelihood and income stress is leading to environment stressing activities like charcoal burning. In Upper Lokok, there is a gradual shift from cattle rearing to crop production. In water stressed areas, crop production takes place around rivers in search for fertile and moist land. This has resulted in massive tree cutting to pave way for agricultural land and charcoal burning as an alternative option.

The district technical offices as mandated by law to implement of government plans and policies and as representatives of the primary stakeholders have high interest in and high influence on the Catchment Management Planning process. Their priorities are set in District Development Plans. They work along elaborate structures and have sustained financial support. The districts technical offices have the knowledge and skills as well as the information base. They are decision makers within their operational area. It is within their task to build capacity of others and to undertake monitoring and evaluation activities. They operation with the political support of the District Councils. Nevertheless, the district technical offices are also challenges by limited funding and inadequate staffing in the environment and natural resources management departments, which restricts the capacity of the district to promote sustainable land management and bio-diversity



conservation initiatives. Limited resources, inadequate staff and political interference in policy implementation and law enforcement results in poor policy and law enforcement by the districts. There is limited coordination and synergy building between the different government departments. Environment committees at sub-county and parish level are weak. More redundancy is noticed at parish level while these are nearer to communities. Also due to limited funding and inadequate staff, the environment policies are limited popularized at community level.

The political leaders include the LC5s, LC3s, LC1s and the RDCs. As the political leaders, their influence high, though their interest in CBWRM appeared to be limited. They have the mandate to approve (or disapprove) the implementation of projects by (i)NGOs in the district as well as to ensure that all projects and organizations comply with District Development Plans through signing of MOUs. They approve development plans and budgets. The LCs monitor service delivery by the district technical staff. They can mobilize the primary stakeholders and they can influence the success or failure of a project in the district. At the same time, they have limited technical capacity in most of the development themes. Political leaders usually participate in any project and expect benefits or financial returns, which are usually high. When their expectations are not met, they have the tendency to turn against the project.

Several Community Based Organisations (CBOs) are active in Lokok Catchment, collaborating on and representing shared interests in water infrastructure, environmental conservation, agriculture, livestock, fishery, mining, financial services, or livelihoods in general. Lokok also host several NGOs working on livelihoods, WASH, energy, disaster risk reduction, climate change adaptation, environmental conservation, rangeland management and peace building. As representatives of water users their interest in catchment management should be high, nevertheless their understanding of IWRM, including Catchment Based Planning and implementation, national environmental policies and laws, is rather low. Also their influencing power is low compared to the decision makers. The local organisations have good knowledge of the context and have a wide coverage. The organisations focus on community development and have a lot of respect in the communities. The organisations have a wide social network. In their set-up, they have low operational costs. Since they have a long term or permanent existence, they can play a big role in the sustainability of a project. On the other hand, integration of natural resources management / environment into their activities is not their priority. Most CBOs and NGOs have short funding periods not capable of yielding impact to communities coupled with limited resource mobilization skills. Their accountability of resources used, is poor. Their geographical scope in implementation of projects is limited to their direct surroundings. They might suffer from the so-called founder syndrome.

Another group which is close to the water users are the cultural leaders (community elders). The elders are highly respected and regarded credible. As promoters of culture, they can support or lead cultural and attitudinal change. Cultural institutions play an active role in conflict resolution on land and border conflicts. They have wide structures for information dissemination and mobilization. Their success in work is based on strong community cultural beliefs and values. They can determine the success or failure of a project especially in Karamoja. On the other hand, the cultural institutions are not supported by policies and legal frameworks and their roles are not consistent with formal laws and policies. Some of their activities conflict with policies and government development frameworks. For example, in Karamoja the traditional leaders believe that drought and destruction of the ecosystem is caused by the disappearance of God during violent conflict times and that to restore the environment they should make sacrifices in the shrines for God to come back. Furthermore, they have limited knowledge on CBWRM and they have limited skills in project planning and management. Traditional practices are poorly documented. Their activities are limited in scope and limited to building cultural unity, conflict resolution and protection of cultural beliefs and values. They don't extend to a wider scope of community development.

Religious institutions can be found in Lokok from Catholic, Protestant and Islamic background. They reach out to a large number of people, as they have many followers. The different churches have wide and organized structures, which can be used for sensitization and information dissemination. They are trusted, forge unity and can be used for attitudinal change. They have community focused programmes. However, their programs are rather exclusive and they do not involve other stakeholders in their programming. They have limited programmatic and community development skills. They have limited knowledge of the national environmental laws and policies, as well as CBWRM. They work in isolation from the government structures. Internal conflicts exist within their religious denominations.

A few research institutions are present in Lokok catchment, including NARO Nabuin-Zardi and NASSARI. Both provide agricultural advisory services to farmers, NGOs, CBOs and district production departments, they provide farmers with new technologies and information (facts and case studies) from research and they provide farmers with drought resistant seeds for drought mitigation. The research institutions also play an important role in the access to information and technologies



regarding climate change adaptation. Furthermore, Makerere University has several relevant departments to support knowledge management and innovation on CBWRM. In general, the influence of these research institutions on CBWRM in the catchment is low and their interest is mainly driven from research perspective. Academics are less involved in practical community development programmes and have a limited presence in the catchment.

Several media companies are active in the catchment, however they don't have a high interest in CBWRM and natural resources management and they are driven by profit maximisation. On the other hand, their influence is big and they can play a big role in reaching out to communities and information dissemination through news programs, publications and radio.

Besides the CBOs which have already been described as civil society partner above, private sector mainly consists of companies active in mining. Their influence on decision making is high because of the economic benefits they bring and because of their high-level connections. Their interest in CBWRM is limited for the same reason of profit making. They have a limited focus on community development work, or even exploit activities against the interest of the communities. They also show little interest in environmental conservation.

Under the development partners one can find the multilateral agencies, institutional donors and international NGOs. Their interest in CBWRM depend on their strategic programmatic objectives and their influence depend on their relationship with district offices or higher government. In general, the development partners provide funding for development and implementation of plans. Quite some development partners work on WASH, IWRM and livelihood programmes. Some provide access to water sources and public works investments like the water and community roads infrastructure. Capacity building is part of their programmes. They have the capacity to carry out vulnerability, capacity and needs analysis as a basis for project development. They have extensive local and international networks, promote research and data collection, documentation and knowledge sharing. Furthermore, a watch dogs from civil society they promote transparency and support civil society to fight corruption. Challenges within this stakeholder group include the concentration on specific sectors and geographical areas, duplication of activities, overlap of implementation areas and even competition relating to programme and project impact and visibility in communities. Most want to protect their interests in line with the donor regulations. There is more emphasis on social needs at the expense of natural resources management, dictated by the funding priorities of the donors. There is limited sector coordination and independent planning not in line with District Plans. Their approaches might be conflicting to development (emergency approach versus service delivery, cash for work and participatory development approaches), which is confusing communities. The working relationship with the local government departments is not always good, arising from failure to share plans and declare budgets with the DLGs. At last, project periods of international organisations are often short, project indirect costs are high because of international organisational structures.

#### 4.2.2 Power dynamics

Analysis of the interests and influencing power of the different stakeholder groups is visualised in Figure 15 **Error! Reference source not found.** The position in the chart and the extent of their circle (of influence) show their position regarding CBWRM, and thus whether they form strong allies or potential blockers.

The stakeholders positioned in the top right corner with high influence and high interest could be strong allies for CBWRM in Lokok Catchment. The stakeholders with a larger circle would potentially form stronger partners than the others, because of their roles and responsibilities within the catchment and in Uganda.

The stakeholders with high influence and little interest have the potential to be blockers of the catchment management process and its therefore important to keep them well-informed and lobby towards their support for improved water resources management in collaboration with other stakeholders. Here it shows that these stakeholders are all very influential and a strategy for their engagement carefully needs to be rolled out.

The stakeholders with high interest but little influence could become stronger participants in CBWRM through the CMP. However, their capacity in this (e.g. negotiation skills) should be strengthened to become strong discussion partners and collaborators. It is mostly this group of stakeholders (water users) that are highly affected by a lack of proper CBWRM and probably have thought through themselves some strategies to overcome issues they are faced with. It is important that these (representatives of) primary beneficiaries participate in catchment management processes.



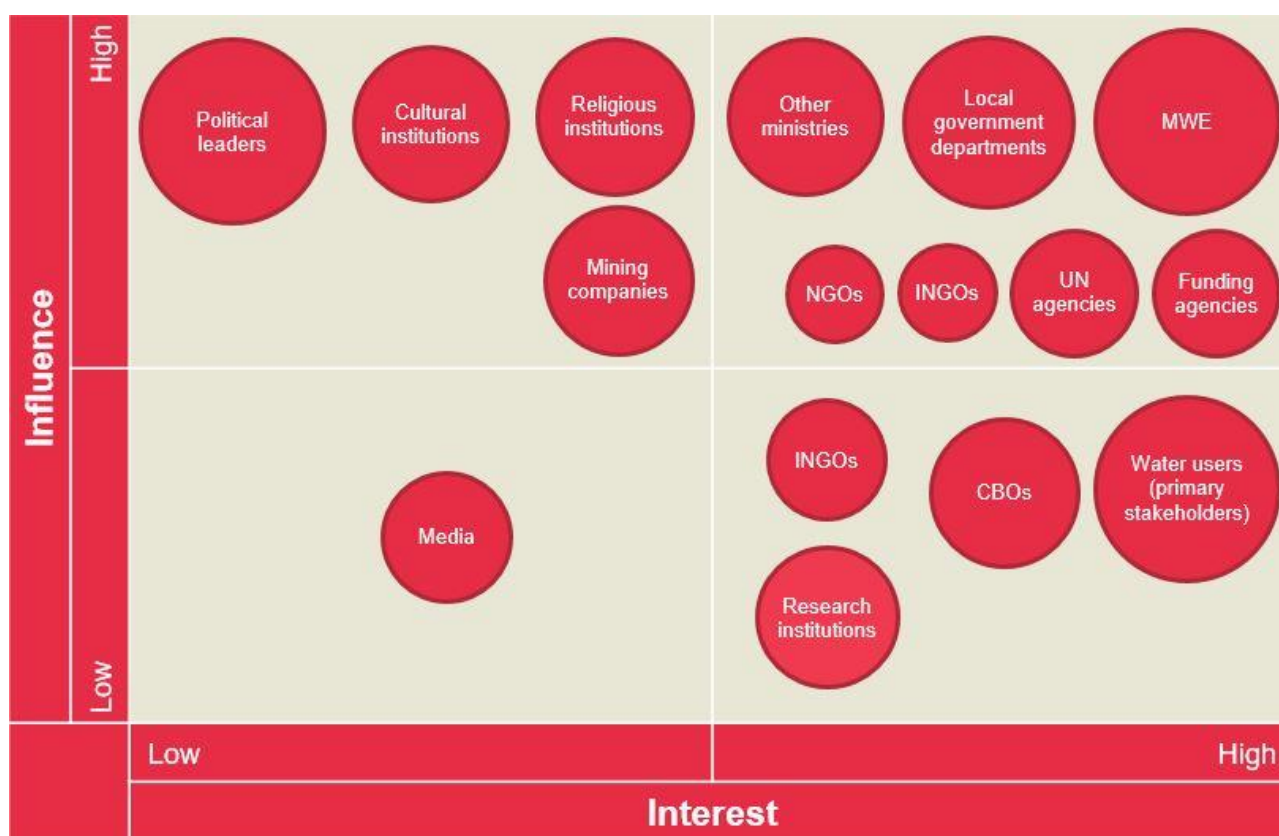


Figure 15: Stakeholder influence / interest map

#### 4.2.3 Issues on stakeholders

From the stakeholder mapping, it can be concluded that IWRM and catchment based natural resources management in Uganda are still in an early stage. The development and implementation of interventions in terms of water for domestic use, sanitation, water for production and natural resources management, for example, are handled by different government institutions.

The district structures have well laid out development plans including natural resources management, but they have capacity gaps in different sectors, as the stakeholder assessment points out. These include but are not limited to:

- Limited funding to implement sector plans.
- Inadequate staffing in the environment and natural resources management departments, and lack of skilled staff.
- Weak implementation of By-laws, coupled with poor policy and law enforcement by the districts. This is exacerbated by political interference in policy implementation and law enforcement.
- Lack of harmony of structures in all districts e.g. environment committees that are important in implementation and management of interventions are in place in most of the districts in Lokok, but not functional. The district environment planning structures are weak especially at parish level. The parish environmental committees are supposed to sensitize and monitor activities related to environmental protection and conservation, but demand for allowances for their work.
- Inadequate sector coordination to enhance proper participatory and inclusive planning, implementation, monitoring and supervision by partners and government agencies.
- Policies have not been popularized among the different local users and stakeholders in Lokok Catchment. Most of the community members in Lokok confessed ignorance of any policies or laws guiding the use of natural resources in wetlands and on environmental conservation.
- The enforcement of laws especially against wetland encroachment and deforestation have conflicted with the livelihood activities of most of the communities. For example, during most of the FGDs with the communities in the Karamoja Region, they reported that they cut trees for charcoal burning and selling as fuel wood, because of the limited sources of livelihoods. In Karamoja, most of the crop production activities especially in the pastoral zones take place along the river.



- Responsibility (and accountability) for operating and maintaining facilities are not clear. Typical established institutions like a Water Users Committee for a reservoir or dam are not functional. Structures are complex, they lack capacity, sense of ownership, funding and personnel.
- Water users have limited influence on decision making in water resources management and the development of water infrastructure.
- Gender remains a contentious issue. Representation in line with use is not always in place.

The coordination of plans and activities of governmental, non-governmental and knowledge organizations, such as Nabuin ZARDI and University of Busetema, is poor. The interlinkages between stakeholder engagement, knowledge development, implementation, monitoring and evaluation are not sufficiently integrated in water management. Institutionalization of these concepts and frameworks at all levels is needed to make it effective. Curricula at different levels and of different faculties or courses, from secondary education up to university level, currently lack the required attention for the problem-focused and needs-driven holistic approach, integrating different water uses (domestic, industry, agriculture, livestock, environment), analytical perspectives (technical, socio-economic, institutional, planning), actors (government, managers, CBOs, users) and geographical areas (up-stream, downstream). Building the recognition and in-depth understanding that many water use and management issues are interrelated and thus cannot be solved in isolation, is not sufficiently addressed.

## 4.3 Water resources

### 4.3.1 Streams, rivers and wetlands

Lokok Catchment is well drained with a dense network of meandering seasonal rivers and streams (Figure 17). There are no permanent streams in Lokok Catchment. The main streams in the catchment spring in Timu Forest, of which rivers Kaabong (downstream known as Dopeth - Figure 16) and Loyoro are the most noticeable. These streams merge south of Kotido Town and flow further to join Kaputh River from the west and Kolinyang from the east. In the lower parts of the catchment the river is known as Lokok. River Lokok merges with River Lokere south of Kapelebyong. The catchment has been subdivided into three sub-catchments: Dopeth, Kolinyang and Lokok (see Figure 18). Sub-catchments allow for the further deconcentration of tasks and responsibilities related to water resources management in the future.

In Upper Lokok rivers are characterized by large variations in low and peak flow, by a large sediment load and by a quick response to rainfall events. Flows cease within one to two days after a rainfall event. These low residence times are indicative of the low base flow component in the system. Groundwater inflow to the rivers is minimal. Research from Gavigan (2013) points out that in these types of streams the runoff is typically “flashy”. The rivers in Middle and Upper Lokok are deeply incised and filled with sand and silt.

On the contrary, in Middle and Lower Lokok river discharge is strongly dominated by a base flow component. The extended wetlands and the thick pack of sedimentary material absorb part of the peak flows in the rainy season and release water slowly in the months that follow. The wetlands of Lokok Catchment have a storage capacity of over 241 Mm<sup>3</sup>, which is sufficient to store 45 mm of rainfall.





Figure 16: Dopeth River upstream (upper) and downstream (lower) of Kotido Town during the dry and wet season. Source: Vries and Ghawana, 2012







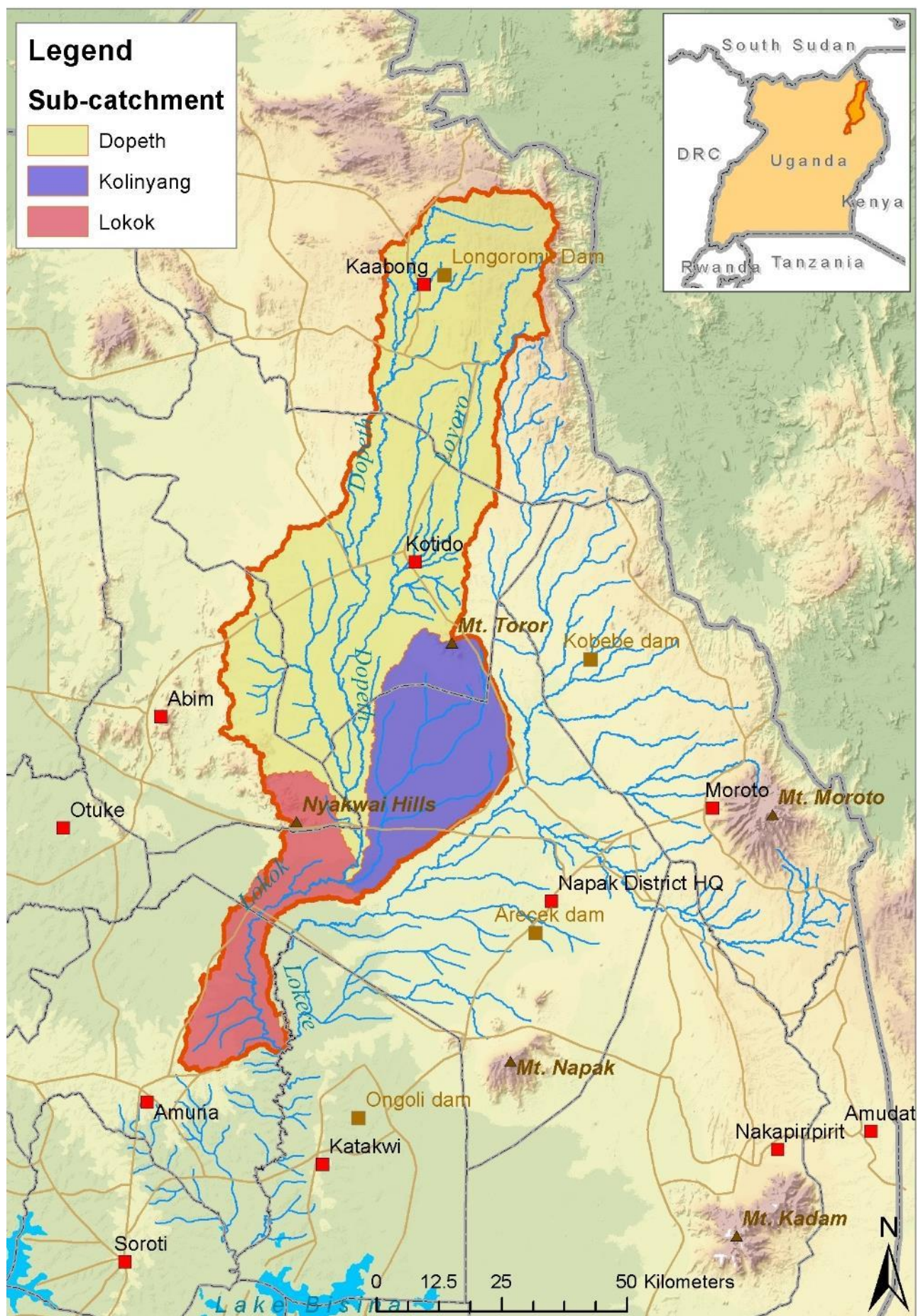


Figure 18: Sub-catchments of Lokok Catchment



### 4.3.2 Groundwater

Three major geologic environments are relevant to understand the occurrence of groundwater in Lokok Catchment:

- Precambrian basement, including banded and acid gneisses, cataclasites along faults, and highly granitized rocks, which have been modified by high-grade metamorphism and are heavily compacted.
- Rocks and outcrops of volcanic origin, including Toror Hills
- Sandy river beds, wetlands and floodplains

Unweathered basement rocks, do not hold groundwater. Only the weathered overburden, faults and fractures contain water. Groundwater pockets in basement rocks are highly compartmentalized. The presence and thickness of weathered material, the occurrence of preferential paths for groundwater flow and its specific hydrogeologic characterization are highly variable over short distances, making the potential to host groundwater highly localized. Drilling depths vary between 50 and 120 m and most boreholes yield between 1.0 and 1.6 m<sup>3</sup>/h. The transmissivity (T) of the weathered aquifer has been reported to be 2 to 58 m<sup>2</sup>/d, but mostly in the lower end of the range (Gavigan, et al. 2009).

Shallow groundwater is present in local overburden aquifers, such as river beds, wetlands and floodplains. Water is abstracted through scoop holes, dug wells and drilled (sometimes manual) wells depending on the depth of the water table. The quality and productivity of shallow groundwater sources is highly dependent on the hydrogeological characteristics of the aquifer. When an impermeable, or less permeable layer is present (thick layer of clay or loam, for example), shallow groundwater wells can be developed as a safe source of water supply. If such protecting layer is not present it is crucial to implement and enforce due measures to protect water quality (source, well and tap protection) and study the groundwater fluctuation characteristics prior to investments.

### 4.3.3 Water demand

Based on the District development plans safe water coverage in Lokok Catchment varies between 29% in Kaabong and 86% in Abim, averaging 54%. Water demand is highest around regional growth centres (Kaabong, Kotido) and will continue to grow in these areas. Based on population and water supply per parish, the domestic water gap was found to be highest in parishes around Kaabong and Kotido. To cover current demand an absolute minimum of in total 3.1 Mm<sup>3</sup>/year m<sup>3</sup>/d of extra potable water needs to be supplied (Figure 19).

Water demand for livestock is high throughout the catchment, but currently the pressure concentrates in areas with valley tanks and dams, i.e. around Kaabong and Kotido. Incoming livestock from Turkana and South Sudan aggravates the shortages. Indicative calculations for Lokok and Lokere catchments<sup>5</sup> indicate that currently there is a combined shortage of 4 Mm<sup>3</sup> of water for livestock in normal years (3-month dry season) and of 28 Mm<sup>3</sup> in extremely dry years (9-month dry season) (Figure 19). Projections indicate that livestock water demand will triplicate by 2040.

Currently -2016- water volumes required for irrigation are negligible. Previous assessments found approximately 6,000 ha suitable for irrigated crop production in Lokok Catchment (based on Volume 1 of the National Irrigation Master Plan for Uganda 2010 – 2035, PEM Consult 2011, see also the Annex A - Assessment reports: Water Resources Assessment). Irrigated citrus, mango and vegetables on the soils and with the climate of Lokok Catchment on average need 6,000m<sup>3</sup>/ha/year of irrigation water. Making full use of that potential would require 35 Mm<sup>3</sup> of water for irrigation.

Apart from the productive uses it is important to guarantee a so-called environmental flow. To safeguard the functioning of ecosystems in the catchment (e.g. support fish life and wetland vegetation, avoid stagnant waters that may increase the incidence of water related diseases), a minimum amount of water has to be kept flowing through the system. It is estimated that this flow should equal 66 Mm<sup>3</sup>/year for Lokere Catchment.

<sup>5</sup> Herders use Lokok and Lokere catchments as a combined resource when watering livestock. Hence the water demand for livestock calculations were combined.



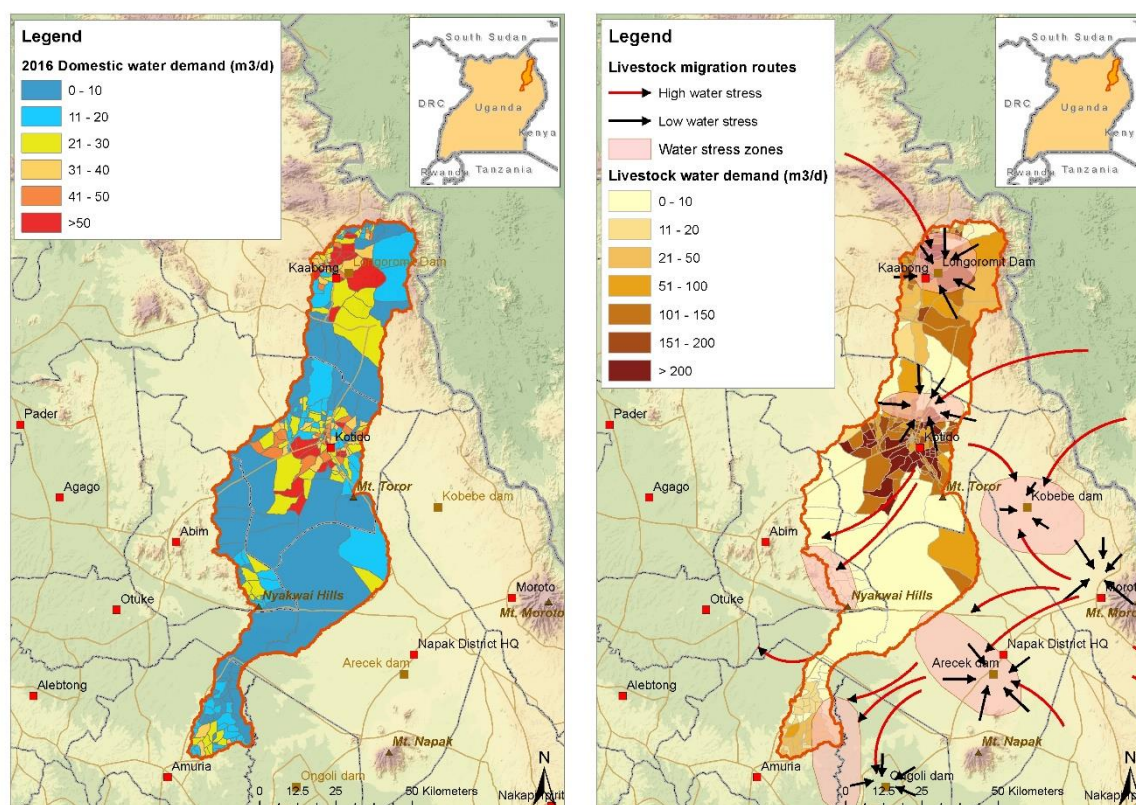


Figure 19: Current -2016- domestic (left) and livestock (right) water demand per parish in Lokok Catchment (maps developed during this project, please refer to Annex A: Assessment reports: Water Resources Assessment for all sources, assumptions and methodology).

#### 4.3.4 Water balance

A SWAT hydrological model was run for 30 years (1984-2013), simulating daily time steps, while writing monthly output data for Lokok (and Lokere) Catchment(s). The model output was calibrated with the flow gauge series for Akokorio flow gauging station. SWAT simulations capture the trends and overall hydrological processes, but the model overestimates “normal” flow and underestimates peak flows at Akokorio flow gauging station. Calibration proved challenging, also because it is unclear how reliable the available flow time series is. The results were also compared with the findings by WE Consult (2014) (Karamoja runoff 0-250mm/year), Taylor and Howard (1996) (40% runoff in similar catchments) and Gavigan et al. (2009) (5% total outflow). The experts involved in the modelling estimate that average annual rainfall estimates could deviate as much as +/-20% from reality, peak river outflow estimates up to +/-50, and the average annual river outflow estimates +/-30%.

Table 6 provides the average annual water balance for Lokok Catchment. On average, 84% of the incoming precipitation leaves the catchment in the form of evapotranspiration. Slightly more than 8% (333 Mm3) leaves the catchment in the form of surface outflow, joining Lokere River at Kapelebyong and running from there into the Lower Lokere wetlands. Almost 11% of the average annual precipitation is (temporarily) stored in shallow (10.4%) and deep (0.5%) groundwater aquifers. With 345 Mm3 of recharge shallow aquifers are at least as important in terms of storage as wetlands (Table 7). An average of 5.5 Mm3 per year (3.6+1.9Mm3) is currently abstracted from the catchment for domestic, livestock and agricultural use, which is only 0.1 % of the incoming precipitation.

**TABLE 6: AVERAGE YEARLY WATER BALANCE LOKOK CATCHMENT**

	Precipitation	Evapotranspiration	Surface runoff	Shallow aquifer recharge	Deep aquifer recharge	Surface water abstraction	Groundwater abstraction	River outflow
mm	735	616	55	77	4.0	0.7	0.4	60
Mm3	4052	3398	301	423	22	3.6	1.9	333
% of P	100	84	7.4	10.4	0.5	0.1	0.0	8.2



**TABLE 7: STORAGE CAPACITY OF THE WETLANDS IN LOKOK CATCHMENT**

Wetland type	Area (km2)	Normal flooding storage (Mm3)	Maximal flooding storage (Mm3)
Regularly flooding floodplain	203	41	153
Seasonal/intermittent freshwater marshes/pools	42	31	63
Permanent freshwater marshes/pools	6	6	26
Total	252 (=4.5% of the catchment area)	79	241 (45 mm of rainfall)

The average annual outflow of the catchment equals 333 Mm<sup>3</sup>, but it varies between 70 Mm<sup>3</sup> and, more than 13 times as much, 920 Mm<sup>3</sup> (Figure 20). In general, in Lokok Catchment a higher annual rainfall results in a higher annual discharge and a lower annual rainfall results in a lower discharge, but the relation is non-linear. Below average rainfall often leads to very low outflows, while above average rainfall results in very high outflows. This effect is strongly linked to the status and the antecedent conditions of the storage systems (i.e. shallow groundwater systems, wetlands, valley tanks and dams) in the catchment. Flow almost ceases between February and April (Figure 21). A comparison of the annual outflow in these years, 70 Mm<sup>3</sup>, however, with the current abstraction rates for domestic, livestock and agricultural use, 5.6 Mm<sup>3</sup>, shows that in terms of water resources there are ample opportunities to improve water supply. To do so, water needs to be stored in the catchment during the wet season, to be used during the dry season.

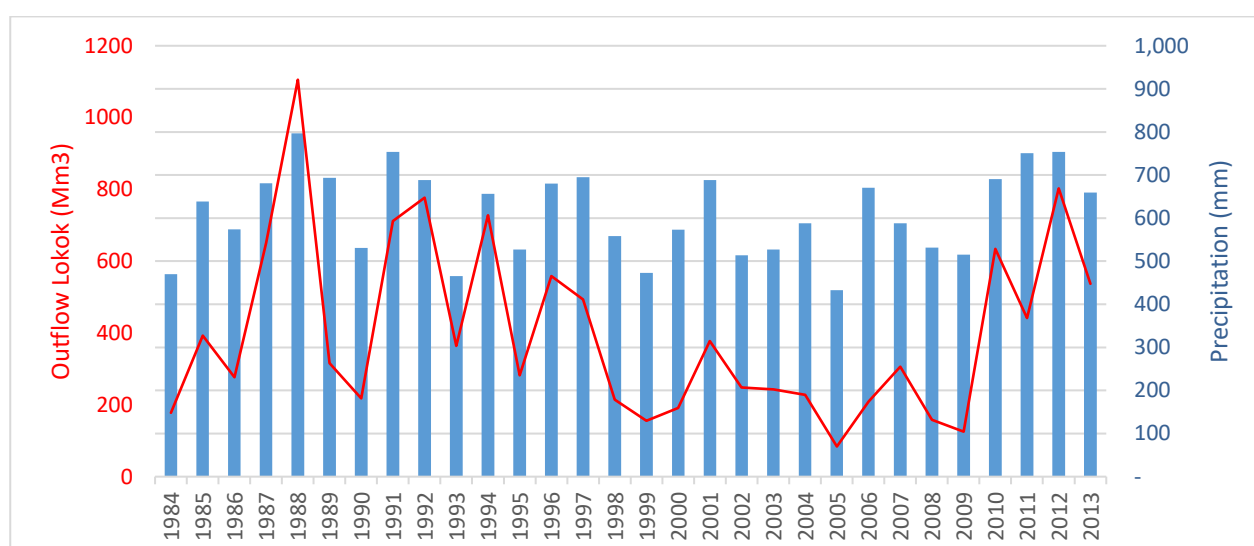
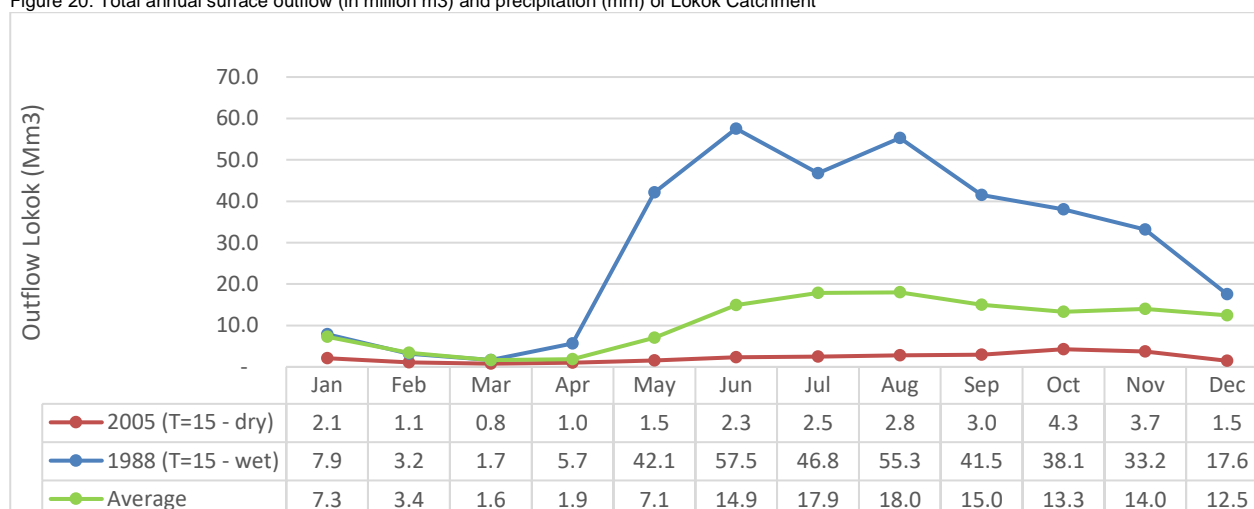
Figure 20: Total annual surface outflow (in million m<sup>3</sup>) and precipitation (mm) of Lokok Catchment

Figure 21: Monthly surface outflow in average, dry and wet years. T=15-dry: A dry year (low rainfall) that has a statistical return period of 15 years. T=15-wet: A wet year (high rainfall) that has a statistical return period of 15 years.



### Surface runoff

The average surface runoff of the catchment is 50 mm, which corresponds to a runoff-rainfall ratio of 7%. Runoff-rainfall ratios are, however, highly dependent on the location in the catchment (Figure 22). The highest runoff-rainfall ratio (up to 25%) occur in Lower Lokok. Generally, areas with a higher precipitation and characterized by soils with a limited infiltration capacity have the highest runoff-rainfall ratio. The modelling results, however, show that the impact of land use and land cover is significant. Runoff-rainfall ratios in agricultural areas, e.g. Kotido (around outlets 8 and 9), are high compared to the surrounding rangelands.

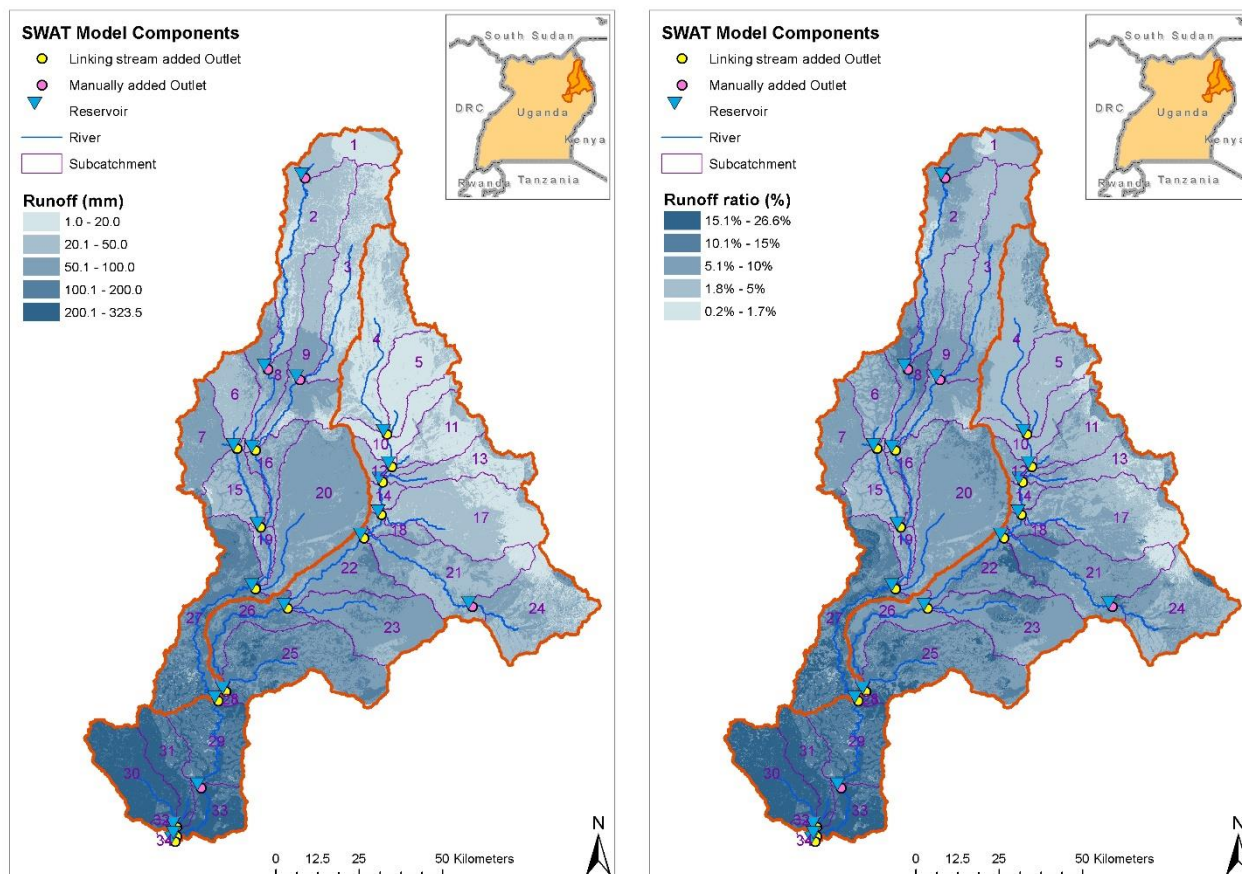


Figure 22: Average absolute annual runoff-rainfall ratio (left) in mm and surface runoff-rainfall ratio (right) in percentage. The maps show the combined output for Lokok and Lokere as the SWAT-model was set-up for both catchments conjunctively.

#### 4.3.5 Issues on water resources

Lokok Catchment is characterized by reasonable but highly uncertain rainfall, with long dry spells and intense rainfall events. Environmental degradation is evident on agricultural lands (Kotido and Kaabong), around large valley dams (e.g. Longoromit), on steep slopes (Toror Hills, Timu Forest), in wetland (Lower Lokok) and on riverbanks. Degradation is strongly linked to deforestation, rangeland burning, expansion of agricultural lands, encroachment of agriculture into wetland and loss of traditional management systems. Eroded areas show high runoff-rainfall ratios (i.e. of up to 25%). Sedimentation of reservoirs such as behind valley tanks and dams is strongly linked to erosion upstream. Climate change, population growth and economic development are expected to increase the pressure on natural resources.

The streams and river in Upper and Middle Lokok are characterized by a flashy runoff. Wetlands play a vital role in water regulation. Indicative calculations show that peak flows could become more than 10 times as high if the buffering function of wetlands would disappear from the catchment. Monitoring of flows, groundwater levels, groundwater abstractions, water quality and climate is poor. Access to existing data is difficult.

Safe water coverage is low (varying between 29% in Kaabong District and 86% in Abim District, source: District Development Plans). Boreholes are the predominant source of safe water supply, but many are non-functional mainly because of poor site selection, design, operation and maintenance. The Uganda Water Supply Atlas by MWE-DWD



([www.wateruganda.com](http://www.wateruganda.com)) is a great step forward (although keeping it updated turns out to be challenging), but the databases with the technical specifications on water abstraction points are incomplete and outdated and data is not accessible for stakeholders. Monitoring of water infrastructure is not institutionalized.

Weather, infrastructure and water resources monitoring and evaluation of is not institutionalized. There is just a limited number of monitoring stations and many are non-functional. To some extent these challenges can be traced back to the insecurity context in the 1990s and 2000s. There is, however, more to it.

- Access to existing data is difficult for stakeholders;
- There is no to limited feedback to those collecting the data on the ground;
- Operation and maintenance of monitoring stations is poor;
- Data storage, processing and analysis is not transparent to the involved stakeholders.

The absence of this knowledge base undermines many development initiatives. Issues are more easily brought onto the regional, national and international agenda's when data is available to support their claims. Also, the development of purposeful and effective interventions is much easier when sufficient information is available to properly understand the problem. However, MWE is developing a plan to establish a Water Institute at the Entebbe premises for study, research and training purposes, incorporate the existing data bases, as well as harmonising the currently scattered training activities.

There insufficient water to cover livestock water demand, particularly in the dry season, as a consequence of which livestock migrates downstream. The pressure on natural resources is further increased by livestock from Turkana and South Sudanese herders during periods of drought (see also Section X on water demand). The National Irrigation Master Plan found almost 6,000 ha suitable for irrigation in Lokok Catchment (PEM 2011). Large scale agricultural developments, however, do not match local livelihoods, may locally undermine the resilience of the system and require huge investments in infrastructure. Also, most irrigable lands are located in the downstream parts of the catchments, while the suitability for dams is highest in the upstream parts of the catchment. Currently another problem is that many reservoirs are built without being based on sound hydrological assessments.

On average, 10% (333 Mm<sup>3</sup>) of the incoming precipitation leaves the catchment in the form of surface outflow. Shallow groundwater potential is high in Lower Lokok, in wetlands and floodplain areas, and there are multiple opportunities to further develop the resource by means of sand dams and subsurface dams, but this resource remains underutilized. In general, chemical water quality is good, but in Upper and Middle Lokok there are some boreholes with high fluoride, hardness salinity and iron concentrations. Microbiologic contamination is another major concern. Due to poor sanitation and sharing of water points with livestock, contamination with e-coli is common.

Hydrological and agricultural droughts are recurrent and intense in Lokok Catchment, mainly due to a combination of dry spells, environmental degradation and an increased demand for natural resources. Flooding seems to be linked, at least in part, to the antecedent conditions of wetlands. The absence of adequate monitoring and early warning systems may be concomitant to the disastrous impact of the floods in Middle and Lower Lokok. Locally in Lower Lokok, water logging occurs due to high intensity rainfall on soils with a low infiltration capacity. Flooding of dams and valley tanks is related to flash floods in ephemeral streams, which are the result of high runoff-rainfall ratios which are mainly related to environmental degradation. Poor design, construction, operation and maintenance of water for production infrastructure also play an important role.

## 4.4 Social and environmental context

### 4.4.1 Socio-economy

The population of Lokok is estimated at 390,000<sup>6</sup> people for 2016, with highest population densities around regional growth centres such as Kaabong and Amuria. Settlements are scattered with concentrations around productive agricultural areas, trading centres, and water sources (UNDP, 2014b; UNDP, 2014c). Regionally important hubs are Kotido Town and Kaabong Town. Major roads connect Moroto (in Lokere Catchment) to Kotido, and Kotido to Kaabong.

<sup>6</sup> Catchments are independent of existing administrative boundaries such as districts. In order to obtain a close to accurate estimate of the catchment population, parish population figures from the 2002 Census were combined with the numbers from the 2014 Census (only district level)



Table 8 provides a summary of the total population of the Lokok Catchment per district as described in the DDPs. As the catchment only partially overlaps with the districts, the total population as described in the table is much higher than the total population estimated to live in the catchment.

The region is among the poorest in Uganda. Recent studies suggest that nearly 80% of the total population live below the poverty line (WfP, 2015). This poverty translates into high levels of food and nutrition insecurity and underdevelopment. Root causes of poverty are reported to be adverse weather conditions, illiteracy, marginalisation, corruption, high prevalence of livestock and human diseases (Akliku 2016), crop pests and prolonged years of conflict.

**TABLE 8: POPULATION GROWTH RATES FOR THE DISTRICTS IN LOKOK CATCHMENT (UBOS, 2014)**

District	Population 2014	% growth rates
Abim	106,140	6.2
Amuria	270,928	3.4
Kaabong	167,879	-1.5
Kotido	94,881	3.15
Napak	45,219	2.11
<b>Average</b>		<b>2.67</b>
<b>Total</b>	<b>685,047</b>	

### Livelihoods

The inhabitants of the catchment rely on the rangelands for their entire livelihoods<sup>7</sup>. In Kotido and Kaabong Districts, the rangelands cover 80% of the total land surface, which is predominantly inhabited by pastoralists and agro-pastoralists. The main economic activity in Lokok Catchment is livestock production. Livestock rearing and management occurs throughout the catchment with cattle, goats and sheep being grazed in open grassland, scrub, thicket and forest margins and on agricultural lands after crops have been harvested. Livestock graze all accessible areas of the catchment. The only areas that receive little grazing include dense forest and permanently flooded swamps. Thickets and scrubs are invariably heavily grazed especially in the dry season.

Crop production complements livestock rearing. An increasing number of people rely on agro-pastoral livelihoods, which combine livestock rearing with crop production. Artisanal mining of gold, silver, copper, iron, gemstones, limestone and marble, brick making and charcoal production are increasingly becoming an important source of income. In addition, other activities take place on a smaller scale, such as gathering of wild fruits, wood and food and harvesting honey. These activities are carried out throughout the year alongside pastoral activities. There is no large-scale industry. Some households produce soap, dairy products, dry meat, process hides and skins, mill of maize, sorghum and rice, produce of crafts and artisan gold products. Figure 23 summarizes the specific productivity in Mt/ha for the districts. On average the productivity is low for each district except for beans in Abim district.

Over the past few decades, greater pressure has been put on pastoralist mobility and conflicts over pastures have escalated, limiting access to some of the water areas. This means that water development without land reform, grazing control and cooperation from livestock producers leads rapidly to the destruction of the grass cover by serious overgrazing, bush encroachment and soil erosion.

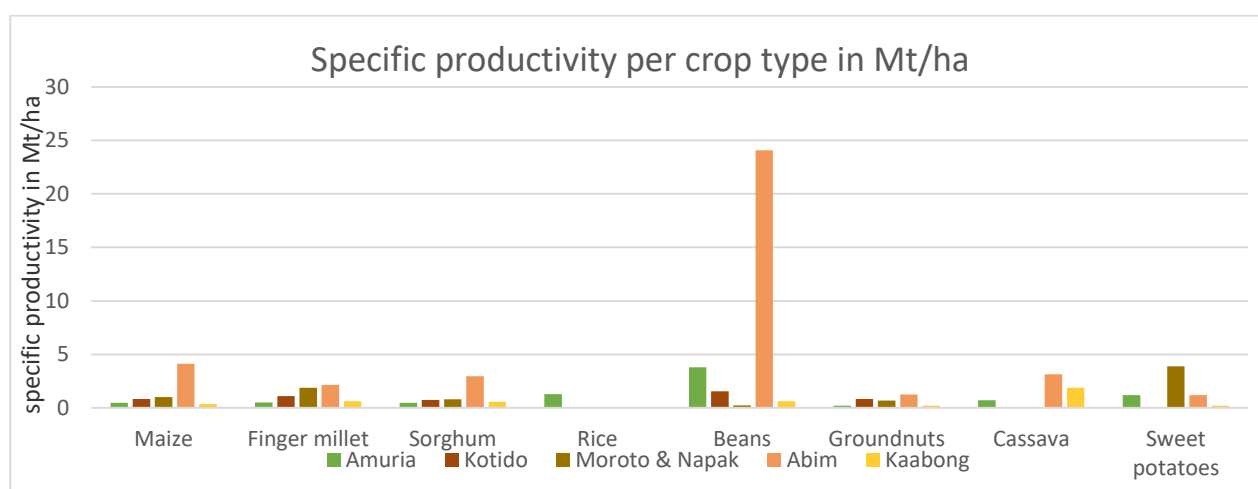


Figure 23: Specific productivity in Mt/ha for the districts (Agricultural Census 2008/2009)

<sup>7</sup> The draft Rangeland Management and Development Policy defines a rangeland as land on which the native vegetation is predominantly grasses, grass-like plants, forbs, shrubs or woodlands suitable for browsing or grazing by animals.



## Mining

Over 50 different minerals are known to occur within the catchment area, including gold, silver, copper, iron, gemstones, limestone and marble (Hinton et al., 2011). Some of the minerals such as marble and limestone have a history of prospection and mining. Others are unexplored but indicated. In spite of its rich mineral potential, the commercial viability of large scale mining (LSM) and artisanal and small scale mining (ASM) and the full range of economic, social and environmental costs and benefits of mining in Karamoja remain unclear (IUCN, 2014).

Presently, artisanal mining (mainly gold) is widely practiced in Upper Lokok. The most commonly reported ASM activities with negative environmental impacts involve the clearance of vegetation for mining activities. This, in turn, results in degraded and fragmented habitats for wildlife (Muwanga, 2012). Other frequently cited environmental impacts:

- The removal of the due to the use of semi-mechanical techniques, such as dredges, water pumps, hoses and vacuums riverbed sediments and riverbanks;
- Locally increased silt during the washing and panning process;
- The diversion of waterways to access mineralized deposits on the riverbed or to obtain water needed for washing;
- Use of pumps to remove water when digging below the water table;
- The direct dumping of waste, tailings and effluents in waterways and removal/disruption of riverbeds and riverbanks because of intensive scooping, dredging or vacuuming.

The use of toxic materials such as mercury and cyanide is a major issue in ASM as it mostly leads to pollution of drinking water for humans and animal species. Artisanal miners indicate that they are not using mercury and cyanide in the process.

## Land tenure

Land in Lokok Catchment is under common, state and private property regimes. Most land is communally owned except in town centres (Kaabong and Kotido) where individuals possess title deeds. Where the land is owned by the community, its use is traditionally controlled by a hierarchy of clan elders. The communal land is collectively managed by the clan and is characterized by a common pool of resources such as grazing fields and water sources. Land use is practiced under a dual system of both customary law and statutory legal systems. The communal land tenure system is, however, susceptible to the “tragedy of the commons”. Increased human pressure on the landscape level (partially resulting from population growth), lack of environmental law enforcement, low level of awareness on environmental degradation and shortage of capacities and resources for monitoring and community-based natural resources management (e.g. for water and rangeland) have resulted in the overexploitation of natural resources at various locations, including upper parts of the catchment.

## Security

Security has long been an issue in large areas of Lokok Catchment. Between the 1990’s and early 2000’s Karamoja Sub-region was a no-go area. “Gun ownership is pervasive, and armed criminality and cattle raiding by civilians in Karamoja exposes the population there, as well as those in neighbouring districts, to high levels of violence, and restricts even the movement of humanitarian workers. It poses significant challenges to the government’s responsibility to provide for its citizens’ security and human rights” (Emerson 2007). Between 2001 and 2010 the Office of the Prime Minister of the Ugandan Government implemented the Karamoja Integrated Disarmament and Development Programme (KIDDP) towards creating conditions for promoting human security and recovery in Karamoja (Office of the Prime Minister 2007). However, as the pace of disarmament was not equal throughout the area, many *Karamojong* groups who handed in their weapons were left unprotected against those who still had their weapons. As conditions deteriorated, between 2006 and 2010 thousands of *Karamojong* women and children moved to Kampala (Sundal 2010). In 2007, the Ugandan government began to resettle these people to Karamoja. Regardless of the initial intent to remove weapons from communities in Karamoja, the forceful means involved had unintended negative consequences for communities as well as for civil-military relations, including increased insecurity for communities; stripping of essential and productive assets; the erosion of traditional mechanisms to cope with vulnerability and food insecurity; shifts in gender-based labour roles, responsibilities and identities; transfer of animal management responsibilities; and the collapse of the dual settlement and migratory systems central to the success of pastoral and agro-pastoral livelihoods. These consequences may have been unintended but not unpredicted; many occurred as recently as the 2001-2002 disarmament campaign which saw sharp increase in attacks on communities, particularly by neighbours from Kenya.

Conflicts over water resources is another issue in Lokok Catchment. In a survey carried out under the Reform of the Urban Water and Sanitation Sector Programme (Dektar et al, 2017), 88.7% of water users in the catchment indicated that there



were water related conflicts. In the Dopeth river catchment which covers a wider area of Kaabong and Kotido Districts, 28.6% of conflicts within ethnic groups are over limited water resources (Lochap et al, 2015). These conflicts manifest in forms of verbal abuses, quarrels, physical confrontations/fights and disagreements between ethnic groups. The causes of this conflicts include animals trampling over gardens, attempts to restrain Turkana pastoralists who are crossing borders to access water and pasture for livestock and over grazing and drinking by large numbers of animals which threatens water security. Other causes include, priority being given to livestock over people in terms of water access especially at boreholes, ethnic differences and intrusion by strangers/pastoralists, ownership and monopoly of water resources by certain groups/people. However, there are structures and forums in place for reporting, mediation and settlement of conflicts. These structures include Local Council I (where most conflicts are reported, upto 63.9%), elders, youths and cultural leaders (Dektar et al, 2017).

#### 4.4.2 Landscape

Land in Lokok Catchment is currently covered approximately by 1/6 of croplands. The rest of the catchment is covered by forest, woodlands, grasslands and shrublands. Extensive wetland systems are present in Lower Lokok (Figure 24) developed based on Landsat Imagery 2015 calibrated with data from field surveys, refer also to Annex A - Assessment reports: Water Resources Assessment).

Land use forms a major divide in Lokok Catchment. Most of the catchment is part of the so-called agro-pastoral zone. The grass- and bushland consisting of acacia shrubs and thickets in open grassland is used for grazing. Patches of small-scale rain fed agriculture (sorghum, finger millet, maize, groundnuts, simsim, sunflower, cowpeas, green grams, beans, soya bean, cassava, sweet potatoes) are concentrated around the somewhat larger towns and settlements. The areas covered by wood- and bushlands are known for wood logging and charcoal production. At the far northern rim, where Kaabong borders Kenya, artisanal mining (e.g. gold, marble) is common. In Lower Lokok, the population is primarily engaged in crop production. In and around the wetlands paddy rice is cultivated. Further away from the streams, lands are used to grow rain fed crops. Locally there are some small-scale irrigated fruit orchards, vegetable gardens and tree plantations.



Figure 24: Sorghum fields around Kotido

Approximately 1/4 of Lokok Catchment has a protected status and is either under the auspices of National Forest Authority (NFA) or the Uganda Wildlife Authority (UWA). The forest reserves along the western and northern border - Timu, Alerek, Nangolowel and Alungamosiomos - are managed by NFA. The Bokora Corridor, Matheniko and Iriri wildlife reserves are managed by UWA (Figure 25 **Error! Reference source not found.**). The reserves are very important for the biodiversity and conservation of ecosystems. In general, the reserves managed by UWA are in better condition than those under the management of NFA. In Timu Forest deforestation and encroachment of agriculture increasingly degrading the ecosystem.



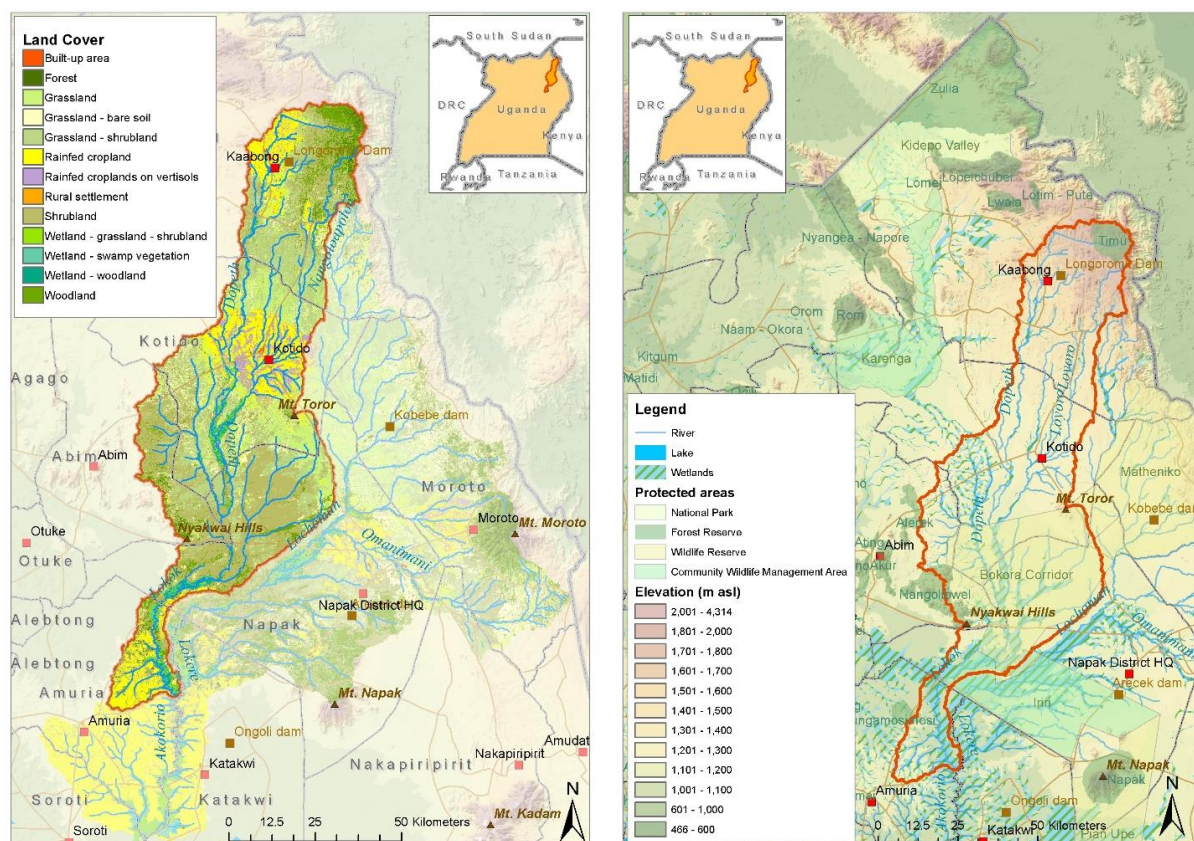


Figure 25: Land cover<sup>8</sup> (left) and protected areas (right, source: NFA 2016) of Lokok Catchment.

#### 4.4.3 Zoning

Lokok catchment presents a diversity of conditions in terms of climate, soil types, culture and beliefs, population, opportunities and economic status. The upstream part of the catchment is different from the downstream and even within the upstream areas itself there exist considerable differences among districts. Napak and Abim, for example, receive more annual precipitation and the soils are more fertile (and greener) than the districts of Kaabong and Kotido. On the other hand, sometimes even within one district, like in Kaabong, one can recognise a greener belt and a drier belt.

Issues that occur in a catchment have different impact depending on the area the impact occurs. Issues such as flooding, low economic development and resettlement impact different areas to a different extent. To enable a better understanding of which issues occur where and with what impact the catchment was divided in zones using multi criteria zoning based land use, population, slope, precipitation, soil and water availability. These zones guide the implementation of interventions and are based on multi criteria landscape assessment, including land use, population, slope, precipitation, soil and water availability. In the Lokok catchment four landscape zones were identified: forest, grassland, flood zone/wetlands, and agricultural lands. In total these zones amount to 14 areas as shown in Figure 26.

<sup>8</sup> Developed during this project using Landsat Imagery 2015, calibrated with data from field surveys, see also Annex A Assessment reports: Water Resources Assessment



TABLE 9: LANDSCAPES ZONES PER AREA OF LOKOK CATCHMENT

Catchment	Zone	Characteristic of zone in the section of the catchment
Upper	Timo forest	Woodlands reduce peak discharge into the Kaabong river system, increasing deforestation likely to cause more riverbank erosion and gully formation
	Kaabong and Kotido grassland	Use of pasture in the upper catchment is limited by the available water in the dry season
	Kaabong and upper Dopeth	Mostly meandering river systems which take erosion into the wetlands of the middle catchment
	Kaabong and Kotido Agricultural lands	Highly erosion sensitive areas which potentially silt up the wetlands in the middle catchment
Middle	Bokora and Nyakwai woodlands	Woodlands reduce peak discharge into the Aduko wetlands system
	Kotido and Lower Kotido Abim Grassland	Use of pasture in the limited by the available water in the dry season, this could be seen as a protection measure to overgrazing
	Aduko wetland and Okok wetland	Wetlands in the middle catchment protect the lower catchment from flooding. If they silt up flooding in the lower section can be expected to occur more regularly
Lower	Wetlands and rivers	These wetlands flood mostly due to local runoff; this runoff will increase if more land is opened up for agriculture. Planting in and burning of these wetlands will increase peak discharges and flooding
	Agricultural lands	Low productivity, waterlogging



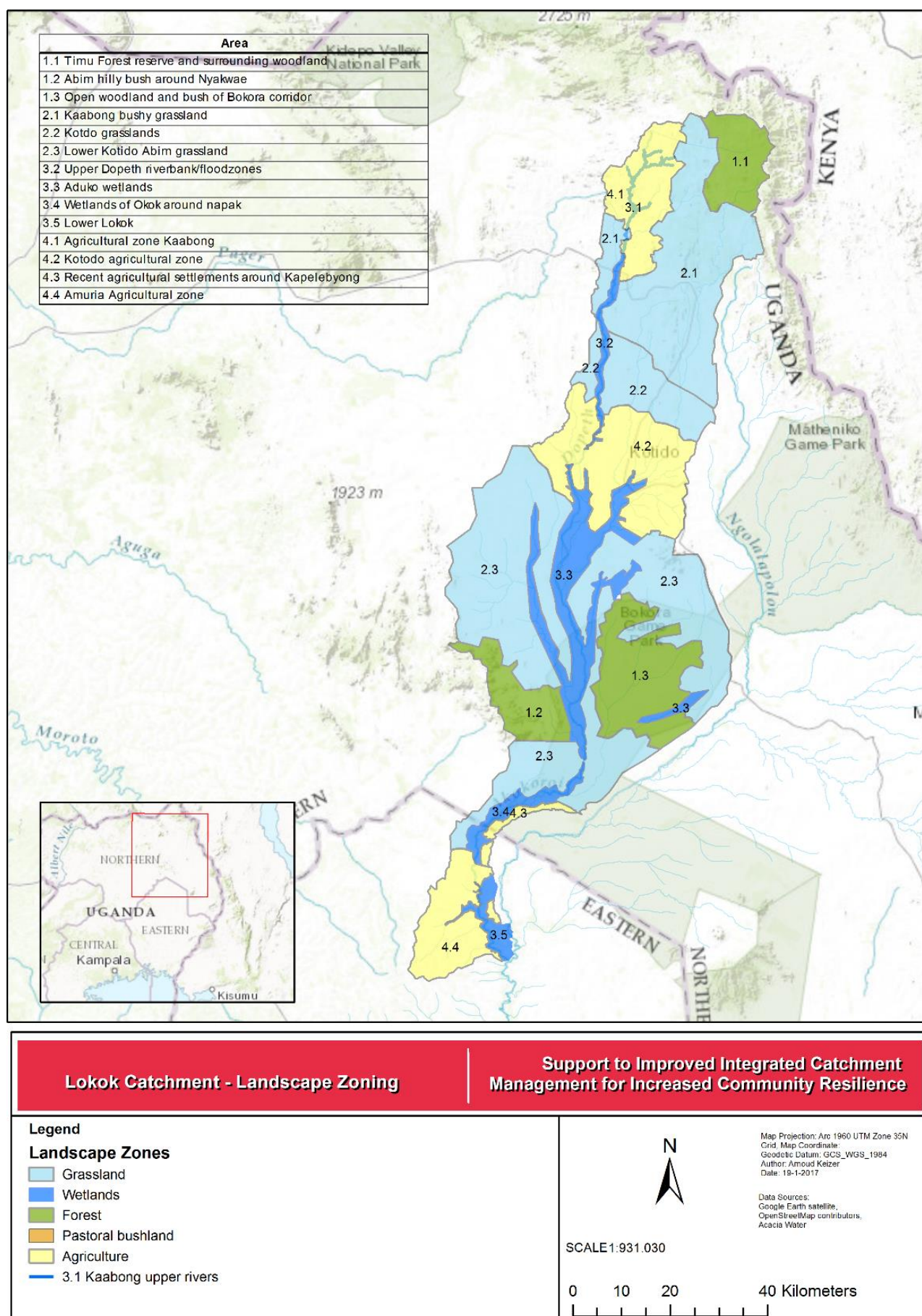


Figure 26: Lokok Catchment - landscape zoning



#### 4.4.4 Issues on the social and environmental context

Lokok Catchment is faced with many social and environmental challenges. The SSEA identified the issues that need to be resolved and provided recommendations for comprehensive planning that will help to avoid problems and maximise opportunities for IWRM and sustainable development. Some of the key social and environmental issues identified are summarised in Table 10 and Figure 30.

**TABLE 10: SUMMARY OF KEY SOCIAL AND ENVIRONMENTAL ISSUES IN THE LOKOK CATCHMENT**

Issue	Description
Population dynamics	<p>The current population of the catchment is estimated at 390,000 people and is concentrated around productive agricultural areas, trading centres, and water sources.</p> <p>Following the Government led disarmament exercise, there has been an increase in movement and population growth. It is projected that the population within the catchment will increase to about 512,600 by 2030, with an average growth rate of 2,67%.</p> <p>In areas where high population numbers are registered such as East of Kaabong town, close to the Kenyan border, demand for water and pasture are relatively high. This has led to opening of lands, leading to resource use conflicts.</p>
High poverty levels	<p>Upper parts of the catchment are known to be one of the poorest areas in Uganda, with poverty levels of nearly 80%. A large proportion of the population reside in the rural areas and depend on pastoralism and subsistence farming for survival, with barely any surplus produce for the market. This poverty translates into high levels of food and nutrition insecurity, underdevelopment, overexploitation of resources and encroachment into sensitive ecosystems such as wetlands and forests in search of alternative sources of livelihoods such as charcoal burning.</p> <p>Root causes of poverty are reported to be adverse weather conditions, illiteracy, marginalisation, high prevalence of livestock and human diseases, crop pests and prolonged years of conflict.</p>
Low literacy levels	<p>The Ugandan National Census (UBOS 2014) shows that the region has the lowest education rates in Uganda – only 6% of women and 12% of men are literate compared to a national average of 67%. These low literacy rates are a major barrier to successfully generating income and improving livelihoods – especially for women. Lack of an income means that communities remain trapped in a continuous cycle of poverty, leading to overexploitation of resources in search of sources of livelihoods.</p>
Limited access to basic services	<p>Access to adequate basic services such as education, health and sanitation, agriculture and veterinary extension is still a big challenge and is far below the national average. Access to energy is limited within the region. Over 90% of the population relies mostly on forest products such wood and charcoal for cooking and lighting homes with far-reaching impacts on the environment.</p> <p>Safe water coverage in the catchment is low and is highly attributed to non-functionality of infrastructure and the poor distribution of water points. Areas around Kotido and Kaabong towns have the highest domestic water gaps of between 61-210 m3/d.</p>
Land ownership system	<p>Land is under common, state and private property regimes. Most land is communally owned except in town centres (Kaabong, Kotido and Moroto) where individuals possess title deeds. Where the land is held in customary tenure, claims to right of access, use and ownership are not backed by formal documentation. Instead, its use is traditionally controlled by a hierarchy of clan elders and is characterised by a common pool of resources such as grazing fields and water points. However, the power of these traditional institutions has been eroded over time due to the power of the gun, the disarmament process and the set of protected kraals, leading to overexploitation of resources at various locations.</p> <p>Threats to tenure security, included but not limited to minerals and mining interests, often undertaken without community knowledge, involvement or consent have been reported within the catchment, with rates of land grabbing on the rise.</p>
Vulnerability to natural disasters	<p>The most common natural disasters experienced in the catchment are floods and droughts. Major flooding events occur in the lower catchment towards September, when rainfall in the upper catchment is far less compared to downstream. Amuria district is prone to flooding because of intense storms, poor draining soils and low slopes. This has resulted in loss of property, reduced soil productivity and soil erosion.</p> <p>Upper parts of the catchment receive much less rainfall than the lower parts. These prolonged dry spells result in: total crop failure with far-reaching impacts on food security, leaving communities vulnerable to starvation; reduced water and pasture for livestock; disease outbreaks; loss of biodiversity and increased resource use conflicts.</p>



**TABLE 10: SUMMARY OF KEY SOCIAL AND ENVIRONMENTAL ISSUES IN THE LOKOK CATCHMENT**

<b>Issue</b>	<b>Description</b>
Land degradation and soil erosion	<p>Increased human pressure on the land (partially resulting from population growth), weak environmental law enforcement, low level of awareness on environmental degradation and shortage of capacities and resources for monitoring and community-based natural resources management (e.g. for water and rangeland) has led to severe land degradation.</p> <p>Some of the activities include; Land use changes, deforestation and overgrazing, uncontrolled bush burning, wetlands, river banks and forest encroachment for cultivation and grazing of livestock, and, overgrazing exceeding carrying capacity of rangelands. This degradation results in higher overland runoff rates and thereby more frequent and intense droughts and floods.</p>
Artisanal mining	<p>Artisanal mining is widely practiced within the catchment area, with sand and gold being the common minerals. This artisanal mining often has widespread negative socio-environmental impacts. These include the clearance of vegetation for mining activities, increase of silt deposits during the mineral washing and panning process, diversion of waterways to access mineralized deposits on the riverbed or to obtain water needed for washing has been reported in the catchment, removal of the top soil due to the use of semi-mechanical techniques such as dredges, water pumps, hoses and vacuums, and increased land and riverbank degradation. Worldwide often use of toxic materials such as mercury and cyanide are used in gold mining, which are highly pollutive; miners in the catchment, however, indicate they do not use chemicals.</p>
Uncontrolled bush burning	<p>When controlled, bush burning is a critical means for transforming nutrients in the soil, with benefits to the quantity and quality of grass cover, and an important means to control tse tse fly numbers. Within the catchment, however, bush burning is a rampant practice because uncontrolled. It often has disastrous consequences, such as loss of life and property, and damage to ecosystems, including forests and soil fertility. Areas around the open woodland of Bokora corridor are worst affected. Other areas where this happens include Abim hilly woodland and bush, Timu forest reserve, and Kaabong bushy grassland.</p>
Conflicts over natural resources	<p>Competition for grazing land and water. Resource use conflicts have intensified within the catchment because of increased pressure on natural resources and insecure land tenure, bringing about competition for scarce grazing land and water especially during the dry season. The pressure on natural resources persists and is affecting their productivity and sustainability.</p> <p>Encroachment of riverbeds lead to conflicts between farmers and pastoralists. This is common along district borders in the Aduko wetlands, wetlands of Lokok around Napak and around Kobebe dam where Livestock from Turkana, Kenya migrate into Kotido and Kaabong districts adding extra pressure to the available water sources and environment.</p>
Weak institutional coordination and enforcement	<p>Protected areas in the catchment continue to be encroached for human activity, either due to poor enforcement of by-laws, or due to poor community attitude towards conservation. Although there are various pieces of legislation spelling out the need for community involvement in management of Uganda's natural resources including wetlands, wildlife, and forests, there is limited progress in practice. This is largely constrained by lack of capacity by the lead agencies (NFA, UWA and WMD) to implement collaborative management initiatives and in wetlands, the challenge is further compounded by understaffing in the local governments with recruitment priorities put on other sectors rather than on ENRM.</p> <p>There is also a decline in budgetary allocation for the ENRM sector, directly resulting in limited implementation of community initiatives.</p>
Socio-cultural influences	<p>Communities living in the upper part of the catchment have been affected by major disruption to the norms and values (including attitudes and aspirations) which have underpinned their existence. Implementation of affirmative action to the region and the disarmament exercise encouraged sedentary agriculture as an alternative to pastoralism. The influx of investment and the government ever-shifting approaches to development continue to affect the lifestyle of the region.</p> <p>Destruction of social values in this way has a high degree of association with increased alcohol dependency and misuse, violence, economic disempowerment, lack of self-esteem and cultural belief and increasing powerlessness. This further limits the role communities play in decision-making processes.</p>



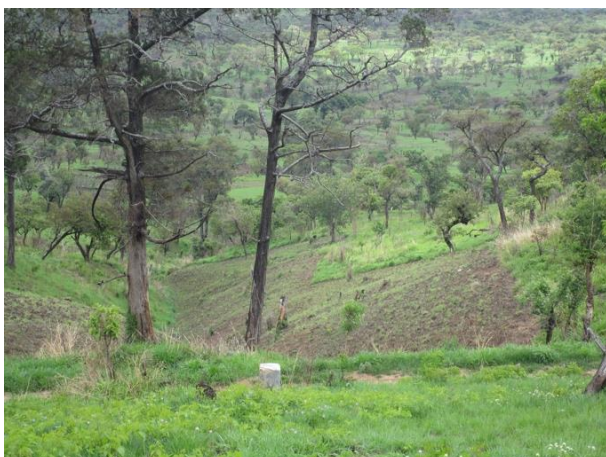


Figure 27: Timu forest encroachment (Acacia Water 2015)



Figure 28: Encroachment into wetlands at Kapelebyong (RAIN 2016)

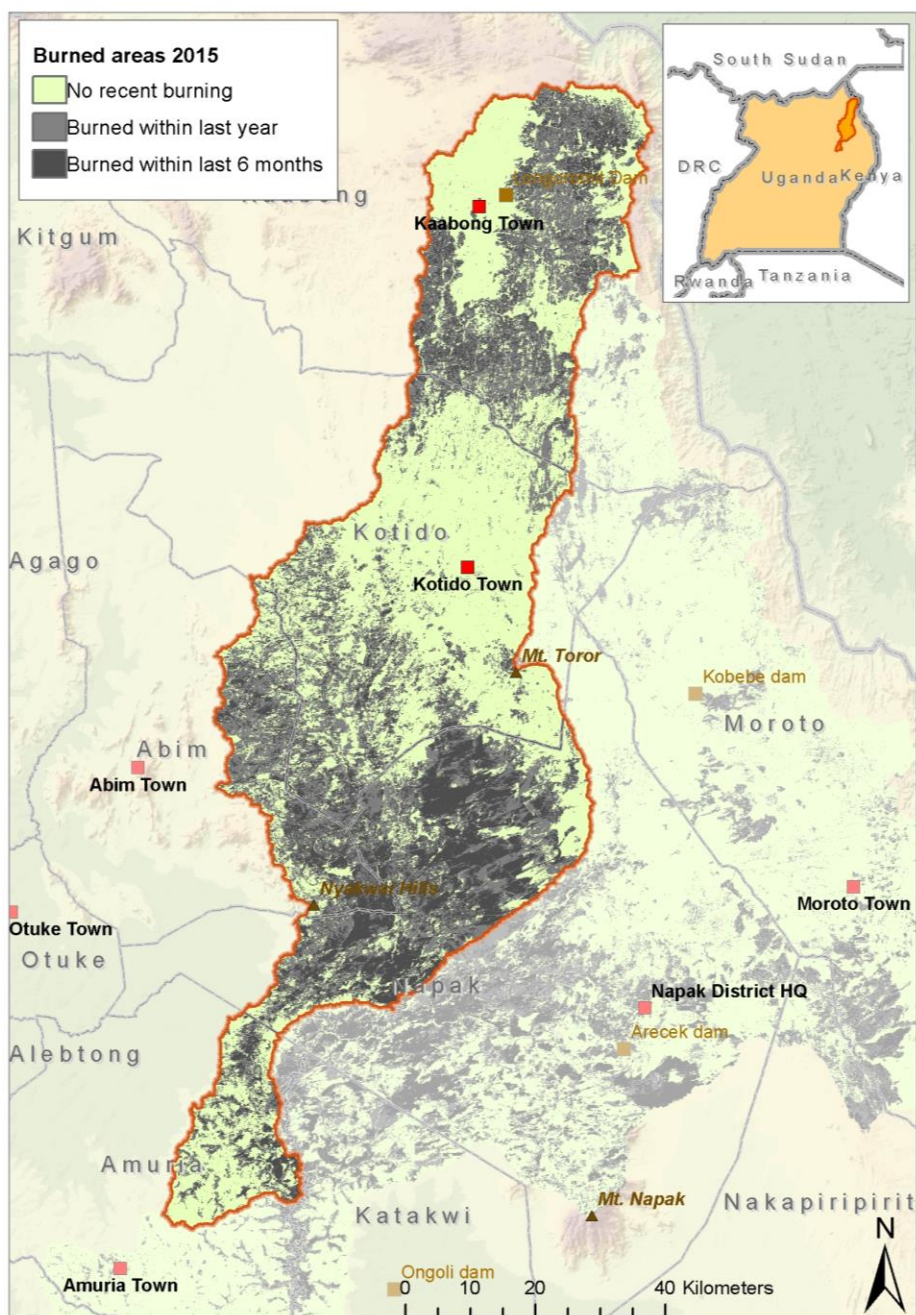


Figure 29: Burned areas 2015. Map developed by Acacia Water based on Landsat Imagery 2015.



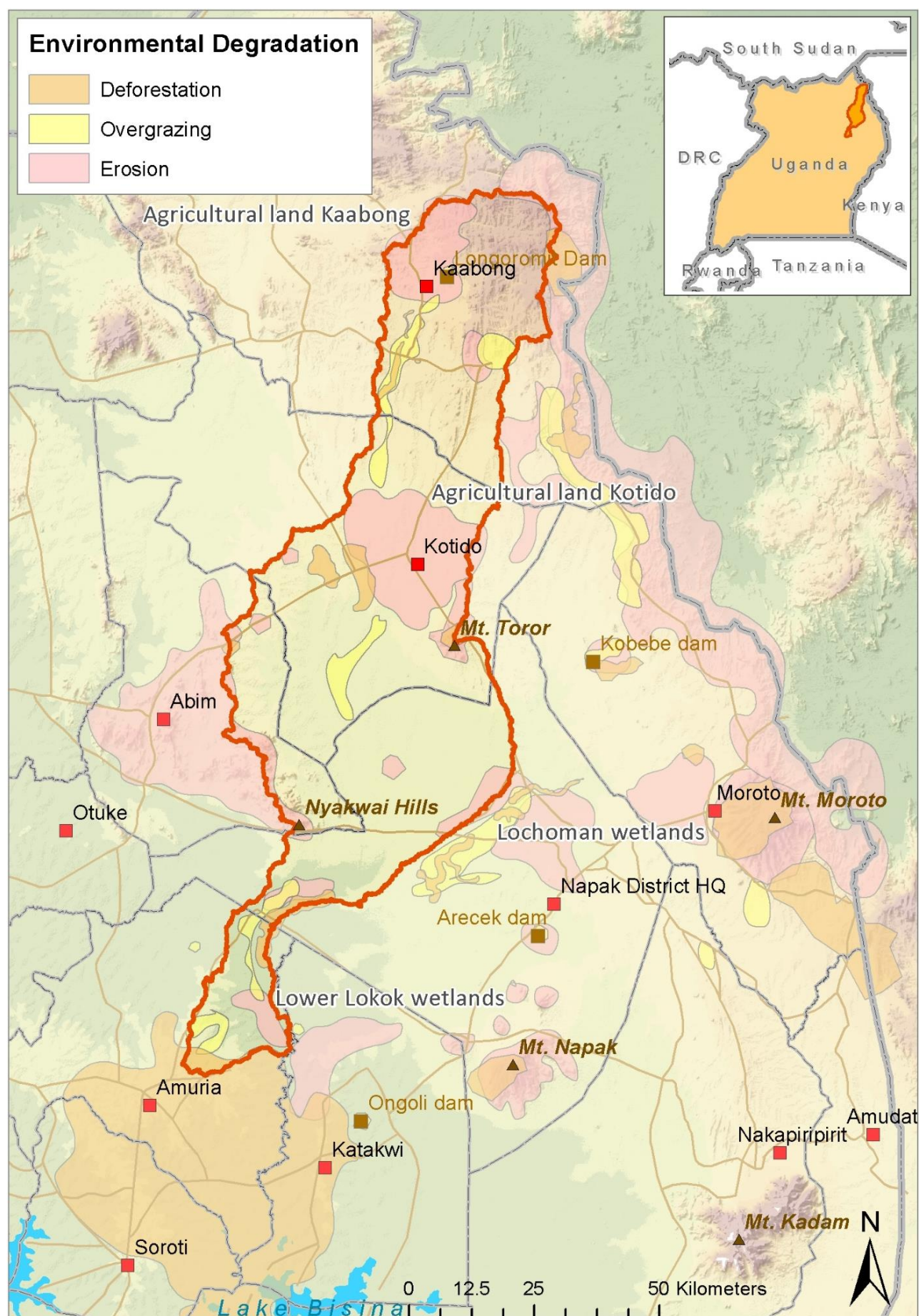


Figure 30: Overview of environmentally degraded areas in Lokok Catchment



## 4.5 Main issues and trends in Lokok for CBWRM

Field observations and analysis of available data provided a number of additions and interpretations of the issues flagged up by the stakeholders in CSF workshops and FGDs and bilateral meetings. An overview of the most pressing issues and trends identified during the catchment management planning process, including the challenges and threats to water quality and/or quantity in the long term, is presented in the table below.

**TABLE 11: MAIN ISSUES AND TRENDS**

Assessment	Issue or trend
Stakeholders	Capacity gaps at district level
	Inadequate sector coordination
	Policies are poorly popularized
	Law enforcement is difficult
	Limited knowledge of Integrated Water Resources Management
Water resources	High surface runoff rates due to low vegetation coverage, particularly in agricultural areas and on deforested slopes
	Siltation of dams and valley tanks due to soil erosion, which in turn is linked to the non-application of water source protection
	Shortage of water for livestock due to insufficient surface water reservoirs, increasingly high numbers of livestock, and incoming migratory livestock from South Sudan and Turkana during periods of droughts
	Hydrological and agricultural droughts are recurrent, due to the high variability in rainfall in combination with environmental degradation
	Water logging in Lower Lokere due to poor infiltration capacity and absence of drainage infrastructure
	Non-functionality of most water infrastructure due to poor maintenance and absence of water source protection
	Poor availability of and access to data, which undermines adequate design, construction, operation and maintenance
Social and environmental context	Population growth and sedentarization, high poverty and low literacy levels
	In the northern parts of the catchment: switch from pastoralism towards crop farming without having knowledge of soil and water conservation measures
	Widespread environmental degradation, including overgrazing, tree cutting and soil erosion
	Low safe water coverage due to limited water supply infrastructure, non-functionality of water points (dry drillings, broken pipes and taps, microbiological contamination)
	Agricultural encroachment into wetlands and forests, which reduces the water retention capacity of the catchment
	Disruption of norms and values, loss of traditional (range)land management structures
	Conflicts related to water (re)sources due to competition over access and migration of livestock in search of water and pasture into agricultural areas







## 5. OPTIONS AND SCENARIOS

During the Catchment Stakeholder Forum of September 2016 in Moroto, catchment stakeholders developed the vision and strategic objectives for Lokok Catchment. Thereafter, stakeholders were consulted several times to support the identification of intervention opportunities that contribute to achieving the strategic objectives (see Annex E). In this options and scenarios chapter, the vision and strategic objectives are presented and the options for catchment management interventions that respond to the identified issues are elaborated. Through a scenario analysis the ideal combination of interventions is determined.

### 5.1 Vision and strategic objectives

The options and scenarios should contribute to the vision for the catchment as agreed by the stakeholders in line with the Uganda Vision 2040<sup>9</sup>:

***A sustainably managed Lokok catchment that supports livelihoods and development by 2040***

In order to achieve this common vision, the CMP addresses the following strategic objectives which were formulated by the stakeholders:

1. To strengthen natural resources management systems and structures,
2. To restore degraded natural resources,
3. To ensure sustainable access to water of adequate quality and quantity for domestic use and production, and
4. To ensure that farming and animal husbandry systems are productive, drought and climate change proof, and improve household income

Wherein “sustainably managed” is defined along the so-called FIETS (Financial, Institutional, Environmental Technical and Social) principles<sup>10</sup>.

**Financial** - The CMP takes an economic development approach, in which water resources management is linked to poverty reduction. Improved security allows herders to capitalize wealth in cattle, and expand and intensify crop production. The CMP fosters value chain development, so that increasingly users have the financial capacity to contribute to operation and maintenance themselves. The principle of demand and ownership is at the heart of the plan. Users need to buy into development based on their needs and will to invest. Interventions are self-perpetuating, allowing people to maintain it themselves, or markets are stimulated to deliver these services. In pastoralist areas revenue can come from cattle markets and be reinvested to improve rangeland management and water facilities.

**Institutional** - In institutional terms catchment management is there not to build or implement, but to deliver coordination. To be effective in Lokere Catchment, community management is taken serious, reinforced with knowledge and strengthened in legal terms. One of the challenges faced, particularly in the northern areas of the catchment is the long history of emergency aid. Cash for work and food for work approaches lead to high donor dependency and neglect of maintenance, a situation already known from the 1990s (Wabwire 1993). To improve the functioning of small committees responsible for management, operation and maintenance, end users should be more directly involved from the beginning.

**Environmental sustainability** focuses on the promotion of well-managed water resources and resilient environment. To address practices that have a negative impact on the environment the CMP promotes user engagement in managing water and related resources, enabling informed decision-making about the use of resources. Management is based on demands and priorities of users, objective knowledge on sustainable resource use and firm legal contracts between users and government bodies including repercussions for trespassing. In this context, management is about taking into consideration

<sup>9</sup> In 2015 Uganda's Vision 2040 for “A Transformed Ugandan Society from a Peasant to a Modern and Prosperous Country within 30 years” was developed.

<sup>10</sup> Developed by the WASH Alliance International (WAI): a consortium of over 100 partners around the world aiming to ensure sustainable access to water and sanitation for all. (See <http://wash-alliance.org/our-approach/sustainability/>).



the carrying capacity of the environment and (re)embedding it into the traditional fabric of communities. Community by-laws, clear and enforceable regulation, and alternative income generation reinforce efforts of government agencies. With regard to water management the CMP strongly focuses on enhancing the natural retention capacity of the catchment towards improving water availability upstream and reducing flooding downstream.

**Technical** - Technology should be appropriate to the users. When users lack the capacities to organize themselves to maintain certain infrastructure there should be clear ways in which other agencies take on this role. Legal ownership, long-term funding, transparency of management and accountability are important elements in this regard. If sustainable operation and management cannot be assured, the technology should not be attempted. Infrastructure which is new to the area or which requires adaptation or piloting should be attempted only by organizations that have a good track record and expertise of implementing and managing such infrastructure.

**Social** principles touch upon gender, safety and security, ethic and cultural sensibilities, and poverty and social equity. Equal gender distribution is pursued in decision making. The CMP adheres to a grassroots approach wherein strong linkages with traditional male authorities are combined with women empowerment. To make sure all needs and rights are taken into account the CMP foresees the formation of resource user groups and networks. In terms of culture and ethnicity, people are different in tradition, but all are citizens of Uganda, dwellers of the catchment and users of the catchment's resources, and should therefore be part of these groups. To deal with conflicts over natural resources the focus is on resources' availability and productivity and harmonious inter-community relations. The CMP pursues equal access to assets and services. Governments should make sure that communities' rights are respected and that development also benefits the poorer sections of society.

## 5.2 Options

Based on the principles, the issues signalled and the foreseen trends in the catchment and particularly in the different zones a number of options were developed. The table below outlines the different categories of options, (1,2,3,4) and the options themselves (1.1, 1.2 etc). These options will be specified in this section, after which they will be analysed in the scenarios section and then become interventions

Outline of options		
<b>1. Ecosystem protection and restoration</b> 1.1 Productive and protected forests and woodlands 1.2 Promoting productive and sustainable rangelands 1.3 Protecting wetlands and flood plains 1.4 Protecting rivers and riverbanks 1.5 Flood management systems and infrastructure 1.6 Regulation and enforcement	<b>2. Water and sanitation</b> 2.1 Access to knowledge 2.2 Monitoring and planning 2.3 Management of piped water systems 2.4 Management of rural water systems 2.5 Sanitation and waste management	<b>3. Agriculture and economic development</b> 3.1 Improve livestock farming 3.2 Improve rain-fed farming 3.3 Micro-irrigation (<2ha) 3.4 Medium irrigation projects (>2ha) 3.5 Road water harvesting 3.6 Promote alternative sources of income
<b>4. Institutional strengthening</b> 4.1 Strengthen the CMO 4.2 Monitor and evaluate implementation of the CMP 4.3 Coordinate at district level 4.4 Sub-/micro-catchment management 4.5 Funding of the CMP 4.6 Learning and knowledge management		

Figure 31: Outline of options

From the analysis of the catchment a number of options were developed in the options and scenario report which can be implemented in the catchment (Figure 31). The last category, the enabling environment is overarching and cannot be



directly related to the zones or sub-catchments. As such it is not included in the scenario development as included under paragraph 5.3. Table 12 below gives a perspective on the kind of issues identified per zone and the options which relate to these issues.

**TABLE 12: LINK BETWEEN LOCATION, ISSUES AND OPTIONS**

Landscape	Location	No.	Issues identified	Options
Woodland	Timu forest reserve and surrounding woodland	1.1	Agricultural encroachment	1.1 Productive and protected forests and woodlands
			Erosion	
			Tree loss (slash and burn, bush burning)	
	Abim hilly woodland and bush	1.2	Increasing population and settlement with risk of degradation	1.1 Productive and protected forests and woodlands
			Bush burning	
	Open woodland of the Bokora Corridor	1.3	Bush burning	1.1 Productive and protected forests and woodlands
Bush land/ grassland	Kaabong bushy grassland	2.1	Water shortage for animals	1.2 Promote productive and sustainable rangelands 2.1 Livestock farming
			Overgrazing	
			Tree cutting for charcoal production	1.1 Productive and protected forests and woodlands
			Bush burning	
			Low productivity	1.2 Promoting productive and sustainable rangelands
	Kotido grasslands	2.2	Water shortage for animals	1.2 Promoting productive and sustainable rangelands
			Overgrazing	
	Lower Kotido grassland	2.3	Water shortage for animals	1.2 Promote productive and sustainable rangelands
			Overgrazing	
			Low productivity	
			Tree cutting for charcoal production	
			Water quality issues	
Wetland	Rivers of Kaabong	3.1	River bank erosion	1.3 Protect wetlands, rivers and flood plains
			Reduced water levels in the streams	1.4 Flood management systems and infrastructure
			High surface runoff and loss of soil	
	Upper Dopeth River and flood plain	3.2	High sediment deposition due to erosion from upstream agricultural area	1.3 Protect wetlands, rivers and flood plains
			Burning	
			Agricultural encroachment	
	Aduko wetlands	3.3	Encroachment by farming (northern part)	1.3 Protect wetlands, rivers and flood plains
			Potential risk of conflict between farmers and grazers	



	Wetlands of Okok around Napak	3.4	Potential risk of encroachment of agriculture	1.3 Protect wetlands, rivers and flood plains
			Conflict between farmers and pastoralist	
			Burning	
	Lower Lokok	3.4	Agricultural encroachment	1.3 Protect wetlands, rivers and flood plains
			Water logging	
			Flooding	
Small scale farm land	Around Kaabong	4.1	Low productivity and erosion	1.4 Flood management systems and infrastructure 1.2 Promote productive and sustainable rangelands
			Low groundwater potential	2.2 Rain-fed farming 3.4 Management of rural water systems
			Sanitation	3.5 Sanitation and hygiene
			Conflicts over resources	3.4 Management of rural water systems
	Around Kotido	4.2	Low productivity and erosion	2.2 Rain-fed farming
			Riverbank erosion	1.4 Flood management systems and infrastructure
			Low groundwater potential	2.2 Rain-fed farming
			Sanitation	3.5 Sanitation and hygiene
			Conflicts over resources	1.2 Promote productive and sustainable rangelands
	Recent agricultural settlements around Kapelebyong	4.3	Low soil fertility outside the wetland causing encroachment on into wetland for farming	1.3 Protecting wetlands, rivers and flood plains 2.2 Rain-fed farming
			Water logging	
			Weak market value chains	3.4 Management of rural water systems
	Amuria	4.4	Low soil fertility outside the wetland causing encroachment on into wetland for farming	2.2 Rain-fed farming
			Water logging	
			Market value chains	2.3 Micro-irrigation (<10ha)

### 5.3 Scenarios

Scenario analysis was undertaken to assess the “behaviour” and impact of the options or sets of options under certain expected circumstances or trends. Such analysis aims to select or prioritise those (sets of) options that counter certain negative trends or accelerate positive trends. This section introduces the scenarios, shows which trends affect the options and then describes the impact at catchment level of the options. The scenario analysis is based on the three implementable categories of options.

- Ecosystem protection and restoration;
- Strengthening resilience of improved water and sanitation, and
- Economic and agricultural development.



### 5.3.1 Scenario I - Ecosystem Protection and Restoration

A number of trends affect the catchment that can be addressed by the options that fall under the scenario of ecosystem protection and restoration. These trends include the increase in population that will cause intensification of unsustainable and destructive practices in cattle herding and agriculture which will threaten the ecosystem functions of woodlands and wetlands. The consequence of these trends can be that the upper wetlands of the catchment silt up more due to soil erosion from the agricultural zones and this might substantially change the water balance. Below in the models for the different scenarios is shown to what extent the peak surface runoff (and thereby also the soil erosion) decrease under this scenario. There is also a risk that arable land will deteriorate and more people fall in the poverty trap due to the degradation of agricultural lands. This can lead to increasing outmigration or urbanisation or alternative livelihoods such as goldmining or charcoal burning. These scenarios apply mainly to the upper and middle catchment zones while the lower catchment might also feel the impact due to changes in the water balance due to siltation of wetlands. There is a risk that this trend could be further exacerbated by the impacts of climate change, which will make agricultural lands more prone to soil erosion. The impact on the catchment of the options operationalized under this scenario are long term interventions which depend on the revival of ecosystem functions, the collaborative management of ecosystems and the restrictions on natural resources exploitation.

**TABLE 13: SCENARIO I - ECOSYSTEM PROTECTION AND RESTORATION**

Trends	Option	Impact at catchment level
<p>Increased deforestation caused by charcoal burning and agricultural encroachment likely to take place in zones nr 1.1 Timu Forest, 1.2 Abim hilly bushland and 2.1 Kaabong bushy grassland</p> <p>Increased resources encroachment into trees for firewood and charcoal by people from within the catchment, but also outside seeking to make business of charcoal.</p> <p>Increased demand of forest products such as neem will help to create more forest cover</p>	1.1 Productive and protected forests and woodlands	The proposed collaborative forest management will lead to an increase in tree coverage and water infiltration. The regulation of charcoal should lead to a decrease in denudation in critical zones. Provision of alternative tree products will also reduce surface runoff if interventions are strategically planned. Thereby option 1.1 presents huge opportunities for improvement of the catchment's water balance
<p>Disarmament likely to increase the number of cattle in the catchment and the pressure on existing boreholes, dams and valley tanks in the grassland zones particularly around 2.3, Lower Kotido Abim grasslands this might include international cattle migration from Kenya as well.</p> <p>Increased agricultural production and irrigation in zones of resettlement likely to cause more conflicts over water sources between pastoralists and farmers in zone 4.3 Settlements around Kapelebyong and 4.4 Amuria Agricultural sector</p>	1.2 Promoting productive and sustainable rangelands	This option critically addresses both the profitability of livestock as well as its function in landscape management. Traditional management of pasture and burning and improved spread of water facilities will dramatically reduce the pressure on grasslands. Thereby siltation of wetlands and rapid surface runoff can be avoided, particularly at areas already suffering from erosion. The emphasis on reduced agriculture in areas of highly variable rainfall in favour of pastoralism will equally have a positive influence on the vegetation cover.
<p>Major concerns here form the urbanisation of the population around Kotido and Kaabong causing the increased pressure on agricultural land. The scenario will be siltation of wetlands 3.2 Upper Dopeth riverbanks and 3.3 Aduko wetland.</p> <p>Resettlement around zones 3.4 Wetlands of Okok and 3.5 Lower Lokok, and the likely increase in agricultural production causing encroachment of the wetlands through the burning and the production of rice in the wetlands. Erosion would further destabilize the water balance.</p>	1.3 Protecting wetlands, rivers and flood plains	Protecting the wetlands and riverbeds will be a prerequisite to maintain the retention function and reduce the likelihood of downstream flooding. This option alone is not enough only in combination with the improved agricultural practices in zone 4.1 Agricultural zone of Kaabong and 4.2 Kotido agricultural zone can further siltation be prevented. Additionally, improved agriculture and reduced surface runoff from the agricultural lands downstream will also be required to reduce the pressure on the wetlands.
<p>Population increase and climate change likely to reduce shallow groundwater sources in the zone 3.1 the upper rivers of the catchment</p> <p>Increased need for agricultural lands demands sustainable forms of flood water regulation</p>	1.4 Flood management systems and infrastructure	These are typical catchment improvement mechanisms whereby retention and recharge infrastructure increase the water retaining function of the landscape and adds to the profitability. If done right the impact can be expected directly around the areas of intervention in terms of increased groundwater, increased agricultural opportunities. These interventions will



**TABLE 13: SCENARIO I - ECOSYSTEM PROTECTION AND RESTORATION**

Trends	Option	Impact at catchment level
		also positively influence the water balance slightly but not as much as for instance 1.1 or 1.2 might do.
Erosion and deforestation in the upstream areas negatively affects water balance, increasing the potential of flooding. the potential of floodwater recession agriculture in the downstream agricultural lands	1.7 Protecting rivers and riverbanks	Stabilization of the upper Kaabong and Kotido riverbanks will reduce the erosion of the riverbanks
Loss of sustainable productive agricultural options will increase the lure of petty gold mining as additional income. The impact of this small-scale mining at catchment level will be small and easy to overcome with better options of livelihood. Large scale mining will be likely to impact water reserves more substantially	1.6 Regulate impact of industry and mining on water resources	If investments in mining and industry also include people from the catchment and the impact on water resources regulated this option prevents negative impact on the water resources.

**SWOT-analysis**

- **Strengths:** The strength of this scenario is in the way in which the promotion or protection of vegetation (trees, grass, reeds) improves the water balance of the catchment. Soil which is left bare (or is burned bare) cakes or hardens (hard pans) and causes direct surface runoff. Vegetation reduces the impact of rain on the ground and slows down surface runoff, thereby also causing water to infiltrate or delay its arrival in the lower catchment. As can be seen in the hydrological modelling, should wetlands such as the Aduko wetland disappear, the impact on the lower catchment will be substantial. Surface water flowing from the upper agricultural areas will not be reduced in speed and silt load by the vegetation of the wetlands and directly increase the water table in the lower catchment. The protection of rangelands also provides a check on uncontrolled farmland expansion in areas where rain fed agriculture could be riskier due to variability in rainfall. These areas include the lower Kotido and Abim grasslands, particularly the section north of the Moroto - Abim road. In the lower catchment, the protection of wetlands will prevent further waterlogging and flooding downstream.
- **Weaknesses:** The weakness of the focus on the protection of natural vegetation is the constant attraction these areas have on the people of the catchment. Unless more profitable livelihood options are at hand or strong community based management, arrangements are in place the temptation to chop trees, open up wetlands or burn grass unplanned will continue to cause the deterioration of the catchment. Certain areas such as the Timo forest are already encroached by farmers, similarly the downstream wetlands are encroached for paddy or super rice production. Protection of ecosystems requires strong regulations and enforcement; it also requires communities around these areas to share the objectives with the protecting organisation.
- **Opportunities:** Opportunities include the development of management plans with communities. The wetlands in the lower catchment can be protected by community bylaws, alternative crops (upland rice instead of paddy) and the collaboration with district government. Rangeland management for improved pasture and reduced hard pans caused by burning can be arranged through collaboration with traditional pastoralist authorities.
- **Threats:** Population pressure and resettlement will continue to threaten the protection of critical areas. Drought also destabilizes pasture management.



**BOX 2: 3R – WATER RECHARGE RETENTION AND REUSE**

The Upper Lokok Catchment is known as one of the driest areas in Uganda. At the same time, the annual precipitation equals the rainfall of many European countries. The main cause of drought therefor is not the absence of rainfall, but the unequal distribution over the year. A set of methods and technologies that aim to keep the water in the system when its available and create a buffer for the rest of the year is gathered under the principle of 3R: Retention, Recharge and Reuse of water. Some of the techniques that fall under this method have been used since time immemorial, others have been tried and tested in other areas and can be implemented in new area.

Water recharge technologies aim to redirect surface runoff from fields or rivers into the ground. Storing water in the ground prevents water from evaporating, contamination and also causing problems with flooding downstream. Technologies such as a sand and sub surface dams, terracing and infiltration pits fall under recharge measures.

Water retention technologies store water when it is falling to be able to use it later. Common forms of retention are dams and valley tanks. Large scale surface water storage needs to be well understood from a catchment perspective: what is downstream from these dams and will this system benefit from reduced inflow.

Water reuse technologies focus on ways to keep water in the system, so to use wastewater for productive use. Water from households to work for small scale irrigation, but also water from roads can be redirected into dams or the ground rather than making it disappear.

Reference guides on 3R, water harvesting and water buffering can be sourced at <http://www.rain4food.net/sharing-documents/> or [www.bebuffered.net](http://www.bebuffered.net)

**5.3.2 Scenario II - Improved water and sanitation services for people**

Resettlement and population increase in some areas will be the main scenario to deal with when strategizing water and sanitation in the catchment. The consequence of these trends can be reduced sustainability, in terms of environmental sustainability (drying up of water sources) and technical sustainability (reduced operation and maintenance). This scenario particularly impacts the groundwater sources in the catchment, more than the peak surface runoff or soil erosion that have a more pronounced effect on the water balance.

**TABLE 14: SCENARIO II - WATER AND SANITATION**

<b>Trends</b>	<b>Option</b>	<b>Impact at catchment level</b>
Increase in population and use of infrastructure requires more operation and maintenance	3.1 Access to knowledge	When the focus is on boreholes and which are not complemented by water for production facilities a reduced availability of water could be risked
Increase in population but reduction of groundwater reserves	3.2 Monitoring and planning	Planning should include the combination of water for production and water for consumption. This could mean more surface water retention and thereby less surface runoff into the wetlands of the middle catchment.
Population increase and (re)settlements will cause a dramatic increase in the need to manage town water supplies in the towns of Kaabong and Kotido	3.3 Improve town / piped water services	Very limited if the groundwater reserves of Kotido and Kaabong are sufficient. If not the impact on the wellbeing of the people will be large and these towns might see less urbanisation.
Poverty will have an effect on the demand for clean water and the willingness to pay for water. If alternative (unprotected) sources of water remain available, poverty reduces market potential.		
Increased private sector development of markets will lead to better market supply of water services		
Climate change can reduce potential of surface water buffers or deep aquifers to sustainably provide the growing towns.		
Security and resettlement will increase the demand for improved water sources and potentially also the willingness to pay for water and the motivation to partake in the operation and maintenance.	3.4 Improve rural water services	The impact is minimal most of the rural water sources do not pump out water at such a quantity that it effects the catchment. Improvement of the rural water services will only very slightly reduce the groundwater availability.



**TABLE 14: SCENARIO II - WATER AND SANITATION**

Trends	Option	Impact at catchment level
Lowering groundwater potential in the upper catchment will increase the demand for alternative sources.  Government laws to ban the use of shallow aquifers reduced the potential for alternative water sources  The reduction of NGO activity and poorly equipped government extension services will reduce operation and maintenance.		The extension services should be sure that boreholes do not pump out water all the time to provide water for cattle, this will eventually negatively impact the catchment when the groundwater reserves deplete and cattle again go to large surface water bodies.
Increase of population will cause problems around settlements.  Areas where unsanitary practices are common see a further fragmentation of settlements as people move to new areas.  Areas with an increase of population (lower catchments) practice better hygiene practices.	3.5 Support households to improve sanitation and hygiene.	Little effect on erosion and peak surface runoff but large effect in water quality and prevention of diseases.

**SWOT-analysis**

- **Strengths:** The provision of water and sanitation for all will increase the wellbeing of the people in the catchment, reducing waterborne diseases and time wasted by women and children to collect water.
- **Weaknesses:** Currently the operation and maintenance aspect of WASH is poorly safeguarded in communities or local government. Implementation of boreholes has shown considerable problems with pollution reaching the water sources.  
The history of emergency relief in the upper catchment which brought free infrastructure led to many abandoned or poorly maintained boreholes. Boreholes are also overused to provide for cattle. The influence on the water balance is limited. The influence on groundwater might be negative should more boreholes be developed.
- **Opportunities:** Setting up standards for the implementing infrastructure and operation and maintenance. Opportunities exist which can focus on rechargeable and renewable shallow water sources to reduce the over reliance on deep groundwater. Additionally, opportunities exist to combine surface water storage for cattle with shallow or deep groundwater provision: the so called Multiple Use Services. A business approach to WASH could be promoted.
- **Threats:** Poverty will threaten water source sustainability when people decide not to invest in their own infrastructure. A business approach to WASH could be promoted but could be threatened by the organisations which continue to provide free or almost free infrastructure.

**5.3.3 Scenario III - Water for production and agricultural productivity**

The scenario foreseen here is that climate change and resettlement at marginal lands with variable rainfall threatens the productivity of agricultural land and rangelands. Furthermore, the surface runoff models in the next section show the dramatic increase of surface runoff should large tracks of grassland be turned into farmland. To counter this trend soil and water management principles should be promoted with subsistence and small scale farmers through incentives or conditional loans or programs. Population increase and market demands will increase the potential for more sustainable and diversified rain-fed agriculture, agroforestry or orchards. Potential for small scale irrigation or medium scale irrigation projects needs only to be attempted when farmers have the capital to invest in land and seeds, particularly in the lower parts of the catchment. At present there appears to be little potential besides programs that require substantial governmental or non-governmental support in O&M. The increased development of Uganda as a whole and the further urbanisation in the region will increase the demand for meat and the trend foreseen is that the areas with variable rainfall can play a large role in accommodating this trend. In these areas livestock production hinges on the availability of water at locations where there is no conflict with farmland development. There are large tracks of land that remain underutilized because of low water availability (see also Mugerwa et al 2014).



**TABLE 15: SCENARIO III - PRODUCTIVE WATER INFRASTRUCTURE, FARMING PRODUCTIVITY AND INCOMES**

Trends	Option	Impact at catchment level
<p>Climate change is likely to reduce rangeland productivity, particularly in combination with unsustainable forms of rangeland management and uncontrolled burning. This trend will set in motion the increased mobility of herds of cattle, not only from within Uganda, but also from outside, reducing profitability of livestock</p> <p>Longer dry spells will cause the depletion of smaller water sources in the rangelands of zones 2. Kaabong bushy grassland and 2.2 Kotido grassland thereby increasing pressure on larger water resources.</p> <p>Mobility will drive livestock to the more fertile and wet areas in the south and west if the above trend perseveres. It will also further increase erosion and siltation around the larger water sources in the north east.</p> <p>Increased market demand for beef likely to create more potential for value chain development in beef.</p>	2.1 Improving productivity and profitability of livestock farming	<p>The option indirectly affects the water balance in a positive way. If market outlets for livestock are improved this could mean more profitable forms of livestock management. In combination with the measures taken at option 1.1 the improvement of rangelands at the expense of agriculture in the areas with highly variable rainfall positively impacts the vegetation. Implementing water tanks and dams and particularly spreading of water sources and mobility of livestock and when done at landscape level form an excellent tool to manage large tracks of grass and bush land. Cattle follow water and spreading water points and making them limited in capacity but spread them out over the landscape reduces pressure on pasture.</p>
<p>Urbanisation in the upper catchment will create potential markets due to the increased demands for diverse agricultural production and value chain development and increased market access for agroforestry products such as neem will stimulate agricultural development in the upper catchment at zones 4.1 agricultural zone Kaabong and 4.2 agricultural zone Kotido</p> <p>Further (re) settlement in the lower catchment at zones 4.3 Agricultural zone around Kapelebyong and 4.4 Amuria agricultural zone will decrease vegetation cover and increase waterlogging of agricultural land.</p> <p>Fruit factory in Soroti will create positive impact on markets for fruits which improve land and water management practices in the lower catchment and farm productivity.</p> <p>Climate change will negatively impact the productivity in areas of increased settlement and unpredictable rainfall leading to soil depletion, erosion.</p> <p>Insecurity at the borders of agricultural areas around zones with little permanent agriculture in the middle catchment (zone 1.2 Abim hilly bushland and 2.3 Lower Kotido and Abim grassland) can be foreseen when climate change or water depletion causes increased migratory practices of pastoralism.</p>	2.2 Improving productivity and profitability of rain-fed farming	<p>This option has been singled out as having the highest possible impact on the water balance. In all the agricultural zones the increase of land under agriculture is directly affecting the water balance through increased erosion, increased direct surface runoff and decreased water buffering and infiltration. Improving the productivity of rain fed farming through improved methods of soil and water management (in situ) or river related productivity (spate irrigation, recession agriculture) will reduce the direct siltation and peak discharges in the adjacent wetlands.</p>
<p>Poverty will reduce the potential for farmers to find investment capital for seeds and land improvement to make small plots a success. Donor driven demonstration plots will only be sustainable as long as the donor is there, but the decreased donor interest in the catchment will reduce the potential.</p> <p>Climate change: erratic and patchy rainfall will affect the potential of small scale irrigation due to high or low inflow of small reservoirs. In the areas in the north the increased evaporation will further reduce the potential.</p>	2.3 Support uptake of micro-irrigation (<2ha)	<p>Only very indirectly will this impact the catchment. Reservoirs for micro irrigation do not have high impact on the water buffer and are not recommended in the agricultural zones 4.1 Agricultural zone Kaabong and 4.2 Agricultural zone Kotido because of evaporation. Downstream, not unless ponds or tanks are implemented at an enormous scale, the impact on surface runoff will also be limited.</p>



**TABLE 15: SCENARIO III - PRODUCTIVE WATER INFRASTRUCTURE, FARMING PRODUCTIVITY AND INCOMES**

Trends	Option	Impact at catchment level
<p>O&amp;M is a major obstacle; people cannot be supported forever to do O&amp;M and desilting is a major issue. Increased dependency on external support renders this option less favourable in areas where donor dependency is a trend.</p> <p>The lower catchment, around zone 4.3 agricultural land around Kapelebyong and 4.4 Amuria agricultural zone have higher potential since people are increasingly resettling and entrepreneurial. Also in these areas, the evaporation might be less.</p>		
<p>Poverty will reduce the potential for farmers to find investment capital for seeds and land improvement to make small plots a success.</p> <p>Donor driven demonstration plots will only be sustainable as long as the donor is there. Unless a popular form of tenure can be devised and an entrepreneurial form of O&amp;M we foresee that large irrigation projects will remain fully dependant on external support. In the current trend of reduced donor interest and further emphasis on self-perpetuation of development solutions the large-scale irrigation.</p>	2.4 Medium irrigation projects (>2 ha)	If medium scale irrigation should be considered from groundwater sources the impact will be negative on groundwater reserves. Medium-sized and large dams in the upper catchment will reduce inflow of water in the middle catchment. This is not necessarily good since the wetlands depend on these floods. Peak discharges during extreme rainfall events will possibly still enter the midstream wetlands. Another impact is the trampling of soil by cattle that come to drink. In all cases the principle on grassroots interventions and spreading of water sources should be the more sustainable initiative.
<p>Increased security leading to increased transport likely to lead to more roads.</p> <p>Investments in infrastructure by central government creates more potential for road water harvesting.</p>	2.5 Promotion of road water harvesting	A typical no regret measure with positive but small impact. Filling of borrow pits with water, diverting road drains, elevating culverts are all small measures which have a positive impact on agriculture, vegetation and the water balance.

### SWOT-analysis

- Strengths:** The scenario that follows from these interventions typically strengthens the majority of the people in the catchment through the provision of support for their livelihoods. The options outlined above already focus on the sustainable increase of production, so the improvement of small scale farming and the improvement of livestock in line with the best possible option for the environment. This model is preferred above the other project intervention whereby farmers receive external support for free or where tracks of land are opened to irrigation for investors from outside the catchment and turned into monoculture cropping through mechanized agriculture. For the sake of the scenario the analysis or the confrontation table follows more closely that economic rationale whereby increase of agricultural land, even with mono-cropping and mechanized agriculture, determines the surface runoff model.
- Weaknesses:** From a catchment perspective, the increase of extensive agricultural land can lead to siltation of the wetlands downstream or downslope from the agricultural zones. Even the productivity of these lands will be reduced by the lack of soil and water conservation methods.
- Opportunities:** The options focused primarily on the development of value chains, for instance in sorghum, fruit or beef and goat, these being the main sources of production in the catchment. Market improvement here will lead to the development of viable numbers of cattle and more sales. It will also slowly move from a subsistence farming method to a more production oriented farming method. At the same time the opportunity to collaborate with cattle keepers on rangeland management, improving areas for fodder production will help to improve the situation of the cattle keepers of the area without negative effects on the catchment. For the farmland areas, the distinction is between the upper catchment whereby the best opportunity is in soil and water management interventions through conditional support in farm inputs. Also in the upper catchment, the emphasis on water retention for livestock can keep the cattle herders longer in the upper catchment so they don't need to travel in search of water. In the lower catchment, irrigation and alternative crops can give the push towards production which is less detrimental to the water balance.



- **Threats:** The scenario of increased farmland production in the upper catchment can potentially threaten the productivity of the farmlands and also lead to siltation of the Aduko wetland. The increased agricultural production of the lower catchment further threatens the ecology of the wetlands as well as lead to siltation. Medium-size and large dams on the upper catchment reduce the inflow of water into the wetland and can lead to further encroachment into these wetlands by farmers.

#### 5.3.4 Impact analysis scenarios 1, 2 and 3

##### *Model set-up*

The scenarios are incorporated in the Lokok-Lokere hydrological SWAT-model to assess the impact of the combination of options on the catchment water balance. Each scenario was compared to the benchmark model. The impact on the water balance was simulated using the 30-year climate data series (1984-2014) (sim 1) and a data series with climate change projections incorporated up to 2040 (sim 2) using the average projections from UK Met Office (2010).

The following scenarios models were compared:

- Benchmark model: Current situation (2016)
- Scenario 1: Ecosystem protection and restoration
- Scenario 2: Improved water and sanitation services for people
- Scenario 3: Water for production and agricultural productivity

To simulate the water balance for the catchment the combination of options first has to be translated to model inputs. The options needed to be translated to impact on land cover, the extent in which soil and water conservation measures are applied, the projected condition of wetlands, water storage and abstraction rates, population growth, the volume of water for irrigation and the condition of wetlands (see Table 16).

As explained, each of the scenarios was run for two situations, one with and one without climate change. The model outputs were post-processed using Python-scripts into water balance tables, runoff-rainfall ratio maps, and graphs showing the river flow at different locations for low, normal and high outflow conditions.

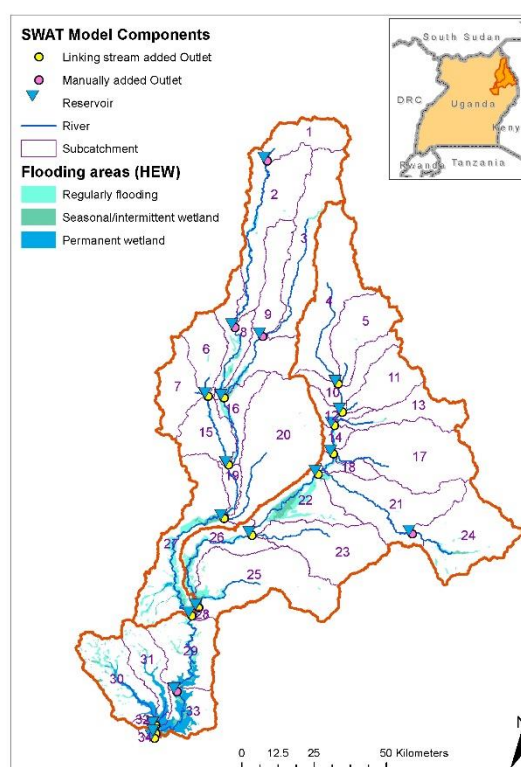


Figure 32: Lokok-Lokere hydrological model set-up



**TABLE 16: PROJECTED CHANGES FOR THE THREE SCENARIOS (INPUT TO THE HYDROLOGICAL MODEL)**

Model	Land cover, wetlands, management practices	Water abstraction	Climate data input
<b>Benchmark model</b>	Current situation	Current water abstractions	1984-2014
<b>Scenario 1: Ecosystem protection and restoration</b>	All forest reserves fully covered by forest. Full soil and water conservation in all croplands. Bare soils into grasslands. Grasslands to shrub lands. Wetlands increased with 30%.	Water abstractions for water supply follows population growth, minimum coverage (20l/d rural, 35 l/d urban)	Simulation 1: 1984-2014 Simulation 2: Climate change up to 2040
<b>Scenario 2: Improved water and sanitation services for people</b>	Land cover in Matheniko and Bokora reserve remain the same. Land cover outside reserves will further deteriorate: grassland to cropland, shrubland to grassland, wetlands-grassland to cropland wetland-woodland to wetland-grassland, forest and woodland to grassland-shrubland. Result cropland increased 2.4 times, from 2844km <sup>2</sup> to 6700km <sup>2</sup> .	Follows population growth + high supply/capita: rural to 50 l/cap, urban to 100l/cap	Simulation 1: 1984-2014 Simulation 2: Climate change up to 2040
<b>Scenario 3: Water for production and agricultural productivity</b>	Similar to Scenario 2. In addition, shrubland (in benchmark) changes to cropland wetlands (except swamp vegetation) to cropland. Large reservoirs (valley dams) are added in the model in each sub catchment to supply water for irrigation.	Water supply follows population growth. Irrigation abstractions: Irrigation with water-intensive cash crops, Lokere 14700 ha = 87 Mm <sup>3</sup> /year irrigation water needed. Lokok 6000 ha = 35 Mm <sup>3</sup> /year.	Simulation 1: 1984-2014 Simulation 2: Climate change up to 2040

### Land cover

The refined land cover map (refined using Landsat 8 satellite imagery of 2015, developed during this project) was adapted for the different scenarios. Together with soil and slope, land cover is one of the three static input parameters for the model. Figure 33 provides the land cover maps that were developed for the benchmark model and the scenarios.

To project land cover change for each of the scenarios, first the autonomous land cover change was looked into. In the water resources assessment and strategic social environmental assessment, it was found that the agricultural lands in the catchment are expanding. Over the last 25 to 30 years the area covered by farmlands around Kotido, Kaabong, Moroto and Lopei-Lokopo doubled. In the lower parts of the catchments farmlands grew into the wetlands and in northern direction. More recently new patches arose around Lorengedwat, Arecek, Lorengechorai and Kapelebyong. The condition of forests under the auspices of NFA deteriorated. Encroachment of wetlands is seen at many different locations, both in Lokok and in Lokere catchments. Only the areas under management of UWA remain more or less intact. These trends were used as the starting point for the projection of land cover for the different scenarios.

Under Scenario 1 Ecosystem Protection and Restoration the condition of the NFA-protected areas improves considerably. The tree-density of the forest reserves increases, and farming is excluded. Farming is also no longer allowed in the wetlands. The expansion of agricultural lands is halted, while the productivity and sustainability are increased through the widespread application of soil and water conservation measures. Existing degraded lands are recovered. The condition of rangelands and woodlands improves as improved management techniques are applied in collaboration with communities.

Under Scenario 2 Improved water and sanitation services for people it is assumed that nothing is done to protect and/or improve vegetation cover, and address environmental degradation in general. Hence the existing trends will continue. The area covered by agricultural land will increase, the condition of forests, woodlands and rangelands deteriorate. Only the areas under UWA will remain unchanged.

Under Scenario 3 Water for production and agricultural productivity the trend towards crop farming will be stimulated. Hence by 2040, except for some protected areas, the whole catchment will be covered by rain fed farmlands. Wetlands will have been encroached and only the permanently flooded ones remain in place.



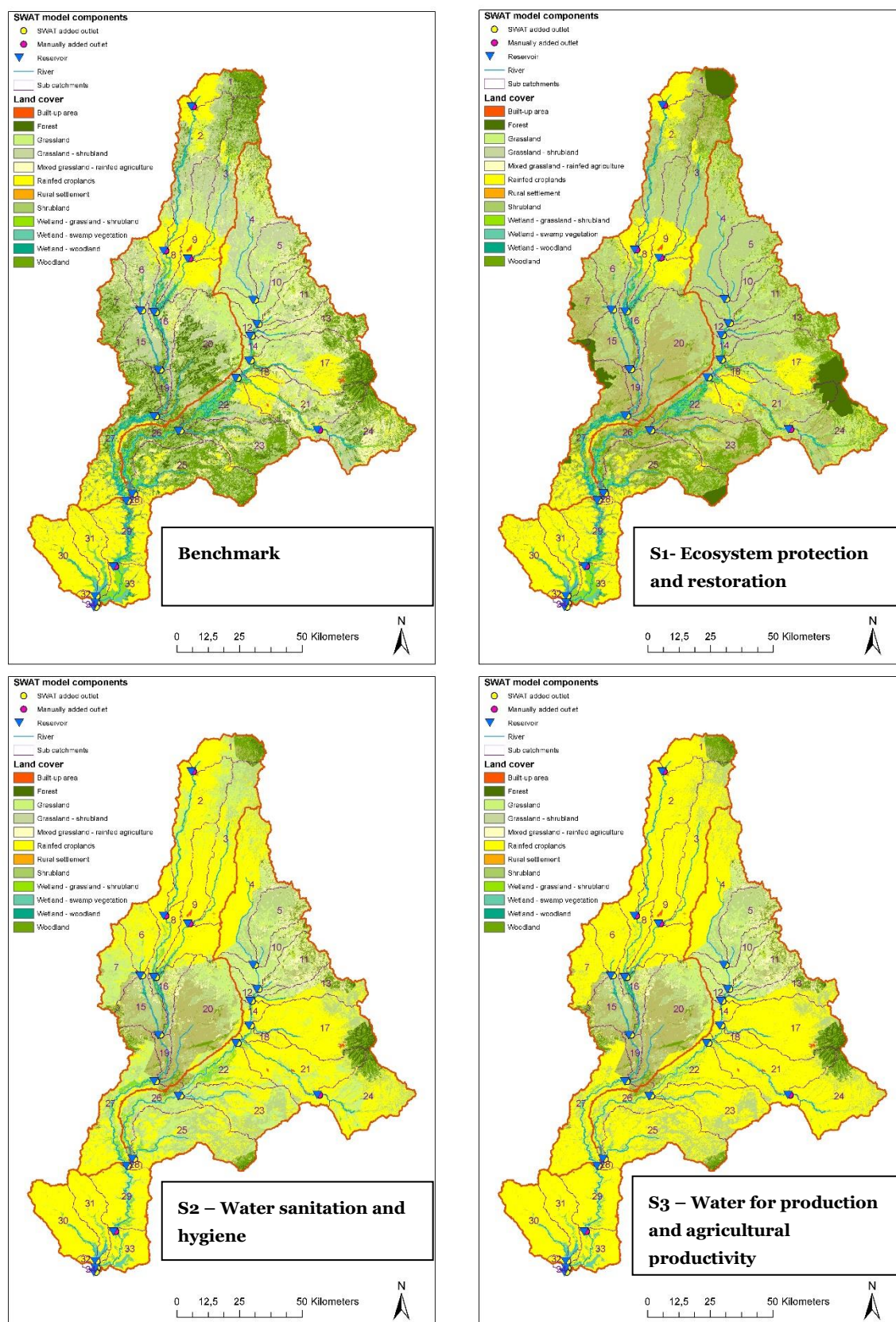


Figure 33: Projected impact of the different scenarios on the land cover in Lokok and Lokere catchments.

### Impact of climate change and land cover on the water balance

Climate change has a large impact on the water balance (Table 17). As one of the major drivers of the hydrological cycle, precipitation increases with almost 20% and becomes more erratic. The impact is non-linear: runoff-rainfall ratios triplicate and river outflow duplicates for all three scenarios. Such changes may lead to an aggravation of flooding in lower lying areas. On the other hand, the increase in rainfall also lead to more recharge of both shallow and deep aquifers.



The interventions have a huge impact on different aspects of the water balance. Under the current climate conditions average surface runoff equals 44 mm/year in the ecosystem protection scenario (Scenario 1), 54 mm/year in the improved water and sanitation services for people scenario (Scenario 3) and 54 mm/year in scenario that focuses only on water for production and agricultural productivity (Scenario 3). In Scenario 3 water for production and agricultural productivity the high runoff is intercepted by dams and valley tanks. Ground- and surface water abstraction is the lowest element in model runs.

**TABLE 17: LOKOK WATER BALANCE YEARLY AVERAGES IN MM/Y FOR THE THREE SCENARIOS, UNDER CURRENT CLIMATE CONDITIONS (SIM1) AND UNDER CLIMATE CHANGE (SIM2)**

Scenario	Precipitation	Evapotranspiration	Surface runoff	Shallow aquifer recharge	Deep aquifer recharge	Surface water abstraction	Ground-water abstraction	River outflow
Benchmark	735	616	55	77	4.0	0.7	0.4	60
Scenario 1 Sim1	734	621	44	77	4.07	0.35	1.34	60
Scenario 1 Sim2	952	691	115	172	9.05	0.35	1.34	169
Scenario 2 Sim1	734	617	54	76	4.01	0.35	3.34	64
Scenario 2 Sim2	952	686	134	166	8.76	0.35	3.34	186
Scenario 3 Sim1	734	619	54	84	4.42	22.5	1.34	46
Scenario 3 Sim2	952	687	134	175	9.19	22.5	1.34	140

**TABLE 18: LOKOK WATER BALANCE YEARLY AVERAGES IN MILLION M3/Y FOR THE THREE SCENARIOS, UNDER CURRENT CLIMATE CONDITIONS (SIM1) AND UNDER CLIMATE CHANGE (SIM2)**

Scenario	Precipitation	Evapotranspiration	Surface runoff	Shallow aquifer recharge	Deep aquifer recharge	Surface water abstraction	Ground-water abstraction	River outflow
Benchmark	4052	3398	301	423	22	3.6	1.9	333
Scenario 1 Sim1	4051	3425	245	427	22	1.9	7	330
Scenario 1 Sim2	5252	3810	635	948	50	1.9	7	934
Scenario 2 Sim1	4051	3405	296	420	22	1.9	18	353
Scenario 2 Sim2	5252	3783	737	918	48	1.9	18	1027
Scenario 3 Sim1	4051	3414	296	463	24	124	7	251
Scenario 3 Sim2	5252	3790	737	964	51	124	7	773

### **Surface runoff**

The scenario analysis clearly illustrates the impact of land cover change and land use practices on the water balance. Land cover changes can have a large impact on surface runoff, infiltration and streamflow and other water balance components. Especially, when vegetation cover is reduced, for example due to deforestation, wetland destruction and expansion of agriculture without adopting swc measures.

In scenario 1 (ecosystem protection and restoration) the impact of good vegetation cover and especially soil and water conservation measures in agriculture is obvious (Figure 34). Even when precipitation is high, surface runoff is low to very low. In scenarios 2 (improved water and sanitation services for people) and 3 (water for production and agricultural productivity) rates are higher due to a combination of land degradation. Climate changes aggravates the situation. These figures indicate that particularly the hourly and daily water balance will be strongly affected. High runoff-rainfall ratios may result in high peak discharges and severe flooding, erosion and increased hydrological droughts.



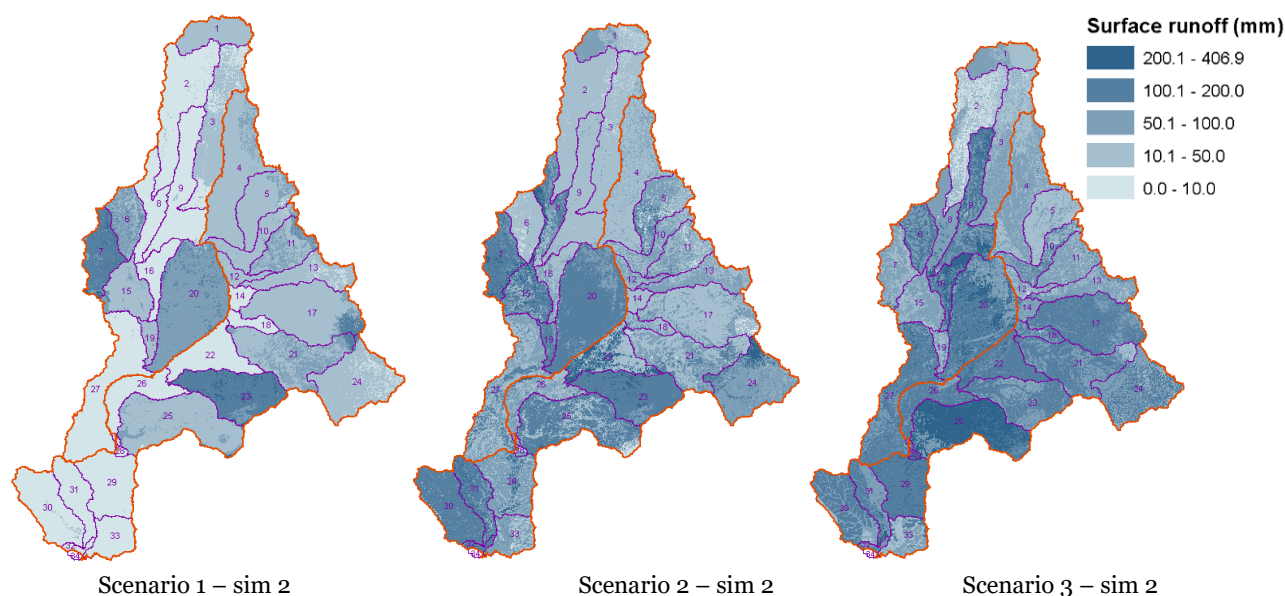


Figure 34: Surface runoff in mm/year for the three scenarios with climate change incorporated

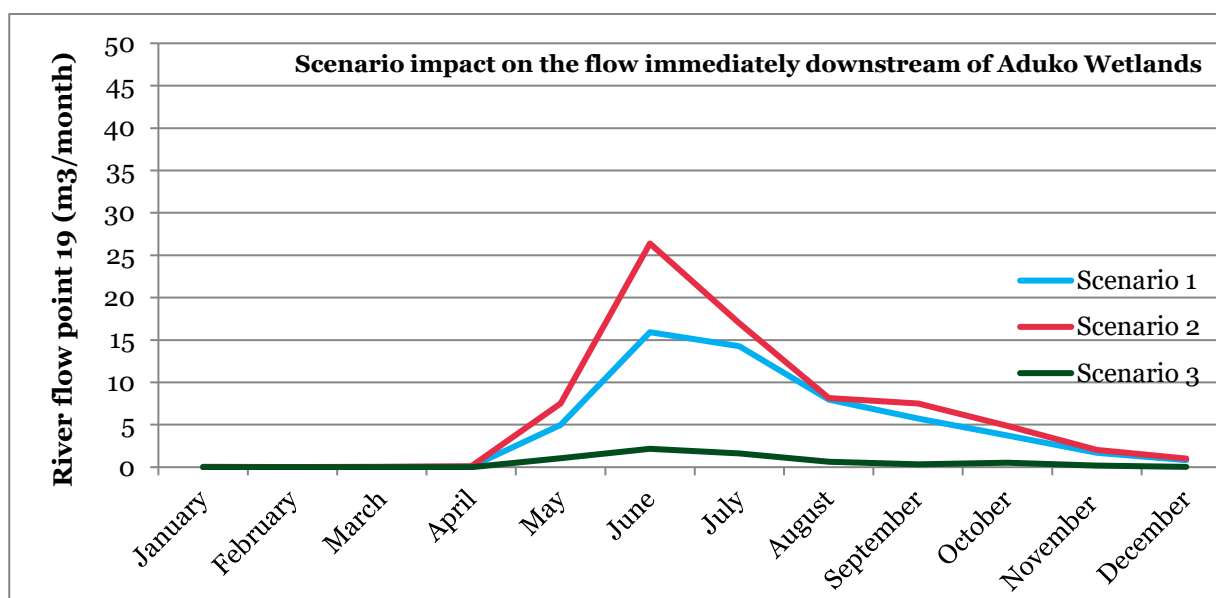


Figure 35: River flow at sub-catchment 19, shown for three different scenarios using climatic data of 1991 as an example year (left), and manipulated climatic data of 1991 to represent climate change (right)

### River flow

Under current climate conditions, river flow is much lower in this location in scenario 3 under current conditions than in the other two scenarios. However, in conditions of climate change differences between the scenarios are very small.

Figure 36 provides the river outflow for different rainfall return periods. Although the peaks of scenario 1 (ecosystem protection and restoration) are lower than those of scenario 2 (water and sanitation), the total difference in catchment outflow is not much lower. This is due to the increased return flow in the model (flow from the shallow aquifer to the stream), much of the additional rainfall that infiltrates in scenario 1, becomes return flow. So the base flow of the rivers increases in scenario 1 (ecosystem protection and restoration). In the stream flow of scenario 3 (productive water infrastructure) the impact of the large reservoirs is clearly visible. Although the surface runoff comparable to scenario 2 and the benchmark situation, river flow is lower in all the presented return periods. Especially in the dry years, streamflow is low to inexistent for most of the year. Such developments could prove disastrous for downstream water users and wetland ecosystems.



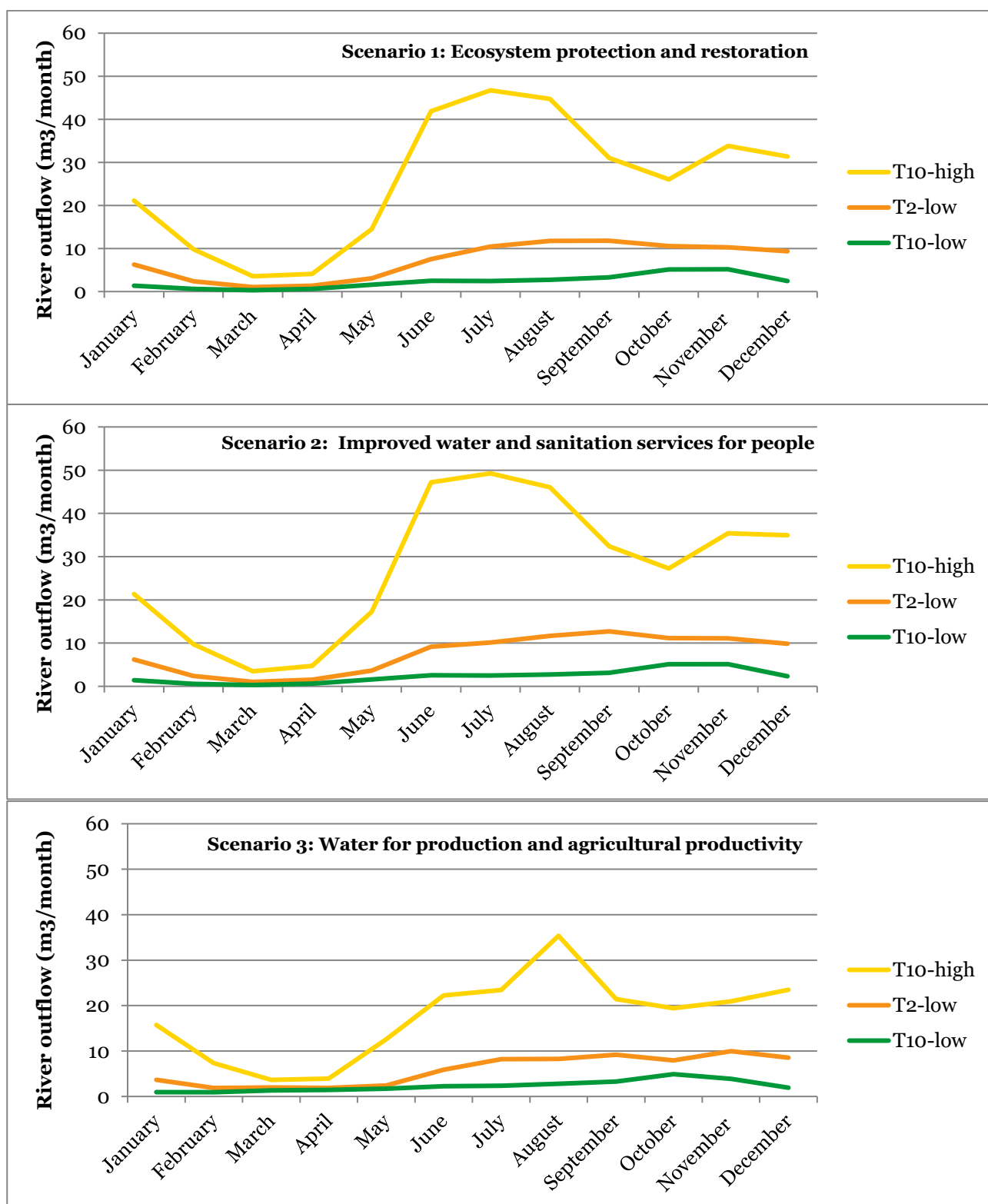


Figure 36: River outflow for different rainfall returns periods, for three scenarios under current climate conditions

### Conclusion scenario analysis

Scenario 1 provides the best results for water balancing in the catchment, while having a positive impact on the environment in the catchment. Water is retained throughout the landscape and the flow through the system is slowed down, although not to the level of Scenario 3. This provides increased resilience to the main climate related hazards in the catchment (droughts and floods) in combination with other environmental and economic benefits.

Increased abstractions for water supply (excluding irrigation) have a very limited impact on the water balance. Even in Scenario 2 (high abstractions) the 2040 situation, total abstractions only are 0.5% of precipitation. However, due to the



absence of environmental protection efforts the water retention capacity of the system reduces. Hence on the short term the options included in this scenario may result in a higher safe water coverage, but in the long term the water resources are undermined, and floods and droughts aggravate.

Scenario 3 results in very high runoff-rainfall ratios. The storage capacity of the soils and shallow aquifers is seriously reduced. At the same time storage in surface water reservoirs is invested in and this has quite a large impact in the water balance. The outputs show that, in Lokok Catchment, are able to store quite a large amount of water. In the case of Scenario 3 the flow almost ceases downstream of Aduko Wetlands.

### 5.3.5 Maximum benefit scenario

The scenario and SWOT analyses show that only a combination of interventions from the three different categories can address the water resources use and management issues in a manner that is sustainable in the long run. Interventions of the category of ecosystem restoration and protection, water and sanitation and economic development have to be combined. Only then can effective and equitable economic development, protection of water resources, and disaster and climate resilience be achieved in the catchment. Hence a maximum benefit combined scenario was formulated by the consultants, based on discussions with the CSF in November 2016, the CMC in January 2017 and KWMZ in January-February 2017.

In the maximum benefit scenario, environmental protection and restoration is spearheaded. The forest managed by UWA are recovered, wetlands are protected and restored, and rangeland and woodland management improved the condition of these lands (Figure 37). Instead of expanding farmlands, crop production is intensified in the existing areas whereby soil and water conservation measures are applied to increase both the water retention capacity of the soils, and the productivity. Water for production reservoirs are built as in the scenario on water for production and agricultural productivity, but care is taken that no facilities are small enough and well-distributed to avoid local environmental degradation. Since the impact of water abstraction for domestic use has barely an impact in the catchment water balance, in the maximum benefit scenario the investments in water and sanitation are taken as in Scenario 2.

A model simulation of this maximum benefit scenario shows that rainfall-runoff rates are lowered as in Scenario 1 (Figure 37). The widespread application of soil and water conservation measures on agricultural lands reduces to 0 to 10 mm/year. This very low surface runoff is one of the most effective ways to control soil erosion, while increasing the availability of water in the soil profile, and hence supporting an increase in agricultural productivity.

When taking into consideration changing climate conditions, average river outflow increases greatly, but much less than in any of the other scenarios.

Under the simulating conditions of the maximum benefit scenario the T10-lowest annual river outflow (i.e. dry year) equals 154 Mm<sup>3</sup>/year, hence the minimum environmental flow of 20% of annual average river outflow (66 Mm<sup>3</sup>/year) is guaranteed. However, there is a period of almost four months during which there is no-flow (Figure 38). Currently, there are no indications that this is a problem, but it is important to monitor the impacts of the changes closely as the system is fragile.

The maximum benefit scenario seems suitable for Lokok Catchment. It enhances the productivity of rain fed agriculture, provides the opportunity to expand irrigated agriculture, increases safe water coverage, while at the same time ensure the availability of water resources in the long term. Yet it remains important to stress that the model includes a great number of uncertainties and focuses on the impacts at catchment level, while the effect of interventions at local level maybe considerable and it is unclear how the biological system will react to the changes in water flow. When planning, designing and constructing interventions (whether it is about protection, restoration or water infrastructure) it is essential to assess also these changes. In addition, the figures show how important it is to establish a functioning and reliable (surface water, groundwater, water quality and biological) monitoring systems on the short term, while at the same time investing in the further calibration of the hydrological model.

In the next chapter the findings of this options and scenarios chapter is translated to a consensus interventions plan.



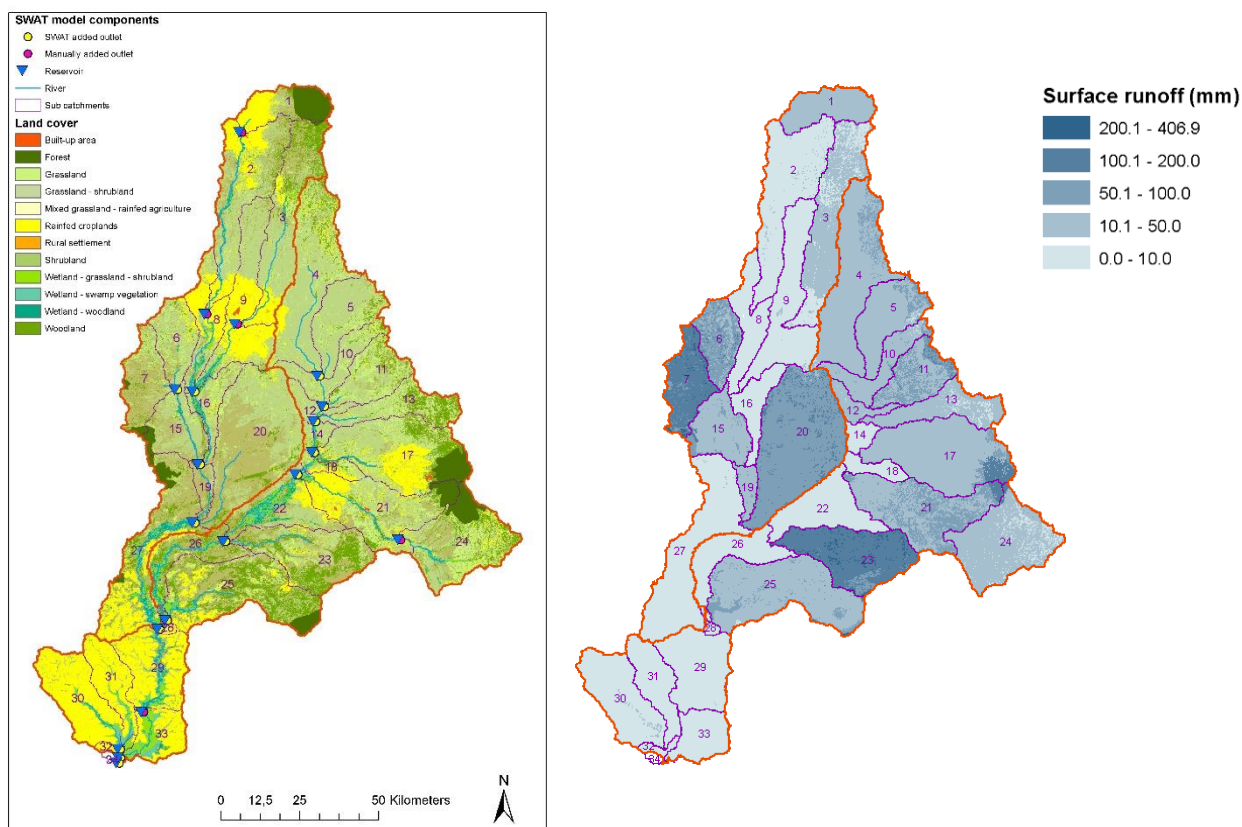


Figure 37: Left: Projected impact of scenario 4 on the land cover in Lokok and Lokere catchments. Right: Surface runoff in mm/year for scenario 4 with climate change incorporated

**TABLE 19: LOKOK WATER BALANCE YEARLY AVERAGES IN MILLION M3/Y FOR THE FOUR SCENARIOS, UNDER CURRENT CLIMATE CONDITIONS (SIM1) AND UNDER CLIMATE CHANGE (SIM2)**

Scenario	Precipitation	Evapotranspiration	Surface runoff	Shallow aquifer recharge	Deep aquifer recharge	Surface water abstraction	Ground-water abstraction	River outflow
Benchmark	4052	3398	301	423	22	3.6	1.9	333
Scenario 1 Sim1	4051	3425	245	427	22	1.9	7	330
Scenario 1 Sim2	5252	3810	635	948	50	1.9	7	934
Scenario 2 Sim1	4051	3405	296	420	22	1.9	18	353
Scenario 2 Sim2	5252	3783	737	918	48	1.9	18	1027
Scenario 3 Sim1	4051	3414	296	463	24	124	7	251
Scenario 3 Sim2	5252	3790	737	964	51	124	7	773
Scenario 4 Sim1	4051	3424	245	334	18	124	7	230
Scenario 4 Sim2	5252	3782	737	661	35	124	7	771



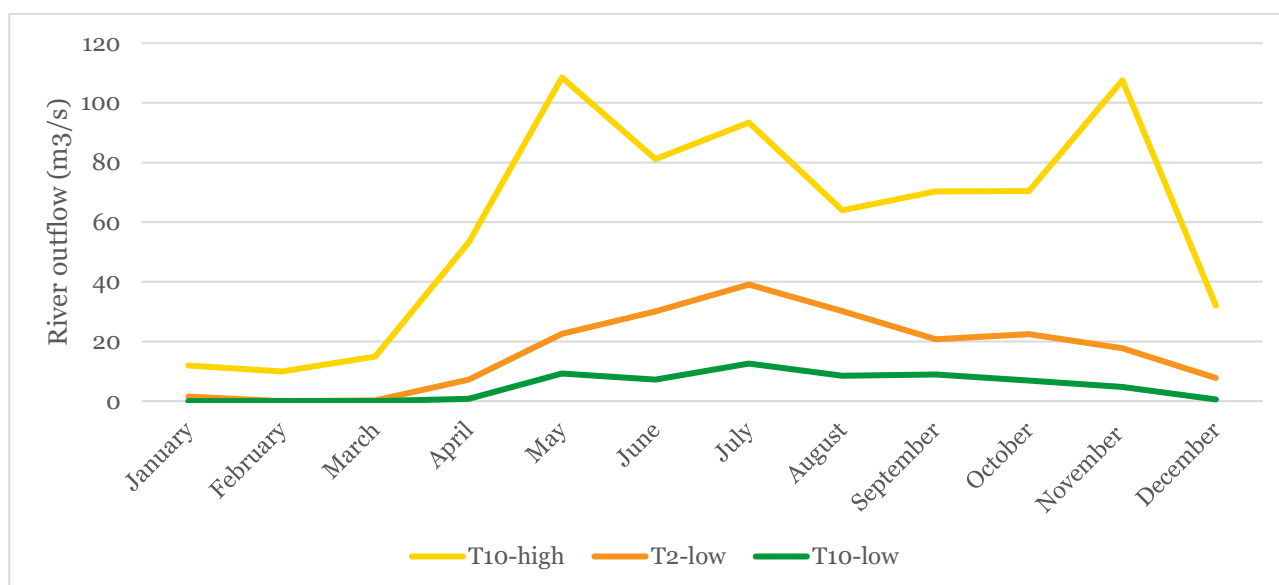


Figure 38: Lokok River outflow for different rainfall returns periods, for the maximum benefit scenario, for different rainfall return periods, taking into consideration climate change.

**TABLE 20: LOKOK WATER BALANCE YEARLY AVERAGES IN MILLION M3/Y FOR THE FOUR SCENARIOS, UNDER CURRENT CLIMATE CONDITIONS (SIM1) AND UNDER CLIMATE CHANGE (SIM2)**

Scenario	Precipitation	Evapotranspiration	Surface runoff	Shallow aquifer recharge	Deep aquifer recharge	Surface water abstraction	Ground-water abstraction	River outflow
Benchmark	4052	3398	301	423	22	3.6	1.9	333
Scenario 4 Sim1	4051	3424	245	334	18	124	7	230
Scenario 4 Sim2	5252	3782	737	661	35	124	7	771







## 6. INTERVENTIONS

Based on the solid process of assessment of issues, needs and opportunities, the development of a vision and strategic objectives, and the analysis of options and scenarios, a catchment management plan has been compiled which presents the interventions which compose the maximum benefit scenario, and hence form the consensus plan. These interventions address required technology and infrastructure, operation and maintenance, rules and regulations, administrative changes, economic instruments, research and social change instruments. The interventions contribute to the vision and objectives the stakeholders have developed for Lokok Catchment.

### 6.1 The consensus

To ensure access to water of sufficient quantity and quality, and mitigate floods water retention and storage in the catchment is fundamental. Conservation and restoration of wetlands and forests, and improved management of agricultural land and rangelands, is hence critical. Large areas of the wetlands in Lower Lokok have already been irreversibly lost, but an effort must be made to avoid further degradation. For the wetlands in Middle Lokok (Aduko Wetlands and wetlands of Okok around Napak) applies that everything needs to be done to conserve the wetlands that are still intact and restore what is degraded. No longer agriculture should be allowed into these areas. Tree cover in Timu Forest Reserve should be recovered and expanded together with NFA, and the strict environmental protection measures by UWA in the Bokora Corridor should be perpetuated. Improved soil and water conservation management of all agricultural lands should be pursued, but especially those in but especially those in Upper Lokok (Kaabong agricultural zone and Kotido agricultural zone). The vegetation of rangelands has to protected and enhanced, which can best be achieved through smaller (<50 000 m<sup>3</sup>) and better distributed water for production facilities in the catchment to reduce the concentration of cattle, and improved rangeland management practices (e.g. controlled grazing, exclosures, farmer managed tree regeneration). Provision of sufficient surface water for livestock at strategic points will also reduce the pressure on boreholes.

To support sustainable economic development which does not undermine the natural resource base. Intensification of rain-fed crop production should be promoted, through improved supply of inputs, application of soil and water conservation measures, and strengthened market linkages. Existing water for production facilities should be rehabilitated and there use extended, particularly towards micro- and small scale irrigation, which will prove an important contribution to food security, nutrition and health status, and economic development. Also new water for production facilities have to be built. At least to cover the water for livestock shortages in normal years (4 Mm<sup>3</sup> in Lokok and Lokere combined), and preferably also moving towards coverage of the gap in dry years (28Mm<sup>3</sup>). Alternative sources of income should be studied and promoted towards reducing the pressure on the natural resources base. On the short-term water availability for domestic use and small-scale irrigation can best be improved through low-cost techniques, such as subsurface and sand dams, rooftop rainwater harvesting, compound water harvesting and rock water harvesting.

Site selection, design, construction, operation and maintenance of water infrastructure (including valley dams, valley tanks and boreholes) has to be optimized as failure, non-functionality and poor water quality are often the result of inexistent or insufficient (hydrological) assessments, in part due to the limited availability of adequate professional expertise. Locally shallow groundwater should supplement costly and high maintenance boreholes. Sanitation should be improved throughout the catchment and piped water supply asserted to all rural and urban growth centres but primarily to Kaabong, Kotido and Nakapelimoru towns.

To implement these measures, it is first and foremost needed that the enabling environment is strengthened. There is a dire need for policy enforcement, regulatory measures, stakeholder involvement, access to information and data, coordination and dialogue, and integration of traditional management practices into governmental guidelines. Climate, water resources quantity and quality, and water infrastructure have to be monitored in more detail, in a more reliable manner, and to the advantage of more stakeholders (i.e. the data should be accessible). Lower priority, but not less important in the long run, is the establishment of financial instruments which aim at reducing the dependency on external funding and promote economic development in the catchment.



## 6.2 Thematic area of intervention A: Institutional strengthening

The enabling environment supports the functioning of all actors. It refers to the policies, regulations, laws, budgets, procedures, systems, structures, culture and power relations which are all critical factors for water resources management. They are about organizations, responsibilities, rights and relations. These formal and informal instruments at the level of national government, local authorities and communities support the creation of assets, determine access to systems and structures, facilitate participation and thereby determine the return from any chosen strategy to water resources management and related livelihoods. Through institutional strengthening the enabling environment is transformed to optimise the support of water resources management by policies, regulations, laws, budgets, procedures, systems, structures, culture and power relations. Thereby it lays the basis for sustainable impact within the other strategic areas of intervention.

Following the process of deconcentration of water resources management by the Ministry of Water and Environment through CBWRM, Lokere Catchment needs a supporting institutional set-up at catchment level. The guidelines for CBWRM prescribe the structure for Catchment Management, including the Catchment Stakeholder Forum, the Catchment Management Committee, the Catchment Technical Committee and the Catchment Management Secretariat. With the establishment of the Catchment Management Organisation (CMO) some responsibilities are devolved to the CMO and the role of the KWMZ changes to one of providing support and technical assistance to the CMO and districts. Through stakeholder participation and representation in the different CMO bodies the given structure facilitates the institutionalisation of catchment management to the lowest levels. The planned activities under this category will support the implementation and strengthening of these structures.

The Catchment Stakeholder Forum and the Catchment Management Committee have been established in 2016 and need to be further capacitated for their tasks in implementation, monitoring and evaluation of the Catchment Management Plan (CMP). CMO bodies need to be formalised and registered in order to fulfil their tasks. The Catchment Technical Committee and the Catchment Management Secretariat still need to be established. KWMZ will supervise and monitor the CMO institutions. Thereby they must refrain from acting as CMS and/or CTC. DWRM is responsible for the rules and regulations.

Further strengthening of the institutional environment includes planning, implementation capacity and knowledge management for all catchment stakeholders. This CMP links various stakeholders from the different levels of Water Resources Management as well as the administrative structures including the catchment, its sub-catchments and micro-catchments, the districts, sub-counties and communities and the WMZ as presented in the horizontal red and pink blocks in Figure 39. Catchment management furthermore requires integration of many sectors, including water, farming, infrastructure and education to mention some. Collaboration between sectors should be strengthened and IWRM knowledge should be built in non-water departments. Development of plans to better manage rangelands, wetlands, forests or farmland require these sectors to work together. All this cross-sectoral coordination is shown in the brown vertical blocks which also link again to the different administrative and WRM levels. By working in multi-sectoral teams during collaborative planning, monitoring and review processes, learning visits and joint assessments, this integrated way of working will become institutionalised.

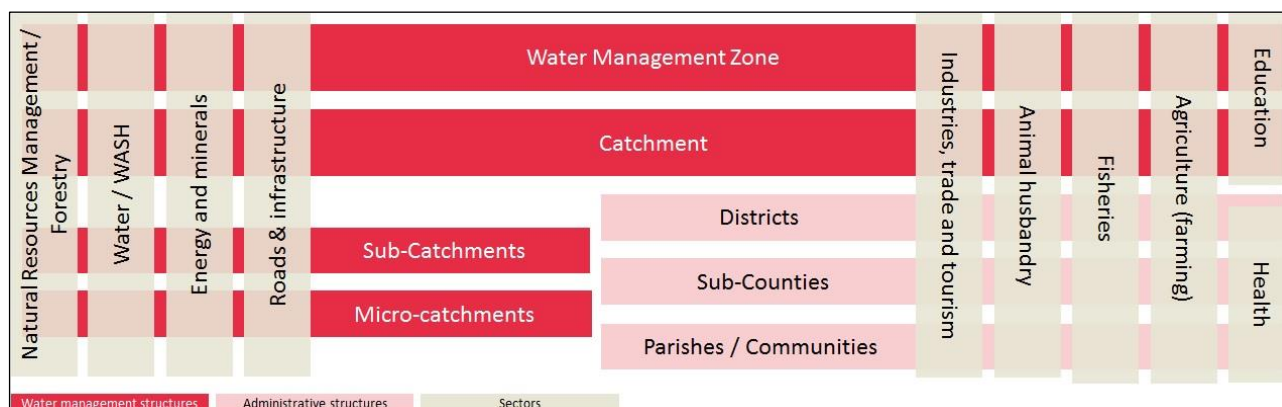


Figure 39: Integration of water management structure, administrative structure and sectors

Capacity strengthening to implement the CMP needs to address the funding constraints and skills shortages, as District technical offices currently operate with many vacant posts, and many of the CMP interventions attribute a major task to



the Districts and involve strengthening of extension services and local planning. With the additional responsibilities and implementation demands, the Districts require strengthening by training and skills development of existing staff, but also recruitment of new staff. On top of that, sufficient funding needs to be ensured and systems and policies need to be in place. Whilst some extension services can be provided by NGOs or SMEs, District Government must be involved in planning and coordination in order to assure political legitimacy of the plans, so that the plans have political legitimacy and so that local plans feed into and inform district planning processes. This requires district extension services to be expanded. Furthermore, districts capacity should accommodate for their role in coordination and project supervision as well.

The interventions to strengthen the institutional capacities are grouped in 1) Strengthening of the Catchment Management Organisation, 2) Monitoring and evaluation of the CMP implementation, 3) Coordination at District level, 4) Sub-catchment, micro-catchment and community action planning, 5) Funding of the Catchment Management Plan, 6) Learning and knowledge management, and 7) Business Development.

**TABLE 21: INSTITUTIONAL STRENGTHENING**

Results		
<ul style="list-style-type: none"> <li>Effective catchment management organisations</li> <li>Collaborative and inclusive planning, implementation, monitoring and evaluation of Catchment Management Plan</li> <li>Coordination of activities across geographical scales, administrative units and sectors</li> <li>Funding for CBWRM</li> <li>Continuous learning and proper knowledge management for wider application</li> <li>Upscaling of effective interventions through appropriate business models</li> </ul>		
Interventions		
<b>Strengthening the CMO:</b> <ul style="list-style-type: none"> <li>Implementation of CMO governance system</li> <li>Support and strengthen the CMC</li> <li>Establish the CMS</li> <li>Support and strengthen the CSF</li> <li>Establish and support the CTC</li> </ul>	<b>District level coordination:</b> <ul style="list-style-type: none"> <li>Prepare districts for CMP implementation</li> <li>Cross-sectoral district operations</li> <li>Guide lower level CMP implementation</li> <li>Guide development partners</li> </ul>	<b>Learning and knowledge management:</b> <ul style="list-style-type: none"> <li>Awareness raising on CBWRM and CMP</li> <li>Capacity building</li> <li>General stakeholder learning</li> <li>Knowledge management</li> </ul>
<b>Monitoring and evaluation of CMP implementation:</b> <ul style="list-style-type: none"> <li>CMP review</li> <li>Policy development</li> </ul>	<b>Sub-catchment, micro-catchment and community action planning:</b> <ul style="list-style-type: none"> <li>Sub-Catchment management</li> <li>Micro-catchment management</li> </ul>	<b>Funding of the Catchment Management Plan:</b> <ul style="list-style-type: none"> <li>Proposal and partnership development</li> <li>Innovation fund (basket fund)</li> </ul>

### 6.2.1 Strengthen the Catchment Management Organisation

The Catchment Management Organisation (CMO) consists of the Catchment Stakeholder Forum (CSF), the Catchment Management Committee (CMC), the Catchment Technical Committee (CTC) and the Catchment Management Secretariat (CMS). The Catchment Stakeholder Forum (CSF) was established in the public consultation held in Kotido on September 6 2016. The Catchment Management Committee was established in the CSF meeting in Soroti on November 16 2016. The Catchment Secretariat and the Catchment Technical Committee still need to be established. The following interventions will enable each of the CMO bodies to fulfil their task and from this position support the implementation of the Catchment Management Plan.

#### *Implement CMO governance system*

The guidelines for Catchment Management Planning and later interpretations describe the different roles and responsibilities in Catchment Management. These include DWRM, KWMZ, the CMO and its different bodies, the districts and other involved institutions. For the CSF, CMC, CTC and the CMS to fulfil their prescribed tasks their mandate, responsibilities, reporting structures etc. need to be formalised. Furthermore, it should be clear how they relate to each other and how they collaborate with the other institutions involved in Catchment Management.

Besides the relations within the catchment the CMO will relate to institutions outside the catchment. The CMO has to create an efficient and effective working relation with the deconcentrated departments of MWE which are based at the WMZ and vice-versa the MWE offices at the WMZ should support the CMOs to perform their task.



As part of a sustainable Catchment Management Organisation it is recommended to explore opportunities how the CMO can create income as a structural minimal basis for their functioning. Opportunities to explore include contributions by districts and payment for ecosystem services by catchment actors. The exploration should also include the legal structure of the CMO in general and the CMC in specific. If the CMC is expected to earn income and manage funds the legal structure should allow this.

### ***Strengthen and support the Catchment Management Committee***

The Lokok CMC was established in November 2016. The CMC members will be (re-)elected every 3 years. See for the actual CMC composition Annex E. During the Lokok CMC elections it appeared that some stakeholder groups were underrepresented. Open positions for the following groups need to be filled to complete the Lokok CMC team:

- CBO representing fishermen
- Elder / cultural institution
- Government agency
- Private sector

After these open positions have been filled the draft CMP needs to be discussed with these new CMC members. They might have other interests or needs and the CMP should be a consensus of the needs of all stakeholders. When interest of different stakeholders (groups) conflict, the CMC should look for an optimal solution taking into account the health of the ecosystem and the sustainable use of its services by different actors.

After its formation, the CMC has participated in the Catchment Management Planning process through another consultation in January 2017 in which they were asked to give their input to the Implementation Plan including the selection of interventions, locations, implementing actors and budget. Through their participation in the different CSF meetings and the CMC meeting a basic understanding of CBWRM has been created. Further capacity strengthening is planned to address:

- IWRM: the process which promotes the coordinated development and management of water, land and related resources to maximise economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems.
- Multi-stakeholder processes: the process to promote better decision making by ensuring that the views of the main actors concerned about a particular decision are heard and integrated at all stages through dialogue and consensus building.
- Collaboration: the CMC brings together different actors from different backgrounds and with different interests in the catchment. Collaboration enables the CMC members to work together to achieve a defined and common purpose. Working as a committee requires capacities on, among others, communication, openness, knowledge sharing, motivation, participation and trust.
- Conflict management: with all the stakeholders and their different interests it is inevitable that conflicts will arise at a certain moment. These conflicts can emerge within the CMO bodies or in the “field” as catchment management is a day-to-day business. The CMC should take up an active role to limit the negative aspects of conflict while increasing the positive aspects of conflict.
- Project management: many interventions will require a project approach in which the criteria of the intervention are defined as well as the route for realisation, communication, reporting, resources, risk management, etc.
- Resource mobilization: funding for implementation of the CMP can come from different sources including ministries, public, private sector and development partners. Each source requires its own approach to get access to the available funding.
- M&E: tracking of progress and results and action in case of deviation from the plan or when new insights arise.
- Guiding implementing partners: all stakeholders of the catchment play a role in implementation of the CMP. The CMC will play an active role to coordinate and give guidance on priorities, approaches and activities to be implemented.

### ***Establish Catchment Management Secretariat***

The CMS provides administrative and support services to the CSF, CMC and CTC. The CMS will host and support meetings. The secretariat is the home (or one of the homes) for the catchment’s knowledge resources and catchment data. The CMP provides a framework for learning, monitoring and evaluation. The CMS could further support the continuous Catchment Management Planning cycle by the development of a CMP M&E framework and collection of baseline and monitoring data.



KWMZ has confirmed to act as the CMS at the initiation stage of the newly established structures of the CMO and the implementation of the CMP. At a certain stage this function should be taken over by an individual or team in the catchment. The CMC could explore if this position could be hosted at a CSO active in the catchment or if a new office should be created at one of the involved districts.

### Box 3: Multi-stakeholder process facilitation

Effective participation of catchment stakeholders is central to the CBWRM approach. The ways in which stakeholders are involved, what they are involved in and how their inputs are used will be crucial in achieving the overarching CBWRM objectives<sup>11</sup> of:

- increased awareness and appreciation of the resources systems and challenges and costs of managing them sustainably;
- instituting sustainable and equitable approaches to IWRM through broadening the scope of knowledge and perspective involved in strategic planning;
- assuring 'buy-in' to the objectives of water resources management strategies and plans and, therefore, greater ownership and cooperation in their delivery;
- strengthening partnership-working and concerted action to produce better environmental management outcomes;
- increased information and experiences sharing leading to enhanced transparency and accountability in resources utilization; and,
- conflict management in resources utilization.

The catchment stakeholders are very diverse and range from, among others, water users, CBOs, NGOs and cultural leaders, to government agencies, district offices, politicians and private companies. These different groups have different interests in catchment management and have different influencing power to realise their visions. The Catchment Management Plan is a result of a process of intensive consultation of different stakeholder groups as well as interaction and collaboration of these different groups. Especially the Catchment Stakeholder Forum is the platform to support this process. As their representation at smaller scale, the CMC should be the driver of this multi-stakeholder interaction.

In the continuous Catchment Management Process, the differences between stakeholder groups also require continuous attention. It is important to bring and keep on board the decision makers as these are the people who have power to make the changes which are needed to achieve the CBWRM objectives. The water users, identified as primary stakeholders, have a high interest but their power to influence is limited. By mobilising and empowering this group, their voices and interests can be brought forward and addressed. (i) NGOs and CBOs can be their allies and support them in this process. Regarding the institutions with high power, but with little interest in CBWRM, it is recommended to link up with them in order to get them on board and convince them of "what is in it for them". KWMZ should follow this process of inclusive participation closely and support the CMC to understand different views as well as to facilitate the interaction.



### ***Support and strengthen the Catchment Stakeholder Forum***

The CSF brings together all stakeholders and provides for a formal platform to provide input to, review and finally endorse the Catchment Management Plan (CMP). The CMP is a living document and review should take place on a regular basis, including re-assessment (scoring) of options for the management of the catchment and update of the stakeholder assessment in order to timely include new actors and take out those actors which have pulled out of Lokok Catchment.

The CSF can function as a platform for information sharing. Some of the stakeholders will not be part of the CMC or CTC, but the CMCs and KWMZ have to maintain communication with them and can call upon them to participate on a case by case basis and through the CSF.

### ***Establish Catchment Technical Committee***

The Catchment Technical Committee (CTC) is the technical arm of the CMO. The CTC is foreseen to be a pool of experts formed from the technical staff from stakeholders in the catchment (local governments, NGOs, private sector, etc.), and technical staff of other ministries and government agencies (see annex D CMO membership). The CTC brings technical expertise and knowledge during the formulation and review of the catchment management plan, can be involved in implementation of programs / projects from the plan, and generally ensures that the different districts in a catchment collaborate to implement the plan. Up to end of 2016 no CTCs were established in Uganda, even though several CMCs are

<sup>11</sup> Source: Operationalisation of Catchment-based Water Resources Management (MWE/DWRM 2010)



already in place. For Lokok Catchment it is foreseen by DWRM that the CTC can be established by the third or fourth quarter of 2017.

#### Responsibilities:

- The CTC supports the CMC in the coordination of the stakeholder driven definition of key water resources related issues in the catchment that require consideration.
- Support the CMC to promote coordinated planning and implementation as well as stakeholders driven decision making related to integrated and sustainable development and management of water and related resources in the catchment.
- Support the CMC in developing plans for coordinated, integrated and sustainable development and management of water and related resources in the catchment.
- Support CMC in developing Catchment Management Plans and their presentation to the Catchment Stakeholders Forum for endorsement.

The district technical officers will participate in the CTC as part of their regular task. It is of essence that the district resources accommodate for this. NGOs and private sector technical experts can be hired for specific assignments on demand.

### 6.2.2 Monitoring and evaluation of the CMP implementation

Developing a plan is just part of managing the Catchment. After planning comes implementation and next to that a continuous review and adjustment process should be installed. Subsequently through structured dialogue on the implementation of the catchment management plan, policy gaps are timely identified and the actors are available to contribute to policy development based on practice.

#### **CMP review**

The Planning Team of KWMZ has led the CMP development process. Now the CMC needs to take over the lead in the CMP implementation and review. The CMC will quarterly discuss progress of the plan. The CSF will annually discuss progress of the implementation of the CMP. As part of the annual meeting, there is an opportunity to refine the options scoring framework so that the whole plan or options within the plan are evaluated against the most relevant framework. An evaluation of effectiveness and efficiency of the CMP should take place on a 5-year cycle. This evaluation should also include the review of the strategic objectives. A mid-term review will be undertaken after 2,5 years.



In a later stage, also management plans at sub-catchment and micro-catchment levels will be developed. These plans will be subject to a similar monitoring and evaluation process by sub-catchment management committees and micro-catchment management committees, each reporting to the next level of the catchment management structure.

Besides the continuous planning process, data must be collected in order to support fact-based decision making. A CMP M&E framework will support this process and will facilitate structured monitoring and evaluation of the CMP. NGOs and others should align their monitoring in order to facilitate data delivery for the CMP and DDPs. Availability of this knowledge base strengthens impact measurement of development initiatives, fact-based decision making and thereby will increase the access to funds. The development of purposeful and effective interventions (and sourcing for their funding) is much easier when sufficient information is available to properly understand the problem and when there are clear systems for monitoring impact and learning lessons. Good M&E starts with strong baseline studies and collaborative planning so proposals should provide sufficient funding for this. At the development of the M&E system, a computerised model should be investigated, like used by ACTED for drought early warning.

#### **Policy development**

Discussion of experiences with CMP implementation and learnings collected through the M&E process will facilitate identification of policy gaps. Policy development should be on the agenda of the quarterly CMC meetings. KWMZ and DWRM support policy development at national level and the required linkages to other sectors.



The CMP also requires several by-laws and ordinances as indicated under the thematic areas of intervention of Ecosystem management and restoration, WASH and Economic Development. The CTC will support formulation and implementation of these by-laws and ordinances at catchment level.

### 6.2.3 Coordination at district level

Districts local councils have the legal mandate, technical staff and capacity to manage funds and activities within their district boundaries. As such, the districts play an important role in Catchment Management and CMP implementation through their own actions and by partnering with CSO actors. The CMP will guide their activities on water resources management and the related sectors. Furthermore, they are an important link towards other CMP implementers at the level of sub-counties, parishes and communities, as well as development partners, private sector and NGOs.

#### ***Prepare districts for CMP implementation***

A first step in the implementation of the CMP is to get the political support and endorsement by the different district executive councils. Furthermore, in order to coordinate and lead the district IWRM agenda, the districts will appoint focal CMP points. (One of) the technical officer representing the district in the CMC is best positioned as one of the focal points to transfer CMC discussions and developments to the districts. Additionally, the District Natural Resources Officer has been identified as the best placed technical officer in the district to coordinate CBWRM and CMP implementation in the district. If the DNRO is also the one representing the district in the CMC the district will appoint another second focal person.

Whilst the CMP guides water resources management at catchment level, the District Development Plan (DDP) guides development sector-wide at district level. It is therefore critical to align these two guiding documents. After a first intensive planning process at catchment level, the DDPs need to be aligned in order to adopt choices made and priorities set.

Subsequently, whilst the CMC coordinates CMP implementation across districts, districts will be responsible for implementation of many of the interventions within their district. The districts thus must be equipped and strengthened in their capacity to coordinate, monitor and support partners to implement the CMP interventions within their respective districts. This requires a structured capacity building plan that looks at both human and financial resources required. Emphasis will be on strengthening extension services, sustainability and value for money. Activities include, but do not have to be limited to, Human Resource Development Planning, developing in-house courses and professional development, scholarships, etc.

#### ***Cross-sectoral operations***

By representation of all different sectors in the CSF, CMC and CTC, the CMO actively promotes sectoral coordination for integrated water resources management, meaning the integration of different district ministerial sectors in the planning process. The CMC should take a further facilitating role in regular sectoral coordination, like the promotion of joint planning, monitoring and evaluation meetings between technical officers within districts. District Planner, supported by DNRO and the technical officer who is member of the CMC, should lead quarterly cross-sectoral planning / coordination / learning meetings per district. Districts report to the CMC and thereby link their district planning and monitoring cycle to the CMP PME cycle. Further sectoral coordination could be organised along similar lines as existing coordination structures as the WASH coordination meetings or the DRR platforms. These structures serve as a learning and knowledge sharing platform, as well as a structure for coordination and integrated planning. Under the other intervention areas specific acceleration platforms are proposed.

#### **Box 4: Acceleration platforms**

An acceleration platform is a selected group of people from the CMC who coordinate a larger group of service providers from different departments and connect existing programs/initiatives – including value-chain programs on forestry, beef, sorghum etc. Acceleration platforms create linkages between different providers and are active in developing service-packages, i.e. bundles of products, finance, advice and business linkages to help kick start enterprises of projects.

#### ***Guide lower level CMP implementation***

Just as it is the role of the CMC to coordinate, supervise and support the work of the districts and align their work with the CMP, so it is the role of the Districts to repeat this role at a more local level. This group of activities focuses on the technical delivery capacity of districts, sub-counties, parishes and development partners at the local levels. These partners may be NGOs, cultural or religious institutions, CBOs, women's groups, cooperatives or small businesses. The existing Disaster



Management Structure which goes down from national, to districts, sub-counties, parished and communities might serve very well to coordinate CBWRM.

The technical capacity includes on the one hand the implementation capacity of the district technical offices to deliver services itself, or to manage the grants and contracts that enable others to deliver services. On the other hand, the districts require the capacity to supervise and support the work of others. This includes reviewing and approving proposals, as well as supervising, providing support to the delivery partner. Investment is required so districts can provide a more active supportive role to partners in implementation. The districts (budgeting by objectives / structured capacity building plan) must be enabled to strengthen especially their extension services, as well as to the collaboration between sectors and build IWRM in non-water departments.

### ***Guide development partners***

The CMP and CMC should encourage and support the districts to assess and approve or reject plans of development partners against the catchment plans. The CMP and DDPs should be leading documents to guide development partners as well as NGO projects. A supportive tool can be a framework for proposal appraisal. Districts should instruct the development actors to collect data to feed CMP monitoring and further fact-based decision making. Development activities should be tracked by the district supported by tools developed by the CMS.

On the other hand, the districts can establish partnerships with development partners with relevant technical capacity to provide training or support on CBWRM to district officers. If a project involves bringing in external expertise, it should be a requirement that the project also seeks to strengthen the District Council's capacity by active involvement in the project.

## **6.2.4 Sub-catchment, micro-catchment and community action planning**

More close to sub-counties, parishes and the water users are the levels of sub-catchment and micro-catchment. A sub-catchment and micro-catchment will specifically invite water users to participate and take action in their own living environment.

### ***Sub-catchment management***

Lokok Catchment hosts 3 sub-catchments: Dopeth, Kolinyang and Lokok (see Figure 18). The process of sub-catchment based water resources management is part of the CBWRM process. Splitting up the catchment in smaller sub-catchments can make it easier to organise stakeholders' participation for the planning and implementation of the CMP, as it involves less people to get something done and it is closer to their homes. KWMZ or DWRM could support the CMC to lead the sub-catchment planning process by providing specific guidelines to sub-catchment management planning. After assessing the sub-catchment stakeholders, a sub-catchment management committee can be formed, which actively participates in the development of the sub-catchment management plan. Once the plan is available, implementation and monitoring could start at sub-catchment level, following the same quarterly meeting cycle.

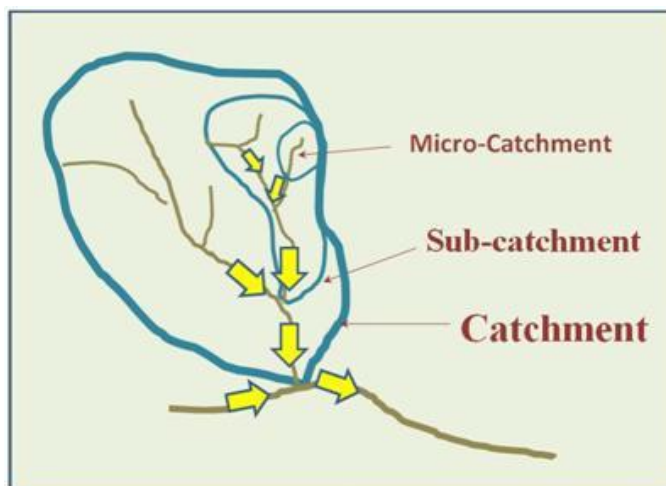


Figure 40: Different levels of catchment based planning

The earlier developed atlas of the Dopeth Sub-catchment and the Kotido and Kaabong resilient development plan can form a solid basis for the development of a management plan for Dopeth Sub-catchment. This plan was developed in cooperation with Caritas Kotido and the district governments of Kotido and Kaabong.

### ***Micro-catchment management planning***

Communities are the most important stakeholders to bring sustainable change. Their participation is very essential for the success of the Lokere CMP. The interventions will affect them directly and therefore their participation from planning to



completion is paramount. To ensure full stakeholder participation it is important to involve stakeholders at a level relevant to them. Community engagement can be promoted best through micro-catchment management.

Micro-catchments are the smallest hydrological units. Their extent is defined by the location of the outlet (also known as pour point). The location of this outlet is chosen in such a manner that the area is manageable by a micro-catchment management committee. Experience (for example from Tigray and Somali regions in Ethiopia) shows that units with an average area of 5 km<sup>2</sup> are suitable, as these are areas for which the hydrological system can be understood by the local population. Micro-catchment management is especially suitable for water management in populated areas. In areas with a very low population density, management at sub-catchment level is more appropriate and suffices. Indicative calculations show that it would be appropriate to set up micro-catchment management in the agricultural zones of Kaabong, Kotido and Amuria, which together cover approximately 1/5 of the total catchment area. With a catchment area of slightly over 5500 km<sup>2</sup>, this would come down to some 200 micro-catchment management organizations.

The extension services system needs to align with the CBWRM approach. Thereby the extension services staff can support the micro-catchment management. The extension staff should facilitate and enable villagers to map their micro-catchment and plan water usage and water resources management. The village action plan or micro-catchment plan needs to be multi-sectoral including wetland planning, rangeland zoning, water safety and community managed disaster risk reduction. There is no need to set up a new structure for micro-catchment management. Existing structures, like watershed committees, water users committees, dam management committees, valley dam committees, or Disaster Management Committees, are well placed to be involved in a micro-catchment planning and management process.

Activities include:

- Development and dissemination of a manual on 'How to develop a micro-catchment management plan'.
- Development of micro-catchment maps and plans, which could include wetland/rangeland zoning and land use planning, water safety planning and community based disaster risk reduction.
- Through quarterly participatory review meetings, communities will have an opportunity to acquaint themselves with what is happening in the micro-catchments and their role in making the project succeed.

### 6.2.5 Funding of the Catchment Management Plan

Implementation of the CMP requires funding. Funding can come from different sources including government, private sector, local contributions and donors. Establishing partnerships for funding requires preparation in proposal development and account management. Apart from project related funding, the catchment is recommended to establish an innovation fund, which is not easily done, but will give opportunities for research and piloting which again will help in acquiring further funding.

#### ***Proposal and partnership development***

The richness of stakeholders active in the catchment or otherwise interested or involved in the catchment gives opportunities for partnerships to enrich development activities and work more efficiently by joining efforts. Partnerships can be developed with private sector, (I)NGOs or other international development partners, research institutions and academia. Each have their specific added value and sector of interest. Based on the stakeholder assessment, the CMC should identify strategic actors it wishes to collaborate with on specific parts of the CMP and engage with them. A list of stakeholders per sector and their possible contribution is included in Table 27 in chapter 8.2. A full list of identified stakeholders and their possible engagement in catchment management is included in Annex C. An MoU (Memorandum of Understanding) can help to document these collaborations. Institutional donors are often interested in actions implemented by and bringing together different actors. As such, partnership development can support acquisition of funding for the implementation of the CMP.

In order to position oneself well among potential funders of the CMP, as well as to prioritise among the different possible interventions and to timely respond to funding opportunities, it is recommended to prepare for action through:

- Develop an evidence base of field and desk research, surveys and consultations to support the evidence base required for project proposals.
- Identify possible community-led activities which can be easily adopted by NGOs for inclusion in proposals for funding.
- Conduct feasibility studies and market research to test options and provide baseline data and evidence to support proposals.



- Develop and assess concept notes and business cases in order to select those initiatives for investment which are expected to be feasible and sustainable.
- Explore opportunities for funding of the implementation of the CMP through climate finance funds.
- Develop and implement a fund-raising plan to explore possible public and private partners for implementation of catchment management interventions, research, knowledge management, or funding. Establish a catchment donor platform (or through the Karamoja IWRM group) where donors, NGOs, business partners and other implementers/funders can discuss the opportunities to invest in Lokok Catchment.

### ***Innovation fund***

Limited access to credit, finance and technology to set up enterprises and to diversify livelihoods with the potential to improve the lives of the vulnerable communities is a big challenge faced within the catchment. Most funding will be granted to districts, NGOs or CBOs based on a specific plan listing one or more activities and targeting one or more locations. To address this issue, an innovation fund that provides subsidies or grants and support exploration of potential and develop business cases for innovative interventions will be established. This will enable to freely investigate techniques and approaches which best fit the area and address the local needs in the most optimal way. Within given boundaries the CMC can decide itself what to use it for. A so-called innovation fund can facilitate the funding of studies, pilot projects, and demonstration projects by government, NGOs or others. Also small grants can be given to communities as an incentive to start and maintain environmentally friendly activities. The establishment of such an innovation fund need further investigation on the possible governance structure, processes and procedures for the management of the fund, building on models for existing –albeit smaller- funds such as Village Savings and Loan Associations (VSLAs) and the Community Environment Conservation Fund (CECF) explained in Box 5. The CMS can provide administrative support to such a fund, while the CMC is the account holder and decides on which initiatives to fund.

The possible contributors to an innovation fund needs further research, but examples include tourists and mining companies (both of whom might be willing to pay a small “catchment management tax”), cattle markets and donors. The CMC should think of a way to see if fees on livestock marketing can be brought back as investments into water for livestock facilities (valley tanks and valley dams). Similarly mining (sand, marble, gold) companies or individuals need to be charged a fee for their extraction activities and the revenue can come back into stabilisation, improvement of piped water facilities or surface water storage in dams.

In order to attract outside sponsors there must be a clear plan with the objectives of the fund, criteria of eligible actions, accountability and reporting. It will require an active outreach strategy to attract sponsors to pool their funding in a catchment management innovation fund.

#### **Box 5: The Community Environment Conservation Fund (CECF)**

Developed by IUCN, the CECF is a mechanism for communities to access micro-credit for livelihood improvements in exchange for engaging in sound management of the natural resources. The fund is conditioned to the implementation of specific natural resources management activities and attainment of agreed communally set targets during for example a (micro) catchment planning process. As of 2014 the CECF had been implemented in Moroto district (Mogoth Parish, Rupa Sub-County) in Lokere Catchment, Kotido District (Naponga Parish, Rengen Sub-County) in Lokok Catchment, Lira, Alebtong, and Otuke of Aswa Catchment, and in Kiruhura District in Rwizi Catchment.

Source: IUCN (2013), IUCN (2014), Egaru (2014)

### **6.2.6 Learning and knowledge management**

Within learning and knowledge management different levels can be distinguished starting from general awareness raising of the catchment stakeholders on the plan and on CBWRM in general. Targeted learning can be organised for highly involved stakeholders. Continuous learning starts with proper knowledge management including knowledge dissemination.

#### ***Awareness raising***

Communities will have to be mobilized through their local political, administrative and cultural leaders in order to orient them about the plan, its objectives and the potential impact to their livelihoods. A popularised version of the CMP will be made available. This will help to manage their expectations, settle their possible misinterpretation of the plan and influence their acceptance and participation in CMP implementation. The media can be used for sensitization, especially for the benefit of stakeholders with low interest in the catchment.



Besides awareness raising in the catchment among local stakeholders, one should also target national level stakeholders to promote the plan and ask attention for integrated planning and CBWRM. Relevant ministries to target include the Ministry of Agriculture, Animal Industries and Fisheries (MAAIF), the Ministry of Finance, Planning and Economic Development (MOFED), the Office of the Prime Minister (OPM), Ministry of Local Government (MLG), Ministry of Lands, Housing and Urban Development, Ministry of Tourism and Wildlife, Uganda National Roads Authority (UNRA) and the Uganda Investment Authority. Presenting the plan will support their understanding of the catchment issues, the CMP objectives and catchment priorities.

**TABLE 22: TOOLS AND CHANNELS FOR AWARENESS RAISING**

Tool	Objective	Target group
Media campaign	Awareness raising on CBWRM and the CMP	All identified relevant stakeholders (groups)
Outreach materials	Knowledge dissemination on CBWRM, specific parts of the CMP and specific project activities and/or results	All identified relevant stakeholders (groups)
Community sensitization through local music, drama, community elders, extension services and CSF members	Knowledge on CBWRM, best practices, non-sustainable practices and gender	CBOs, community members and local resource user groups (farmers, bee keepers, cattle keepers, fisher men, firewood collectors and charcoal burners), cultural and parish based religious leaders
Local government sensitization	Knowledge on CBWRM and best practices	Local government departments
School course materials	Awareness raising on water source protection, catchment management, ecosystem restoration, etc.	Children at primary and secondary schools and their families.

### **Capacity building**

Capacity building has already been mentioned for the CMO bodies in the sections above and it will be mentioned as well in the other three areas of interventions. An in-depth capacity assessment has been undertaken by PROTOS. This study was not ready by the time of the development of this draft CMP. However, the outcomes of this study might lead to adjustment of the current included capacity strengthening activities. In addition to the earlier mentioned capacity strengthening, and anticipating the outcomes of the PROTOS study, capacity strengthening is recommended for the following:

- KWMZ: capacity to implement a CBWRM programme: e.g. M&E, project management, multi-stakeholder process facilitation, public private partnerships.
- District technical staff: capacity on water source protection, CBWRM, implementation of the CMP, role of the CMC and CTC, contract management, fact-based decision making, multi-stakeholder processes, etc.
- District extension services: capacity on CBWRM, water source protection, implementation of the CMP, role in knowledge dissemination, support to communities, etc.
- Environmental police officers, tourism police and police officers in general: capacity on enforcement of (bye)laws, ordinances and regulations.

Any capacity building activity should start with a proper assessment of the current capacities in order to tune any training to the target group.

With all CMOs requiring similar training and capacity building and similar investments included in many of the CMPs, such as the development of manuals and delivery of training support, KWMZ has a critical role to play in promoting collaboration and learning between CMOs within the zone and delivering technical assistance. In other words, for example, where 2 or more CMOs plan to develop a manual on micro-irrigation, the zone can bring people together to develop the resource together: thus saving money and pooling knowledge.

### **General stakeholder learning**

Although learning is embedded in all options through learning visits, assessments, acceleration platforms and so forth, this activity builds the capacity of the wider catchment stakeholders. This includes:

- CSF learning events, including e.g. cross-catchment exchange visits.
- Trainings, exchange visits and project reviews for water user groups, for example through farmer-to-farmer learning.
- Prepare and disseminate booklets with simplified explanation of relevant laws, policies and guidelines.
- Develop and disseminate training and technical guidance manuals on IWRM/CBWRM, water harvesting and micro-catchment management.



**Knowledge management**

Issues are more easily brought onto the regional, national and international agenda when data is available to support their claims. Also, the development of purposeful and effective interventions is much easier when sufficient information is available to properly understand the problem. Knowledge centres must build on existing resources such as NAADS and the GIZ CCA knowledge centre. The CMP and all knowledge collected as part of the CMP development process is an important basis of data for the catchment.

To facilitate knowledge and information management it is planned to:

- Establish a library/learning/knowledge centre under the management of the secretariat.
- Ensure that data and learning from the different projects, assessments, pilots and so forth is documented and managed.
- Put in place a knowledge dissemination plan (including use of radio, etc.) that makes this knowledge accessible to as many learners as possible. This will involve adapting learning resources and extension materials to the context and language of learners (through translation or concise summaries and videos).

Initially the library for Lokok catchment will be established at KWMZ. However, it is highly recommended to bring the information as close as possible to the users. Therefore, when a local CMS has been established, it might be considered to host the catchment library there as well. Alternatively, putting information online is the easiest and quickest way of knowledge dissemination. However, one should be sure that the information will be accessible by all catchment stakeholders, including the fishermen, cattle herders and farmers.

**6.3 Thematic area of intervention B: Ecosystem protection and restoration**

Ecosystems within Lokok catchment are increasingly being threatened by various anthropogenic activities. Timu forest reserve is under pressure from increased agricultural use of the land. Farmers are opening up the land through slash and burn practice leading to sheet and gully erosion. In Bokora corridor, pastoralist graze this area and the main issues include uncontrolled bush burning. From Kaabong to Kotido, pasture is not optimally utilized because of the shortage of water from the few functioning water points, which leads to conflicts between users. At water points (for instance around Loyoro) overgrazing occurs causing sheet erosion. Wetlands and river banks of Dopeth and Lokok rivers have been encroached for both subsistence farming and livestock grazing.

The progressive, systematic and induced unsustainable management of fragile ecosystems has caused declining resource productivity and resilience, resource scarcities and inequitable access, breeding conflicts, population displacements and increased human vulnerability. As such, ecosystem management and restoration is key for enhancing land productivity, reducing poverty and enhancing the quality of life for communities within and around the catchment. This includes implementation of interventions geared towards rangeland and micro-catchment management and promotion of healthy and resilient ecosystems.

These interventions for ecosystem protection and restoration are classified into the following groups: 1) Productive and protected forests and woodlands, 2) Promoting productive and sustainable rangelands, 3) Protecting wetlands and floodplains, 4) Protecting rivers and riverbanks, 5) Flood and Waterlogging management infrastructure, 6) Regulation and enforcement.

To achieve the outcomes, the interventions will focus on developing and accelerating natural resource enterprise; improving natural resource management systems; creating an enabling environment by improving access to knowledge and technical support and business support where relevant, as described below.



**TABLE 23: ECOSYSTEM PROTECTION AND RESTORATION**

Results			
<ul style="list-style-type: none"><li>■ Increased tree cover and tree based enterprises</li><li>■ Improved natural resource management systems</li><li>■ Enhanced awareness and capacity on sustainable forest and wetland management</li><li>■ Improved natural resource management systems</li><li>■ Improved livestock management e.g. grazing, disease control and watering</li><li>■ Enhanced public awareness and capacity on sustainable rangeland and wetland management</li><li>■ Reduced unplanned grazing and rice cultivation of wetlands</li><li>■ Improved wetland management systems</li><li>■ Sustainable utilisation of wetland resources</li></ul>		<ul style="list-style-type: none"><li>■ Reduced flood and riverbank erosion in risk areas and reduced damage to assets</li><li>■ Improved agricultural and investment conditions</li><li>■ Increase in flood protection of towns and settlements</li><li>■ Enhanced awareness on flood mitigation techniques</li><li>■ Effective enforcement of regulations</li><li>■ Increased monitoring of impacts of development interventions</li><li>■ Enhanced awareness on the importance of natural resources and regulations governing them</li></ul>	
Interventions			
<p>Productive and protected forests and woodlands:</p> <ul style="list-style-type: none"><li>■ Request NEMA to establish regional office in Mbale</li><li>■ Improve management of Central Forest Reserves</li><li>■ Improve tree cover in degraded areas</li><li>■ Regulate charcoal production and firewood use</li><li>■ Promote use of alternative sources of energy</li></ul>		<p>Productive and sustainable rangelands:</p> <ul style="list-style-type: none"><li>■ Promote collaborative rangeland management with traditional rangeland management institutions and other stakeholders</li><li>■ Protect and rehabilitate rangelands</li></ul>	<p>Protect wetlands and floodplains:</p> <ul style="list-style-type: none"><li>■ Sensitize and create awareness on the value of wetlands</li><li>■ Develop and implement community based wetland management plans</li><li>■ Restore degraded wetlands</li></ul>
<p>Protect rivers and river banks:</p> <ul style="list-style-type: none"><li>■ Promote riverbank management</li></ul>	<p>Flood and water logging management infrastructure:</p> <ul style="list-style-type: none"><li>■ Construct flood and water logging management infrastructure</li></ul>	<p>Regulation and enforcement:</p> <ul style="list-style-type: none"><li>■ Support enforcement of regulations</li><li>■ Regulate gold and sand mining</li><li>■ Regulate marble mining</li></ul>	

### 6.3.1 Productive and protected forests and woodlands

Increase Promoting productive and protected forests and woodlands is expected to yield the following results:

- **Increased tree cover and forest based enterprises:** For most people living in the catchment, especially the poor, forests and trees are the sources of food, fuel, fodder, medicines, and building materials as well as income. In order to improve the productivity of the forests, while conserving the surrounding ecosystems, this CMP proposes the development of income-generating and forest product enterprises which will incorporate components of incentives to sustainably manage these resources. These enterprises will be designed with the help of participatory forest management plans, enabling all stakeholders to be part of the decision-making.
- **Improved natural resource management systems:** There is need to strengthen institutional systems and structures on natural resource management, and where there are none, establish them in a participatory manner. This includes creating and training forest management committees, improving local knowledge and resource management and promotion of innovation platforms for improved resource management. This includes the use of interlocking stabilised soil blocks, which ultimately reduces the amount of wood fuel used in kilns for brick-making.
- **Enhanced awareness and capacity on sustainable forest management:** Access and capacity to use diverse methods of generating, acquiring and using forest management information will be developed. For example, the CMC with the support of the NFA will lead the process of developing guidelines, by-laws and ordinances for the sustainable management of forests. Sensitisation campaigns to relevant stakeholders, including the public will also be conducted.

#### ***Establish a National Environment Management Authority regional office***

Setting up a regional office of the regulatory agency NEMA in Mbale will help to ensure the identification and integration of environmental concerns in planning within the catchment, and further, coordinate, monitor and regulate environmental issues as provided for in the law. Establishment of an office will however only be useful if adequate resources (human, financial) are allocated to support delivery of its mandates. Moreover, coordination between this NEMA office, the regional UWA, NFA and Wetland departments will be crucial in ensuring effective implementation of the CMP.

#### ***Improve Management of Central Forest Reserves***

Sustainable forest governance is one of the key approaches towards improving forest management and solving the environmental, social, economic and political issues among forest users and managers, including governments and



communities. The CMC will liaise with the NFA to promote Collaborative Forest Management (CFM). This approach will reduce resource use conflicts between communities and the government, including addressing the rampant charcoal burning occurring within the catchment. The goal of CFM is to work in partnership with all stakeholders in decision making processes to ensure the sustainable management of forests reflects the diverse interests of all forest users.

### ***Improve tree cover in degraded areas***

Increased tree cover has direct impacts on water resources. Moderate tree cover can increase ground water recharge, especially in the dry seasons which are experienced within the catchment. This CMP proposes the establishment of wood lots of fruit trees and native species in schools, and tree planting on bare land, including along the boundaries of protected areas and roads. In addition, where steep land or land with erosive soils has been cleared for farming, farmers. Moreover, an enabling environment where communities, including forest management committees and extension service officers are trained on collaborative forest management will be promoted. A fund for woodland/forest protection will also be created. This fund will provide subsidies or grants and support to explore the potential and develop business cases for innovative tree species and tree based products will be established. The NFA will support KWMZ and the CMC in this activity. IUCN will offer technical support base on experience in implementation of similar funds in the region.

### ***Regulate charcoal production and firewood use***

Forest management committees will be formed as part of the development of CFM plans. These committees will play a key role in supporting NFA in compliance and enforcement of forest regulations. It is therefore necessary to strengthen their capacity on community forestry on public and private forest enclaves through meeting forums and training on monitoring and evaluation. In addition, this CMP proposes the development and implementation of guidelines for charcoal production, which will regulate this destructive activity, and the formation and implementation of by-laws at the local level. Examples include promoting trees on farms and community woodlots, reducing demand for wood through use of improved stoves and live fencing and reducing charcoal demand by promoting alternatives in the major urban markets.

### ***Promote use of alternative sources of energy***

Forests contribute, often significantly, to rural income and quality of life, and in a number of ways: directly, as a user of land and resources to transform assets into a range of outputs, and indirectly, through linkages with downstream processing sectors and the provision of non-market benefits. Timu Forest reserve is exploited for both forestry and non-forestry related business activity. Strategies that reduce pressure on natural resources will also be assessed and promoted. For purposes of sustainability, CFM will need to adapt to the changing needs by establishing energy plantations of forests preferred for firewood or charcoal, conducting training on briquette production from agricultural residue, promoting use of improved cook stoves, and supporting start-up businesses around briquetting such as fabrication of briquette presses.



## ADODOI COMMUNITY DECLARATION

### BACK GROUND - COMMUNITY PROFILE:

Adodoi village is located in Kapujan Parish in Kapujan Sub-county, Katakwi district. People of this community have experienced various problems and hazards such as water logging arising from heavy rain showers and long dry spells that have had a negative impact on the socio-economic livelihoods of the people. Lately the members of the community realized that the major cause of these problems can be attributed to some human activities besides the natural causes.

### BACK GROUND TO THE PROBLEM:

For the last many years, Adodoi Village has suffered from the negative impacts of environmental hazards and faced many health risks arising from the local populations' engagement in activities that are destructive to the environment.

### JUSTIFICATION FOR THE BYE-LAWS:

To conserve the environment and promote sustainable agricultural production and responsible production and animal rearing, the community of Adodoi saw a great need for community bye-laws that shall govern community activities on the areas of environment. The bye-laws shall shape the community's capacity to build resilience to disasters and foster environmental conservation and restoration.

### BYE-LAWS

#### - INTRODUCTION

These bye laws have been collectively set by the members of Adodoi community and shall apply to all the members of the community including outsiders who commit the offence within the community.

1. It shall be the responsibility of every member of the community to protect the environment.
2. No member of the community shall cut down a tree without first planting 10 trees.
3. Tree planting shall be practiced by every household.
4. No member of the community shall be found or discovered to have conspired to burn bushes around the community.

#### - PENALTIES:

1. Anyone found to have cut down a big tree without planting 5 live trees as replacement for one tree shall be charged a fine of 50,000 and asked to plant 5 trees for each of the trees cut.
2. Anyone found burning or found to have burned bushes shall be charged a fine of 25,000 Uganda shillings and in case of any damage to property, the person found guilty shall have to agree with the aggrieved party for compensation for the damages caused and this shall be done before the sub-county authorities.
3. Anyone found destroying a planted tree shall be charged a fine of 20,000 and asked to replace with 10 trees.

#### - ENFORCEMENT OF THE BYE-LAWS.

A law enforcement committee shall be constituted to oversee the implementation of the community bye-laws. The committee shall be comprised of the members of the Adodoi community.

The committee shall collect all fines and invest in community development hand it over to the Sub-county authorities as revenue.

The enforcement committee is mandated to confiscate any asset/property equivalent to a fine stipulated for a given offence in case the offender defaults or deliberately refuses to pay the fine.

The enforcement team will comprise of 10 members with the leadership composed of the Chairman, vice chairperson, secretary, treasurer mobilizer and security.

Figure 41: Example of a local by-law to regulate tree cutting (TPO Uganda - implementation of no-regret IWRM measures in Katakwi District)

### ***Implement strategies to reduce pressure on natural resources***

on farms and community woodlots, reducing demand for wood through use of improved stoves and live fencing, reducing charcoal demand by promoting alternatives in the major urban markets, strengthening law enforcement and land use planning to avoid clearance of steep slopes. Where steep land or land with erosive soils has been cleared for farming, farmers should be required and supported to adopt soil and water conservation measures such as biological measures



(mulching, contour planting, intercropping, agroforestry and vetiver grass lines) and physical measures (contour bunds, gully rehabilitation and terracing).

### ***Establish a National Environment Management Authority regional office***

Setting up a regional office of the regulatory agency NEMA in Mbale will help to ensure the identification and integration of environmental concerns in planning within the catchment, and further, coordinate, monitor and regulate environmental issues as provided for in the law. Establishment of an office will however only be useful if adequate resources (human, financial) are allocated to support delivery of its mandates.

### ***Improve access to knowledge***

An enabling environment where communities can strengthen their skills set and knowledge on the value and importance of forests and business models need to be created. Improving availability of and access to high quality, affordable local technical services, training and technical guidance/manuals is critical to creating an enabling environment where community members can learn from the assessments, pilots and success stories identified from the conservation fund (outcome 1). Technical back-up services from national and international experts is often required initially where local capacity and knowledge is limited. Where technical support is required from outside the catchment, it will be used as an opportunity to develop local capacity builders (LCBs) to reduce this dependence.

### ***Promote forest-based market development***

Forests contribute, often significantly, to rural income and quality of life, and in a number of ways: directly, as a user of land and resources to transform assets into a range of outputs, and indirectly, through linkages with downstream processing sectors and the provision of non-market benefits. The Timu CFR in the catchment is exploited for both forestry and non-forestry related business activity. For purposes of sustainability, CFM will need to adapt to the changing needs by developing tree species / forest-tree based enterprises, promoting value chains and market access. Examples include fruit trees, briquettes, and improved cook stoves.

## **6.3.2 Promoting productive and sustainable rangelands**

Implementing interventions that support productive and sustainable rangelands will have the following benefits:

- Improved natural resource management systems: There is need to strengthen institutional systems and structures on natural resource management, and where there are none, establish them in a participatory manner. This includes creating and training rangeland management committees, mapping and demarcation of rangelands, improving local knowledge and resource management and promotion of innovation platforms for improved resource management.
- Improved livestock management e.g. grazing, disease control and watering: This will be achieved through increased sensitisation efforts on the value of rangeland protection, and the implementation of rangeland management plans, which will include guidelines for bush burning and controlled grazing
- Enhanced public awareness and capacity on sustainable rangeland management: Exchange programmes for herder associations will be encouraged. These visits to locations where sustainable rangeland management has been effectively practiced is important for horizontal learning and sharing.

### ***Promote collaborative rangeland management***

Policies are recognizing the value of pastoralism regarding the sustainable and productive use of the rangelands and that in fact, the pastoral system does not interfere with the rangelands ecosystem, but makes the ecosystem. Facilitating dialogue between rangeland users is thus key in improving management of rangelands. The community and tribal elders who traditionally were instrumental in managing cattle migration, controlling of bush burning and managing conflict but whose influence is reportedly reduced should be involved in developing solutions for rangeland management which should include the extent of rangelands, cattle migration routes, watering points, markets, cattle dips, cattle density including seasonal patterns and document trends in migration and land use patterns; current stocking rates and carrying capacity of all rangelands (all which have been mapped and validated as part of the CMP process) and develop a plan to maintain animal numbers at optimum levels. Alternative strategies for pest control and soil and water conservation measures should be included in the plan. Consequently, an enabling environment where communities can strengthen their skills set and enhance their awareness on sustainable rangeland management needs to be created. This can be done through preparation and dissemination of rangeland management manuals and preparation of collaborative rangeland management plans; expand and strengthen Livestock and Natural Resource Management Extension Services including training/ guided learning, learning visits, Catchment Livestock Network coordination meetings. There are several good rangeland



management practices and models adopted in the region with similar landscapes. For example, rangeland rehabilitation in the MaMaSe project in Serengeti, Kenya/Tanzania, minimal grazing in Ethiopia and irrigated commercial farms in Kenya. Assessments will be informed by a programme of learning visits to examples of these good practices.

### ***Protect and rehabilitate rangelands***

Rangelands in Uganda are a target for investment, including for mining and large-scale crop production. In the catchment area, rangelands are used collectively, thus vulnerable to grabbing and unsustainable use. By supporting communities to obtain certificate of titles, communities can monitor and bring attention to critical issues on the ground. A secure land tenure policy framework that supports the pursuance of sustainable economic and land use practices that are in tune with people's socio-cultural systems would go a long way towards sustaining livelihoods, promoting biodiversity conservation, and reducing poverty and landlessness in rangelands. Strategies that reduce pressure on natural resources will also be assessed and promoted. Examples include promoting control of tick-borne illness by insecticide dips and spraying; sustainable collection of fuelwood (using enclosures, farmer managed natural regeneration, community woodlots, coppicing and lopping); and alternative livelihood options for charcoal producers, promote live fencing of kraals and villages and establishment of fire lines including use of fire resistant species. There is need to review and document existing by-laws on rangeland management including bush burning and charcoal production practices, which have far reaching impacts on the environment. CMC will support the capacity strengthening efforts to improve stakeholder awareness on regulations and their enforcement.

### **6.3.3 Wetlands and flood plain protection**

Promoting wetlands and flood plain protection is expected to yield the following results:

- Improved wetland management systems: activities that can be conducted with, in, and around wetlands, both natural and man-made, to protect, restore, manipulate, or provide for their functions and values will be encouraged. This includes use of natural wetland protection measures and wetland restoration.
- Sustainable utilisation of wetland resources: There is need for inclusive policies, plans and guidelines, and enforcement mechanisms for there to be marked improvement in the sustainable utilisation of wetlands. The CMP proposes the development of collaborative wetland management plans, and strengthening formal and informal enforcement systems.
- Enhanced public awareness and capacity on sustainable wetland management: Effective wetland management requires knowledge on wetlands and their values. Sensitisation and awareness interventions will form an integral part of CMP.

### ***Sensitise and create awareness on the value of wetlands***

An enabling environment where communities can strengthen their skills set can be achieved through improving access to knowledge, improving availability of and access to high quality, affordable local technical services, training and technical guidance/manuals is critical to creating an enabling environment where stakeholders can implement sustainable wetland management interventions.

### ***Develop and implement community based wetland management plans***

Approaches towards wetland protection and restoration should pursue strategies that maximise outcomes for catchment management. This includes mapping and demarcation of vulnerable sites and habitats, improving the institutional framework will also contribute to healthy wetlands. Issues of flood management and flood plain protection should also be included in the plan. Effective collaborative wetland management will reduce resource use conflicts between communities and the government, including addressing the rampant rice growing in the lower catchment area. Experience from previous project indicates that for successful implementation communities (e.g. elders, farmers, men and women) have to be involved in planning and demarcation and approaches to reduce the demand for products that destroy the wetlands have to be worked out, e.g. promote the consumption of upland rice instead of paddy rice.

### ***Restore degraded wetlands***

Limited access to credit, finance and technology to set up enterprises and diversify livelihoods with the potential to improve the lives of the vulnerable communities is a big challenge faced within the catchment. To address it, an innovation fund that provides subsidies or grants and support to explore the potential for agri-business and sustainable wetland products will be established. Strategies that reduce pressure on natural resources and restore degraded wetlands will also be assessed and promoted. Examples include demarcation of wetland zones, promotion through training of wetland management



committees, awareness raising on value of wetlands goods and services, promoting good fishing habits in wetlands and supporting traditional leaders to declare some wetlands as traditional shrines and set-up community by-laws. Regulation and enforcement of national laws and by-laws strengthening community and formal enforcement systems where appropriate to outlaw unsustainable and unplanned expansion rice production. Enforcement of NEMA regulations on rivers and wetlands, including by-laws on grazing and implementation of zoning plans. Creating alternative businesses as well as strict law enforcement on trespassing and unchallengeable demarcation will be fundamental to wetland protection.

#### **6.3.4 Rivers and Riverbank protection**

Riverbank protection will ultimately lead to reduced flood and riverbank erosion in risk areas where flood and riverbank erosion has direct negative consequences on communities living along the riverbanks. In order to address this challenge and reduce damage to assets, several interventions are proposed.

##### ***Support riverbank management***

In the Lokok catchment, riverbank erosion is evident in Lokok and Dopeth rivers, where activities such as artisanal mining and cultivation along the riverbanks is rampant. The seasonal wetlands in Acowa sub-county experience flash floods during erratic rainfall. In order to effectively address the flood issue, there is need to implement interventions to restore degraded riverbanks and buffer zones through tree planting and grassing. In order to effectively address the flood issue, there is need to implement interventions to restore degraded riverbanks and buffer zones through tree planting and grassing. The severely eroded streamlines of rivers in the lower catchment need to be stabilised by use of techniques such as the vetiver system, construction of gabions and protection of riparian forested areas. Stabilising the loose soil helps to promote plant growth, prevent the loss of land or damage to utilities, reduce sediment loads and maintain capacity of the river channel. Areas where mining can sustainably take place should be identified together with the communities, mining associations and regulatory authorities. Moreover, comprehensive catchment management measures to reduce run off, increase infiltration and thus reducing soil erosion should be applied.

#### **6.3.5 Flood and waterlogging management infrastructure**

- Flood mapping and early warning: In order to effectively address the flooding issue, there is need for a decision support system that provides forecasting data for flood prediction and monitoring. This includes collaborative flood plain delineation and hydrological modelling, in order to identify the best suited intervention for flood management.
- Increase in flood protection of towns and settlements: Better monitoring, planning and communication will ultimately lead to increased flood protection for people, their assets and the ecosystem
- Enhanced awareness on flood mitigation techniques: There is need for individuals, institutions and communities to develop abilities to solve the flooding problem. This includes interventions such as sensitisation meetings, creating an enabling environment and building social capital.

##### ***Construct flood and waterlogging management infrastructure***

Measures to increase water infiltration and the storage capacity of upstream wetlands need to be explored, in areas with more permeable deeper soils simple measures as infiltration pits have been very effective in draining excess water. Similarly, roots of trees can break the impermeable soils and allow more water to drain. Treelines along the contours can stimulate infiltration and reduce the negative impact of flooding. Intervention will include training for communities to develop their capacity to operate and maintain identified structures and to manage flood and erosion risks at the community level. The community capacity development will be combined with livelihood improvement supports. In addition, unplanned road construction is one of the major reasons aggravating waterlogging problems. While road construction is one of the development indices, the construction has become the problem, calling for systematic planning and adoption of rehabilitation measures to improve road drainage systems.



**Box 6: How to construct an improved flood resistant hut?**

From the Partners for Resilience programme<sup>12</sup> in Apac, Otuke and Katakwi districts implemented by Uganda Red Cross Society, CARE and TPO Uganda (2015):

Three simple steps to construct a flood resistant hut:

1. Lay building material, locally known as 'kaveera' or black plastic sheeting, on a 1.5 feet raised foundation floor.
2. Build a special soil brick mound to make a conical wall, plastered with a mixture of dung and mud, for termite control.
3. Roof with grass or iron sheets.

**6.3.6 Regulation and enforcement**

Effective regulations and enforcement is important as a means of the public maintaining confidence in the planning system. Several institutions are mandated to enforce regulations; however, they face many challenges including inadequate resources (financial and human) and limited awareness on the subject and scope. Some of the interventions that will lead to effective enforcement of regulations are described below.

- Increased monitoring of impacts of development interventions: As detailed in chapter 3 of this report, development interventions, including mining have a negative impact on ecosystems. In order to adequately protect and restore the vulnerable ecosystems, there is need for strict monitoring to ensure compliance.
- Enhanced awareness on the importance of natural resources and regulations governing them: There is need to intensify natural resource governance and management by making information on the laws governing them easily available and accessible. Communities with enhanced awareness on the importance of regulations and legislations have been proven to be more engaged in conservation and protection efforts, leading to better natural resource systems.

***Support enforcement of regulations***

While numerous policy frameworks relevant for the conservation of the catchment areas exists, what has become apparent from discussions in the catchment stakeholder forums is that enforcement has led in certain cases to duplications, overlaps, inconsistencies, and a system of very weak penalties. Moreover, there is inadequate awareness on the importance of ecosystems and poor enforcement of relevant regulations to protect them. To address this, it is important to document and disseminate existing regulations on sustainable ecosystem management to stakeholders with the CMC taking an active role in this.

***Regulate gold, sand and marble mining***

The mineral extractive sector in the region is growing. Artisanal and small-scale mining (ASM) of gold, marble and sand provides livelihoods to thousands of individuals. However, the sector is under regulated and hazardous, evidenced using mercury in small-scale gold production, for example in Kaboong where impacts on water bodies in the catchment were disastrous. This CMP proposes a collaborative approach to sustainable ASM, which involves prohibiting the use of mercury and provision of alternatives, sensitisation and awareness raising targeting the ASM associations and supporting environmental conservation initiatives such as tree planting in the mining area and collaborative designation of mining areas. NEMA officials should conduct site supervision and monitoring visits to ensure compliance with set regulations.

<sup>12</sup> The Partners for Resilience alliance consist of Netherlands Red Cross, Care Netherlands, Cordaid, Wetlands International and Red Cross / Red Crescent Climate Centre. In Uganda, the programme implemented resilience measures in the Districts of Amuria, Katakwi, Nakapiripirit, Napak, Otuke and Apac from 2011 until 2015. Implementing partners included Uganda Red Cross Society, Cordaid Uganda, TPO Uganda, Socadido, Caritas Moroto, ECO Uganda and Caritas Uganda and Care Uganda.



## 6.4 Thematic area of intervention C: Water and sanitation

This category primarily focuses on improved water and sanitation services for people and relates to household WASH, which encompasses potable water, sanitation and hygiene. With safe water coverage below the national average and microbiologic contamination being a major concern in Lokok Catchment, there is a huge task for all responsible institutions at all levels – from MWE to the CMC, and including the Water and Sanitation Development Facility East (WSDF-E), the Karamoja Umbrella of Water and Sanitation (KUWS) and the Umbrella of Water and Sanitation East (UWS-E) – to improve WASH services at household level within the catchment. Moreover, rapid population increase and resettlement of pastoralists in transition to agro-pastoralism will cause a dramatic increase in need for water and sanitation services, especially in urban areas such as Kotido and Kaabong. For the Catchment Management Organisation (CMO) aforementioned issues will be the main scenarios to deal with by carrying out the CMP and strategizing water and sanitation services in Lokok Catchment. With the establishment of the CMO some responsibilities are devolved to the CMO, changing the role of the KWMZ in certain cases from implementer and regulatory body to one of providing support and technical assistance to its CMO and districts.

**TABLE 24: OVERVIEW OF INTERVENTIONS ON IMPROVED WATER AND SANITATION**

Results		
<ul style="list-style-type: none"> <li>■ WASH knowledge strengthening of the Catchment Management Organisation (CMO) through capacity building</li> <li>■ Abstraction and pollution management systems</li> <li>■ Water resource model, maps and data management systems</li> <li>■ Potable water planning and design capacity</li> <li>■ Efficient and effective management of piped water supply schemes</li> <li>■ Effective and efficient management of rural water systems</li> <li>■ Entrepreneurial well and pump mechanics</li> <li>■ Availability of products and back-up services</li> <li>■ Increased latrine usage</li> <li>■ Improved hygiene awareness and practice</li> <li>■ Increased availability of products and services</li> </ul>		
Interventions		
Learning and knowledge management: <ul style="list-style-type: none"> <li>■ Promote capacity building</li> <li>■ Support extension services</li> <li>■ Improve knowledge management</li> </ul>	Monitoring and planning of water services and resources: <ul style="list-style-type: none"> <li>■ Reinstate climate monitoring</li> <li>■ Establish groundwater monitoring</li> <li>■ Strengthen surface water monitoring</li> <li>■ Establish water quality monitoring</li> <li>■ Establish sediment monitoring</li> <li>■ Establish flood monitoring</li> <li>■ Enforce the water abstraction permit system</li> </ul>	Piped water supply systems: <ul style="list-style-type: none"> <li>■ Extend and rehabilitate water supply systems</li> <li>■ Construct new water supply systems</li> </ul>
Management of rural water schemes: <ul style="list-style-type: none"> <li>■ Rehabilitate and close non-functional water points</li> <li>■ Improve operation and maintenance</li> <li>■ Promote water harvesting for domestic use</li> <li>■ Improve deep borehole drilling</li> <li>■ Promote shallow groundwater development</li> </ul>	Sanitation and waste management <ul style="list-style-type: none"> <li>■ Upscale sanitation programmes</li> <li>■ Promote waste management</li> </ul>	

The first set of interventions focuses on strengthening the capacity of stakeholders on the sustainable utilization of water resources. The second set of interventions focuses on the monitoring and planning capacity for WASH both at CMO and district level. It sees monitoring, data management and modelling capacity strengthened for informed, evidence based planning. The third set of interventions focuses on the management of piped systems which are mostly found in towns and larger settlements and areas designated as growth centres. The fourth set of interventions focuses on rural water supply schemes which largely consist of shallow wells and hand pumps. The reason to separate piped and rural systems is because the complexity of managing piped systems is significantly greater than rural schemes from a technology and operational point of view, with maintenance often being sub-contracted to a water utility or contractor. Rural schemes are technically simpler and are managed by committees made up of end users. In rural areas, there is particularly low functionality of water points, while management committees require significant strengthening and back-up services. The fifth and last set of interventions aims to reduce water contamination and water borne disease through improved sanitation and hygiene. The presented interventions will target areas close to and upstream of water points and urban/peri-urban areas where poor sanitation has greater impact than in scattered settlements.

Coordination of intervention planning and implementation is required at horizontally level among different sectors and vertically at different scales of planning (i.e. catchment, district, down to micro-catchment or village). The different types of coordination are presented earlier in Figure 39.



### 6.4.1 Learning and knowledge management

Access to knowledge and skills is fundamental to work towards more sustainable water resources management. Within the context of learning and knowledge management it is fundamental that integration at institutional levels takes places, so as to best support stakeholders on the ground. That means that DWRM, DWD and KUWS have to work closely together.

#### ***Promote capacity building***

In regard of capacity building and training to enhance the (access to) knowledge of stakeholders in the catchment the following interventions have been identified:

- Develop and disseminate training and technical guidance manual for district technical staff on supervision of borehole drilling, especially in basement areas and including supervision;
- Strengthen capacity of drilling contractors to site, drill, develop and equip new boreholes;
- Design and implement a capacity building programme for hand pump mechanics associations on wind pumps, solar pumps, maintenance hand pumps, electromechanical systems, source protection, community skills, and other relevant subjects;
- Training to local artisans on manual drilling and hand dug well construction, and relate this to water source protection;
- Design, develop and disseminate a practical training programme and technical guidance manual for Water User Committees (WUCs) and other stakeholders on water source protection, repair of infrastructure, financial management and other relevant subjects.

#### ***Support extension services***

Build capacity of extension services on water sources protection by making the technical DWRM guidelines more practical. Through two-day trainings the extension services will discuss the significance of source protection and how this can be enforced. Biennial refresher trainings will keep both the guidelines as the knowledge of extension services up to date.

#### ***Improve knowledge management***

Organize a training to KWMZ and local government technical staff on the access to and application of DWRM's data management systems (Aquarius and WIS).

### 6.4.2 Monitoring and planning of water services and resources

The pressure and demand for water resources is increasing, but water resources and climate monitoring systems are in many cases non-functioning or even absent. To monitor and evaluate it is important to rehabilitate and expand these systems, and improve on data storage, analysis and dissemination.

#### ***Reinstate weather monitoring***

UNMA, with support of GIZ, should continue with the rehabilitation of meteorological stations for each district within the catchment. Likewise, a programme will be developed and implemented to re-instate basic weather monitoring (rainfall gauges, wind vane, barometers) at primary and secondary schools, which will be included in the regional weather monitoring plan. Furthermore, mechanisms should be established to promote the transfer of weather monitoring stations installed during road construction to UNMA. This possibly could be encouraged through adjustments in the permitting system. Additionally, the CMC (through KWMZ) should lobby at MWE to designate the UNMA offices in Mbale as coordinating office for all stations within both Lokere and Lokok catchments via which measured data and information needs to be sent and disseminated through water bulletins, UNMA or district website(s) or other means. Stakeholders requested to revive the website developed by WFP in partnership with UNMA some years ago. The development and implementation of a management system for transfer and dissemination of weather data and information, including weather forecasting, will enhance effective regional weather dissemination and knowledge. The management system could be expanded and supplemented with the establishment of a database on traditional weather monitoring and forecasting systems, while this local knowledge can be integrated in the weather bulletins and on the UNMA-databases and website. Simultaneously, the status of the current weather monitoring network needs to be assessed, while a regional weather monitoring plan should be developed and implemented, including an operation and maintenance plan of the meteorological stations. Existing monitoring stations in Kotido, Nakapelimoru and at the KDA Compound should be rehabilitated, and new stations should be established at the district head quarters of Abim, Kaabong, Moroto and Napak. The weather monitoring plan should also foresee to formalize weather focal points at district level – in general this is the Natural Resources Management (NRM) officer -, including the training in roles and responsibilities of these focal points.



Relevance and application of weather data will be promoted to technical district staff (NRO, DWO, DEO, DIO) and media houses through sensitization programmes (e.g. radio, TV, smart phones, etc.).

### ***Establish groundwater monitoring***

KWMZ should establish a deep groundwater monitoring network plan, including the operationalization and implementation of it. Existing monitoring wells should be rehabilitated, while new groundwater monitoring wells should be allocated to strategic, high water demand locations, such as: abstraction and infiltration areas of water supply systems (WSS) and intensive irrigation areas (fruit plantations and processors). Potential monitoring well implementation could be in the abstraction areas of the water supply systems (WSS) of: Kaabong, Kotido Town, Kotido sub-county, Nakapelimoru, Rengen, Kalapata, Kathile, Sidok, Kanawat and Panyangara. Likewise, a deep groundwater monitoring network, there should be a shallow groundwater monitoring network be established for Lochoman and Lokochar wetlands to test the hypothesis on the relation between floods and storage level of wetlands. For both monitoring networks activities will include, but is not limited to: identification of existing monitoring wells (potentially 15 in Lokok Catchment; 7 in Kaabong and 8 in Kotido and Abim Districts), capacity building to staff on groundwater monitoring, development of a data collection system (software if sensors are used) for storage, validation, analysis and dissemination of monitoring data, an investment and operation plan of the monitoring network, clearly described coordination and support responsibilities to the districts, and instalment of the monitoring stations. For the shallow groundwater monitoring network, new monitoring wells and stations should be installed after the confluence of the Dopeth and Loyoro Rivers, and in Kapelebyong River, before the confluence of Lokok and Lokere Rivers.

Alongside with the establishment of groundwater monitoring plans, there should be a periodic update of regional deep and shallow groundwater potential mapping at district level. On a yearly basis, all recent studies should be reviewed and included (e.g. Lahmeyer studies, groundwater potential maps of DWRM (2012), national borehole database, etc.), sustainable abstraction rates of water points updated, and shallow groundwater potential re-assessed. Furthermore, a periodic (biennial) re-assessment of spring functionality, discharges and locations will be performed, to further the understanding of the impact of environmental degradation of springs, the possible mitigation measures to recover functionality of springs, and the implementation of such measures. Focus should be on Timu Forest (Kaabong District), Nyakwai Hills, Mount Toror and Toror Hills, where historically most springs are reported. This all should be accompanied by an awareness raising campaign directed to the local government (primarily the district water department), drilling companies and consultants to report the status of boreholes as well as dry borehole drillings. Lastly, it is important that a groundwater model will be built to estimate sustainable abstraction rates to support technical advisory services from KWMZ.

### ***Strengthen surface water monitoring***

To advance surface water monitoring a data collection plan needs to be developed, which includes the instalment and operation of gauge readers, and how data and information will be stored, validated, analysed (including calibration curves) and disseminated, to make it easier accessible for interested stakeholders. Currently the measured data is sent to the DWRM head office in Kampala for interpretation, while beneficiaries are only informed about events of rain, flooding or droughts after the event already took place. Although within Lokere Catchment and not in Lokok Catchment, it is important that flow gauging stations in the main streams (Akokorio and Kapir stations) are rehabilitated and expanded by DWRM, with support of GIZ, in order to make better predictions of surface runoff, flooding events and water availability. Currently under-monitored streams are the Dopeth and Lokok Rivers. Identified potential locations for new gauging stations are provided in 'Implementation Plan Lokok Catchment'. Significant attention should be paid to the operation and maintenance (O&M) of the surface water monitoring system, which can be achieved through capacity building and training.

Based on improved river gauging data a surface hydrologic modelling programme can be designed and implemented. This can be built on and continue from the current SWAT model, which will require additional capacity building to hydrologist staff of KWMZ. Furthermore, roles and responsibilities with regard to the modelling should be formalized so that effective operationalization will be achieved. With increased modelling capacity and new validated data from the newly suggested gauging stations at KWMZ, the SWAT model for Lokok Catchment can be further calibrated and optimized. For this it is important that the CMP is updated with recent water balance and allocation data.



***Establish water quality monitoring***

Environmental water quality is currently poorly monitored and the monitoring should be reviewed. KWMZ should develop an operational plan for an environmental water quality monitoring network plan to ensure regular monitoring is taking place. The monitoring plan should include:

1. sediment analysis on heavy metals in streams of urbanizing areas;
2. sediment analysis on mercury and syenite in the upper reaches of rivers Dopeth and Loyoro, i.e. downstream of artisan gold mining sites;
3. Ugandan standard water quality analysis downstream of wastewater discharge points (see also wastewater discharge permit system);
4. monitor COD and BOD Lower Lokok; and
5. storage, validation and analysis aspects of the collected data.

Surface water will always be microbiologically contaminated, and hence microbiological analysis of surface water in Lokok Catchment is not useful. Likewise, parameters in seasonal rivers differ strongly and rapidly depending on the season and moment in time (first 'flush', moment during rain event, dry – wet season, etc.). Taking water samples periodically at fixed moments does therefore not make much sense either.

With regard monitoring of groundwater quality for drinking water purposes a sustainable funding plan should be developed and implemented by KWMZ in collaboration with DWD, district water offices, WSDF-E, KUWS and UWS-E, so that – following the national water supply guidelines – 80% of the boreholes in each district is monitored each year. For this equipment, consumables, water quality testing kits should be made available at each district, and should be supported by water quality analysts from KWMZ-office Mbale. Water quality monitoring should be executed according to the national water supply guidelines. Further, it is recommended to conduct an in-depth study on fluoride and salinity parameters in volcanic areas, and include these parameters in the monitoring plan and guidelines as well as in the widespread water quality analysis of boreholes.

***Establish sediment monitoring***

Develop and implementation of a sediment monitoring plan, including data collection, storage, validation, analysis and dissemination as well as the operationalization and maintenance of it. The exact method of monitoring still needs to be determined, but can be either the measurement of sediment accumulation in a deposition area or by developing a mechanism to monitor solid matter content. Monitoring of sediment transport through streams and rivers is important to predict siltation of water pans, dams and wetlands, which impacts functioning and sustainability of (water) infrastructure and the fertility and usability of agricultural areas and (aquatic) ecosystems. To get sediment monitoring in place it is important to request support from MWE at national level during the preparation of the plan, since mandates in this regard are unclear and the analysis capacity is limited.

***Establish flood monitoring***

In regard to this intervention it is most important to conduct an in-depth assessment of flooding processes and to implement a flood monitoring network. The flooding processes assessment should include detailed remote sensing analysis, statistical analysis of regional climate data of UNMA, river flow data from the Akokorio and Kapir gauging stations, and long-term water level time-series of Lake Kyoga and Bisina. Among communities living in flood-prone areas in Lokere Catchment – and as part of the flood monitoring network – awareness about flood risks should be raised, re-settlement to upland areas promoted, and a household-level flood protection programme designed and implemented. The latter should include the excavation of trenches and infiltration pits, the identification of evacuation routes, and the construction of flood resistant houses. Based on aforementioned sub-activities a flood early warning system (FEWS) can be developed and implemented, including a corresponding communication plan and identification of what type of flood monitoring has to be in place and where.

***Enforce the water abstraction permit system***

KWMZ should take the lead in designing and operationalizing an enforcement plan for a water abstraction licensing system. KWMZ can lift along with the latest policy developments in this regard at national level. The implementation of a licensing system will contribute to a better, regulated management and more sustainable use of the water resources. Moreover, it should take into consideration different user and uses groups, and the periodically abstracted volumes. Therefore, the following activities should be undertaken:



1. Review, complement and optimize the set-up of the KWMZ water abstraction permit database, and include coordinates, characterization of wastewater, obligatory monitoring of water levels, etc.;
2. Design and operationalize an enforcement plan of the improved water abstraction permit system.

### **6.4.3 Piped water supply schemes systems**

Piped water is the safest source of water supply, and is particularly important in towns and rural growth centres where microbiological pollution is increasingly a problem due to poor sanitation practices. To improve the coverage of piped water supply schemes in a sustainable manner it is fundamental that DWD, NWSC, WSDf-E and DWRM work closely together.

#### ***Extend and rehabilitate water supply systems***

Firstly, the status of existing piped water supply schemes (including volumes of non-revenue water) need to be assessed. Refer to Annex I for an overview of the water supply schemes identified during this project. Based on this an extension and rehabilitation plan should be developed, while the current operation and maintenance system needs to be revised and complemented with source protection and monitoring of water levels. If this is in place rehabilitation and extension of existing water supply systems (WSSs) can be planned and executed.

DWRM should agree and formalize within its own governing body a licensing system wherein the CMC has the mandate to veto large scale projects in line with the CMP when they are at the scale of catchment level. This mandate does obviously not apply for overarching projects at regional or national level. All districts in Lokok Catchment should receive extra support from the DWD to repair and extend their piped town WSSs, review utility contracts and enforce improved O&M by the operator.

#### ***Construct new water supply systems***

For the planning and construction of new water supply systems, rural growth centres need to be mapped and the current water demand without a WSS in place be assessed. After feasibility studies have been conducted plans can be developed to implement new WSSs, which should also encompass establishment of sustainable (ground) water abstraction rates, design, operation and maintenance (O&M), capacity building and source protection of the newly proposed system.

### **6.4.4 Rural water supply**

Due to poor sanitation and sharing of water points with livestock, contamination with e-coli is very common in Lokok Catchment. At the same time, district governments lack the (financial) resources and capacity to combat the poor sanitation situation as well as the causes of water borne diseases. DWD should allocate additional resources to the district governments to effectively negative impacts of poor sanitation in rural areas and setup a water quality monitoring system.

#### ***Rehabilitate and close non-functional water points***

There are several sub-activities that can be executed as part of this intervention. Firstly, the domestic water gap analysis and maps should be updated upon each new population census. Furthermore, the functionality of all water points should periodically (annually) be re-assessed. Based on this assessment it can be decided and planned which water points to rehabilitate and close those that will no longer be used. Water points should only be rehabilitated if community contribution is in place; 1) else it undermines the district water point rehabilitation system and 2) it will create a sense of ownership among amidst the community. The water point data collection forms should be adjusted and aligned so that it is possible to create a comprehensive report of all water points. Attached to this system optimization is the capacity building of the district water (DWO) and district production (DPO) officers, and the implementation of a long-term funding plan to ensure that all resources are in place to monitor water points. KUWS could support in this regard. Include a sensitization campaign on water source protection, and the contamination potential of old non-functional boreholes. In line with this, an awareness campaign for communities and hand pump mechanics should be implemented by the respective district water offices to report non-functional hand pumps. DWRM should recommend the district water offices on the establishment of feedback mechanisms that provide an analysis and summary of the collected borehole data.

#### ***Improve operation and maintenance***

Improved and effective operation and maintenance (O&M) of water sources and water source protection in accordance with the water source protection guidelines (refer to MWE 2013) is an important aspect of catchment based water resources management (CBWRM). In this regard DWD, DWRM and KUWS should work closely together. With CMC being the logic



implementer, development of effective water source protection measures can be in cooperation with the CMC of Lokok Catchment and in conjunction with the Lokere CMP. Improved and more effective O&M can be achieved through:

- The design and commencement of WUC pilots. The number of WUC-members is reduced to three, while they are paid for their activities. Raise awareness in the community that they should hold the WUC accountable for their performances;
- Support the deconcentration of handpump mechanics associations to the lowest levels (i.e. as close to the source and the water point as possible), request the legalization of these associations in the Water Act, and advocate for adjustment of the Public Procurement and Disposal of Public Assets Act, so that repair and rehabilitation works can be commissioned to handpump mechanics associations, which is less expensive for local governments and users, and makes the associations more viable;
- The support (through subsidies) of ventures that sell spare parts for boreholes, pumps etc locally;
- Assessment of the success of WATESO and upscale the establishment of water cooperatives. Identify factors of success, main challenges and opportunities, and stakeholders to be involved;
- The design and commencement of a pilot on pre-paid water supply. NWSC has initiated a pilot in the outskirts of Kampala;
- The assessment of success, main challenges and opportunities, and main stakeholders to be involved in the "Borehole as member of the VSLA" approach by TEDDO. Adapt this approach for upscaling to other areas in the catchment;
- The setup of a pilot in which a percentage of the VSLA is allocated to water point maintenance, such as is being piloted in Agago district.

### ***Promote water harvesting for domestic use***

Regarding (rain)water harvesting for domestic use the following sub-activities were established:

- Development of a manual and simple guidelines on rainwater harvesting, including operation and maintenance (O&M) systems, specifically for the context of Lokok Catchment;
- Determine locations for rock catchments for water for domestic use. Assess potential for water storage from rocks at Upper Lokok in Kaabong District, the Nyakwai Hills, Toror Hills, Kalokoruk Rock at the border between Kotido and Kaabong, and other scattered granite inselbergs in Lokok Catchment. Subsequently, verify the different options with local water demand, surrounding communities and the DWO. Set-up a management plan and construct the water harvesting infrastructure;
- Assess the potential for water storage in river beds through the implementation of sand and subsurface dams. Conduct a feasibility study and assess river beds, map settlements along the river and their current water needs. Discuss the findings with the DWDs and communities. Agree on an operation and maintenance system, and construct the water harvesting infrastructure. Especially the riverbed of the Nangaloapolon River looks promising, therefore locations close to villages Lokanavona, Lomenona, Toroi and Toro Central should be assessed;
- Design and commence a sensitization campaign on rooftop water harvesting. Promote roof water harvesting for all building with tiles, metal sheets or plastic roofs within Lokok Catchment;
- Identify appropriate schools, health centres and other institutional buildings and equip them with rooftop water harvesting systems. Ensure that the respective institution contribute to the construction to build a sense of ownership;
- Design and start a number of pilots on compound rainwater harvesting for domestic water use. Establish the conditions of such pilots as well as areas for pilot implementation.

### ***Improve deep borehole drilling***

The CMC should coordinate, under auspices of KWMZ, DWD and KUWS and with support of development partners, the provision of training to district technical staff in supervision and contract management in regard to deep borehole drilling, so they better know what to look for in terms of the contract as well as during the actual drilling. Improved understanding of deep borehole drilling, technical supervision and contract management will increase both the success rate as the sustainability of boreholes significantly.

### ***Promote shallow groundwater development***

In areas of shallow groundwater, there are business opportunities for local artisans (including existing pump mechanics) in manual drilling and hand dug well construction. This will require training in manual drilling and hand dug well construction to local artisans at district level, while capacity of local contractors need to be developed to site, drill, develop and equip new boreholes. The artisans will be supported at catchment level to establish SMEs and their work assessed for quality assurance, through re-directing external willingness to invest, for example through the development of guidelines, in water infrastructure.



Such niche market can be boosted through the establishment of pilots. The proposed pilots should focus on shallow groundwater development through manual drilled shallow wells in river banks for domestic use, supplementary irrigation and livestock watering. Periodically the results of the pilot should regionally be disseminated, while in general awareness should be raised on the opportunities, potential and need for development as well as protection of shallow groundwater wells.

#### **6.4.5 Sanitation and waste management**

Especially in rural areas, sanitation coverage is low and open defecation high. This can result in contamination of water points and prevalence of water borne illness. It is difficult to state to what extent water points are contaminated by human or animal faeces due to the lack of water quality testing, but it is likely to be greatest in the rainy season, in areas of shallow groundwater especially if the well head is cracked or lacks a sanitary seal. In promoting greater latrine use, the water point mapping will identify water points which are contaminated or at risk. Priority will be given to water safety planning which involves safeguarding sufficient, safe water throughout the year.

##### ***Upscale sanitation programmes***

Detailed information about the current hygiene and sanitation status and practices in Lokok Catchment is still lacking. It is therefore proposed to implement contextualized sanitation plans and approaches with village elders and community leaders. Develop dissemination materials on simple hygiene and water treatment options. Also the capacity of village health teams should be improved and scaled up to implement several hygiene and sanitation programmes, such as:

- Community Led Total Sanitation
- Child Hygiene and Sanitation Training
- Participatory Hygiene and Sanitation Training (through schools)
- Village Environmental Sanitation Teams
- Elder-related sanitation approaches

Furthermore, the intervention should focus on raising awareness of the benefits of improved sanitation and hygiene. For dissemination of the message of a sanitation awareness campaign, radio, churches, district health clinics and departments, NGOs, community leaders and school teachers, will prove effective media. In close co-operation with village elders and WUCs, a joint plan and approach for improved education about hygiene and sanitation will be developed. By promoting awareness in schools, children can be encouraged to promote behaviour change at home. While DWD should support the development of improved WASH facilities, the Ugandan Ministry of Health, together with locally active NGOs, should:

- develop a WASH education package for schools;
- support WASH community awareness programmes, and
- develop dissemination materials on simple hygiene and water treatment options.

Likewise, for domestic use, for pastoralist communities an awareness raising campaign should be implemented to sensitize kraal leaders on the importance of WASH and the need for stricter separation between livestock watering points and those for domestic use.

District governments – with support of KWMZ and development partners and in line with the National Health and Environment Act – should implement programme to enforce latrine construction when constructing a house. Respective district departments (DWD and DHD) should monitor that distances between water points and depths as stated in national guidelines are respected. This should also be linked to the intervention ‘rehabilitation of water points’ under paragraph 5.3.4. Water points should only be rehabilitated and boreholes being drilled if there is thought about latrine construction at sufficient distance from the abstraction point and a hand washing facility in place. In regard to new sanitation facilities, significantly more latrines should be built in towns, at markets, near churches, health centres, and close to valley tanks and dams. Overall objective should be to elevate people from open defecation to at least unimproved or shared sanitation facilities, which is linked to the sanitation ladder (WHO/UNICEF).

##### ***Promote waste management***

In regard to waste management two types of waste management can be distinguished: 1) solid waste (including electronics and batteries) and 2) sewerage. For both a waste management system need to be developed, strengthened and implemented by the district governments for urban and rural growth centres. Therefore, current waste management practices need to be



assessed and a plan developed, which also should include the processing, funding, design and implementation of such waste management system. It is recommended to encourage and support ventures that invest in reuse and recycling.

## 6.5 Thematic area of intervention D: Agriculture and economic development

The economic developments which have an impact on the water balance mostly revolve around subsistence agriculture and pastoralism.

- No large industrial facility has yet entered the catchment or has any significant impact on the water balance.
- The majority of the people live in rural areas of the catchment where they derive their livelihood mainly from crop farming or livestock and increasingly from exploitation of natural resources.
- Tree cutting for firewood, brick making and charcoal increases, especially during the dry season.

Because the main setback in agricultural productivity is water, the key to increasing profitability and resilience to climate shocks is to improve water availability and conserve soil and water. Poverty and absence of sustainable alternative livelihoods seems to fuel dependence on resources exploitation such as goldmining, charcoal burning and wood cutting. Improving the profitability of farming can reduce poverty and improve health and nutrition of the poor while at the same time encouraging natural resources protection.

The interventions presented in the next sections seek to increase production of agriculture while making steps towards the development of environment-conscious cash crop farming. In the interventions we highlight opportunities which make economic development in agriculture part of catchment protection. At the same time a number of opportunities exist in agriculture which can have a deteriorating effect on environmental and social sustainability. For instance, we do not propose to promote large scale agriculture of investors from outside the catchment who might be in a position to turn large stretches of land into monocrops and irrigate this with groundwater. There might be opportunities to do this, but these will be detrimental to the catchment groundwater reserves and economic opportunities of people who now make a living on small scale agriculture. Furthermore, at present there is little protection in communal land ownership that might help the people of the catchment to be engaged in decision making for more intensive agriculture. Therefore the interventions focus on farmer-led, market based solutions that create profit whilst sustainably using the natural resources. The opportunity to earn cash and build businesses is a primary driver of change especially for interventions that can be adopted by individuals or small groups. These interventions combine the development of business opportunities with the maintenance and recovery of healthy and climate resilient ecosystems.

**TABLE 25: AGRICULTURE AND ECONOMIC DEVELOPMENT**

Results		
<ul style="list-style-type: none"> <li>■ Reduced soil erosion</li> <li>■ Increased incomes and more (climate) resilient livelihoods</li> <li>■ Improved agricultural and livestock production which results in increased food security, health and nutrition status</li> <li>■ Improved ecosystems services from farmlands, which amongst other contributes to water security</li> <li>■ Increased availability of farming products and services, which augments the productivity and profitability of farming</li> <li>■ Business development, which supports entrepreneurial farmers, and small and medium scale farming enterprises</li> <li>■ Inward investment support programme</li> </ul>		
Interventions		
Improve livestock farming: <ul style="list-style-type: none"> <li>■ Research into livestock value chains</li> <li>■ Develop and implement a plan to improve access to water for livestock</li> <li>■ Improve access to pasture and work on rangeland management</li> </ul>	Improve rain fed farming: <ul style="list-style-type: none"> <li>■ Promote sustainable and productive rain fed farming</li> </ul>	Promote micro and small-scale irrigation: <ul style="list-style-type: none"> <li>■ Promote micro and small-scale irrigation</li> </ul>
Promote medium scale irrigation: <ul style="list-style-type: none"> <li>■ Feasibility study</li> <li>■ Demos medium scale irrigation</li> </ul>	Promote road water harvesting <ul style="list-style-type: none"> <li>■ Implement road water management and harvesting</li> </ul>	Promote alternative sources of income: <ul style="list-style-type: none"> <li>■ Alternative economic activities</li> </ul>

Agricultural production can have a high impact on the environment and the water balance. When developing the agricultural sector, appropriate measures have to be taken to mitigate the effects of projected climate change, including more erratic and higher intensity rainfall events. The interventions selected to boost economic development in Lokok Catchment seek to demonstrate the potential and profitability of commercial farming, and provide support to farmers in



the form of knowledge, products, services, finance and business. The interventions include support to 1) livestock farming, 2) rain-fed farming, promotion of 3) micro irrigation, 4) large-scale irrigation, 5) road water harvesting, and 6) inward investment.

### 6.5.1 Livestock farming

#### ***Research into livestock value chain development (beef, dairy, horns, skins, goats)***

The research focusses on the current and upcoming programs in livestock value chain development such as beef and hides. Several NGOs and research institutes (Nalirri) are working on livestock value chains and there is a risk that development partners do the same projects or parallel programs on similar topics. The priority of the research should be on the opportunities to develop the beef sector and cattle related products (hides, horns, bones) whereby the researchers explore existing best practices or proposals to increase the strength and profitability of livestock breeds. With existing best practices is also meant that the livestock breeds which are best adapted to the catchment need to be selected.

The research on markets needs to take into account:

- The specific dynamics of a pastoralist livelihood (mobility depending on pasture and water)
- Opportunities new markets can bring to reduce pressure on pasture during the dry season
- Alternative national and international markets. The closure of the Juba market leading to the overstocking of certain areas in Karamoja. Alternative markets can help to reduce the pressure caused by international dynamics.

Other alternative outlets that need to be researched are the profitability of a privately held slaughterhouse in Kotido. Currently the slaughterhouse is believed to be publicly held and the production limited. In the study on the beef value chain (Annex F) an outline can be found whereby private sector development (chilled transport to offset markets) facilitates the marketing of cattle. This means that business studies should be made on existing markets and understand better the conditions under which pastoralists will decide to market their cattle (and at which time of the year).

It would be ideal for market development when pastoralists can be organized as groups such as livestock cooperatives. These can then more easily be approached by slaughterhouses, markets, impact financiers or other interested parties to engage into improved stockbreeding, product diversification (skins, horns) etc. There used to be the Jie pioneers which was a successful model. The research should also look into former collectives such as the Jie pioneers to see if this could be a model to reinstate (without excluding other tribes).

#### ***Develop and implement a plan to improve access to water for livestock***

Interviews with pastoralist groups in the catchment revealed that decisions to migrate to new pasture were mostly motivated by reduced availability of water for livestock. Especially in the north-eastern part of the catchment, the grasslands of Kaabong, Kotido ((landscape zone 2.1 agricultural zone Kaabong and 2.2 agricultural zone Kotido), and the areas outside the catchment to the east still have reasonable pasture in the dry season but not enough water to support the cattle. Large dams exist in the area, which cater for vast numbers of livestock, but especially around these dams overgrazing occurs in the dry season, causing pastoralists to move further away in search of pasture. As can be seen Figure 30, the locations of the bigger dams show overgrazing. In many cases cattle move freely into the dam reservoirs the bare soil around the dam catchment is easily picked up by runoff water. Overgrazing around the dams and the trampling of the soil increases siltation of the reservoirs of the dams because the topsoil is exposed and loose when it starts to rain. In some areas pastoralists resort to borehole water, thereby putting pressure on underground water reserves, overusing the infrastructure and in general reducing the availability of water and water pumping technology for domestic use.

To amend this situation a study should be conducted to better understand the carrying capacity of the landscape, taking into consideration the livestock migration routes, current and expected conflicts over natural resources and changing land use, and community land rights. The study should preferably be done by the pastorals groups relevant for the catchment by mapping with them the areas, the pasture and the water facilities used. This could be the first step towards integration of pastoralists in catchment land use planning, managed burning and improved pasture management. It is highly recommended that the study and planning is done in close collaboration with the Lokere Catchment. The study on the



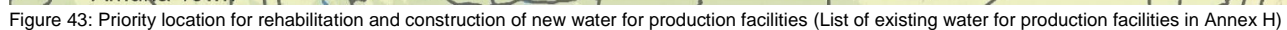
carrying capacity can further build upon results of the water resources assessment (this project) and the migration route maps developed by Acacia Water (this project) and GIZ CCA (2016-2017). The same assessment should work out the numbers of incoming livestock from Kenya and South Sudan in wet, normal and dry years. Ideally the assessment comes up with a rough idea on what the catchment can sustainably cater for and what this might mean for incoming groups of pastoralists. Thereby the study can provide a platform to start dialogue on cross-border water supply for livestock between Uganda, Kenya and South Sudan and explore the feasibility of payment for incoming cattle from Kenya and South Sudan (in kind or in cash). The cross border inter tribe deliberations could follow the same communication lines which delivered the Nabilatuk agreement which ended the cattle raiding in 2012. In new meetings amongst the same stakeholders, agreements can be made whereby water and pasture management is taken into account and the authority of local cattle keepers respected. At the same meeting, it could be discussed whether compensation for pasture and land in kind or in cash is an option to insure fairer access.

The primary goal of the activity is to find the right locations for water facilities for livestock to support a viable stock reserve in areas where pastoralism is a preferred option. The study should consider that the spreading of water sources leads pastoralist movements and has the potential to reduce the pressure on existing grazing lands. A study has already indicated some of the locations which are viable for dams and valley tanks and a map detailing a number of proposed locations can be found below.



Figure 42: Kailikong dam in Abim september 2016 with thick grass cover around. During the dry season pastoralists from the east of Kotido settle around this dam





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existing facilities can be improved. The involvement of cattle keeper groups should be the first step towards co management of the facilities whereby pastoralists can feel entitled to collaborate or take the initiative in operation and maintenance. Together with these groups the existing water facilities should be visited to see about the functionality status of dams and tanks and see if rehabilitation/desilting is a sustainable solution in the long term.

A number of options should always be considered to increase the functionality of the dams and valley tanks:

- Plant trees around the smaller tanks to reduce evaporation and create a wind break.
- At large dams always create drinking places (cattle troughs) separated from the main water body to prevent cattle from getting into the water.
- Look for opportunities to implement silt traps before the water reaches a tank or catchment improvement in the form of upstream soil and water conservation measures (for instance exclosures).
- Make sure there is a maintenance plan (see 6.5.4).

### **Improve access to pasture and rangeland management**

Bushland and grassland in the catchment can be further developed through improved water facilities, so increasing the number but also the distribution of water sources which allow underutilized pasture to be kept short and reduces the pressure on overstocked areas. As has been show in the options and scenarios, the main challenge is the spreading and drying of water sources (see also Mugerwa et.al 2014). Again, in very close collaboration with pastoralists groups, or even led by pastoralist groups through the Alomar (Figure 44), management plans should be developed that focus on long term sustainability for all users. The Alomar is an organizational layer higher than the kraal (*ngawuyoi*) led by someone who is known to support the best interest of the kraals.

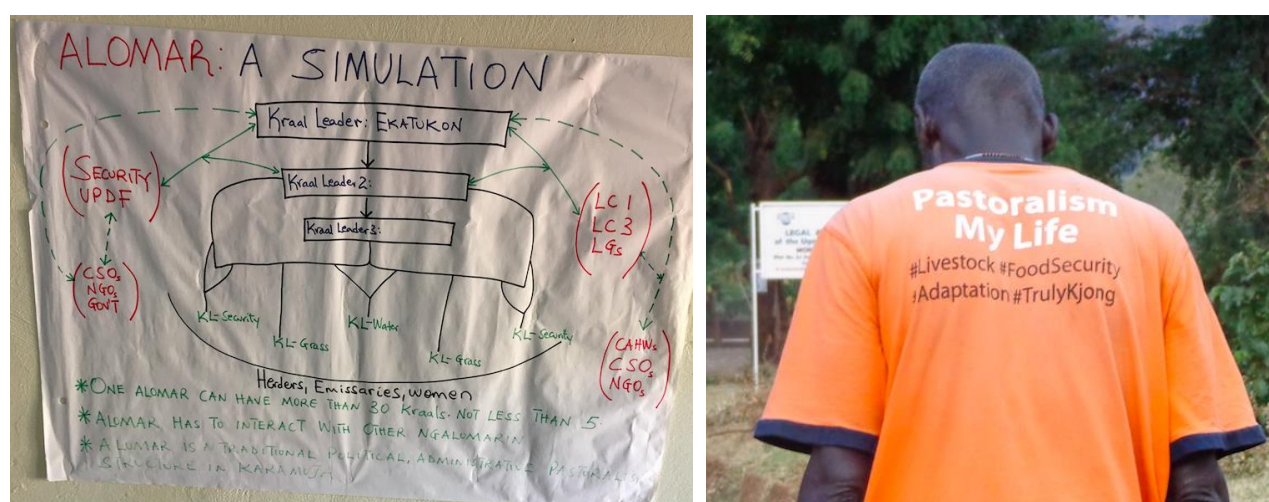


Figure 44: Simulation of the Alomar (left). Message on the value of pastoralism to the Karamojong (right) (Source: RAIN)

The primary focus of this plan should be on mechanisms to work out the location of underutilized pasture, (in combination with the erosion maps), plan for reduced or controlled burning and controlled/rotational grazing. It is proposed that the CMC collaborates with the Alomar to enable them to create management plan, possibly mediated by NGOs such as KDF to mainstream the development and interpretation of planning. IGAD needs to be included in cross border management to back up the KWMS and DWRM since they already work cross borger and in 14 districts relevant to the catchment. Furthermore, the KWMZ should look for an organisation that has the mandate to come up with one common resolution in the cattle corridor putting together early warning systems, payments as a community and rearing animals across border. The same organisation should seek to establish a memorandum of understanding between the pastoralist communities of Karamoja, Teso and Turkana.

In such planning the CMC should also research the opportunities to increase productivity of rangelands through the creation of food banks, enclosures, live fencing and establishment of fire lines. In other areas, such as Kenya, these food banks support livestock in times of distress, they also give degraded areas the time to become productive again and as such reduce erosion. As a recommendation, the CMC and Alomar could visit areas in Maasai land in Kenya or South Africa.

Other economic potential can be found in improvement of fodder for zero grazing or foodlock cows (cut and carry system). Particularly in combination with wetland management, zones in the wetlands of Okok around Napak (3.4). The cut and



carry system keeps the root system of vegetation intact and removes nutrients from the wetland thereby producing a more diverse ecosystem. Production of hay at some scale needs to be researched on the potential. The Kotido grasslands (some 4 km<sup>2</sup> north west of Rengen in zone 4.2) show potential for hay making, only that they are currently used as commons. Improved soil and water conservation, or even floodwater distribution, could lead to good grass for hay and silage production. The main sustainability principle that should be adhered to is that areas for grass production should not be taken away from (mostly women) subsistence cereal production or small scale commercial cereal production. The main focus here should be to locate bush or grassland that can be excluded from grazing and cereal production and closed off for grass in community or cooperative schemes.

### 6.5.2 Rain-fed farming

The business case of rain fed agriculture in combination with household and community based land and water management interventions has high environmental, economic and social priority because a large portion of the population is (seasonally) engaged in rain fed agriculture, it has a large impact on land use, and the activities influence land cover more than any other activity which currently takes place in the catchment. Different approaches to rain-fed agriculture are proposed in different locations in the catchment.

#### ***Promote sustainable and productive rain fed farming***

In the northern sorghum and millet areas there is a need to address droughts, soil erosion and low productivity. The activities in the farmlands there will reduce the siltation of wetlands. Hence, it is suggested to popularize best practices in soil moisture retention, erosion prevention and fertility improvement. Current good practices should be supported, such as the development of community woodlots and farmer managed natural generation practices, and additional techniques, such as the plantation of hedgerows and vetiver bunds, the use of soil bunds and mulching, tree belts and deep trenching could be promoted to reduce surface runoff and soil erosion as well as increase infiltration of surface runoff

The problem with these interventions is not so much their usefulness, but the methods through which the government or NGOs can make these interventions popular. In other areas of Uganda similar interventions led to a 50% increase in production but due to the extra work and the donor dependency few farmers pick up these measures. The main setback seems to be the lack of markets or market interest of farmers, abundance of available land to open up and shortage of labour availability to improve land. Hence, the need to identify, assess, demonstrate and develop business cases in rain-fed farming while at the same time seeking to establish methods towards the improved management of farmland.

#### ***The southern agricultural zones***

In these areas, there are fewer issues with erosion and drought than in the upper zones and a lot more problems with wetlands encroachment, waterlogging and flooding as well as poor market development for crops. Also unlike the upper zones, labour is less an issue with families settling in new areas to open up land and communities being more acquainted with cropping opportunities. As has been established in the water resource assessment and the options and scenarios, a lot of the flooding events can be led back (at least partially) to local surface runoff that stagnates in the wetland or in the villages when soils are saturated. In other areas, the burning, cultivation and draining of the wetlands upstream leads to higher surface runoff in the downstream wetlands. With the increase of sediments into these wetlands the models show that this type of flooding will increase.



Figure 45: Encroachment of agriculture, super rice, into the wetlands around Okobo Amuria (RAIN 2016)



In this particular area, it is critical to provide alternatives to wetland rice (super rice) this crop has already proven to be destructive for wetlands ecology and hydrology with parts of pristine wetlands being burned and partially drained to grow rice. The CMC and KWMZ through the districts should do a research into the opportunities to put a fee on using the wetland for paddy rice. At the same time a viable alternative is available in the promotion of upland rice in floodwater recession zones. Activities to expand on this will be through include awareness raising, demonstration sites and learning visits.

Other alternatives include the promotion of fruit tree orchards, such as oranges, mangos and papayas and includes trainings on grafting and soil and water conservation in community schemes hospitals and schools. Mango tree seedlings that sustain dry condition such as Kapule should be promoted. The factory that is set up in Soroti to process fruits can have a good influence in the profitability of fruit trees. If demonstration sites can combine fruit trees with soil and water conservation the profitability will go up and the surface runoff from the land which causes flooding can decrease. In the agricultural zones of Amuria it was found that many orange trees planted in burned ground without shade or soil and water conservation dry up during extensive dry seasons. There are good examples in Uganda that combine fruit trees with mulching and mixed cropping (e.g. pulses). Such gardens or orchards often combine 10 different crops with different growing cycles, thus providing products all over the year.

### 6.5.3 Promote micro- (<0.5 ha) and small-scale (<2 ha) irrigation

#### ***Promote micro and small-scale irrigation***

Small scale irrigated horticulture on plots smaller than 2 hectares is happening already close to rivers and ponds on the upper side of the catchment around Kotido and Kaabong. On the lower side of the catchment there is usually enough rainwater to produce subsistence and higher value crops such as rice without supplementary irrigation. For profitability of the agricultural sector and resilience to drought there is huge potential to expand micro-irrigation (<12 ha) further. Like with rain-fed agriculture there is need to differentiate between the northern sorghum and millet areas and the southern areas. In the southern parts, existing practices need to be assessed and promoted where small ponds provide additional water supply and can be harnessed for drip or bucket irrigation. In the northern areas, current practices of irrigation from riverbeds or groundwater near the riverbeds can be supported. These practices currently include bucket irrigation and shallow groundwater. Combined with water retention measures such as sand or subsurface dams, riverbank stabilisation (see sections on sand and subsurface dams as well as eco-system protection) these areas around the rivers can become more productive and create more opportunities for crop diversification.

#### **Box 7: Sand dams and subsurface dams**



Sand dams and subsurface dams are technologies for seasonal rivers in arid lands where the sand in the riverbed can serve as a reservoir for underground water. A subsurface dam is built in the sand bed of the river and where it blocks the underground flow of the river to retain water in the sandy riverbed. A sand dam adds an extra dimension to this principle and is built to increase the level of the sand. It makes this sand bed function as a reservoir of water from which it can be accessed with scoopholes or shallow wells. Coarse river sand can contain almost 30% of its volume in water. Water stored in the sand does not evaporate and cannot contain waterborne diseases. One of the additional benefits of sand dams and subsurface dams is that they retain only a very small percentage of the flow of the river (only 1 or 2%). They do this at a time when that water is not needed downstream and thereby only have positive environmental impact.

Unfortunately the implementation of sand dams is not easily done from a manual and several examples could be found in the catchment of dams that were implemented in the wrong place or with the wrong dimensions. The sand dam in the picture to the left for instance appears to function, but because there is no stilling basing or apron at the downstream side to reduce the turbulence of the water the water flowing over the dam will continue to deepen the hole and can in some cases destroy the dam.

### 6.5.4 Medium scale irrigation projects (>2 ha)

#### ***Conduct a feasibility study***

There is potential to develop medium scale irrigation schemes by either developing new groundwater sources or using existing surface reservoirs and dams. However, there are significant risks associated with irrigation such as weak performance due to weak management and negative social and environmental impacts. To mitigate these risks, rigorous economic, social and environmental risk assessment studies and management plans are required to test feasibility.



### ***Demonstrate medium-scale irrigation***

The Lokok Catchment has areas suitable for floodwater distribution weirs. Around Kotido and Kaabong farm lands the areas that flood show higher yields due to increased nutrients and moisture in the soil through the sediments deposited there. Through the diversion and blockage of floodwater large tracks of land can receive more water and fertile sediments and produce hay or sorghum. This sediment is of no use further downstream since it will fill up the wetlands and only part of the surface runoff will be diverted from the river. At the Dopeth River around 3° 10.405'N 34° 4.229'E such a structure can be attempted but there should be research into the risks. Ideally this research should establish the business case for irrigation by checking if a tenure system is possible whereby farmers lease land and water for a year. The research should also ascertain the quality and quantity of available water and look for these areas where surface water storage is possible.

#### **6.5.5 Road water harvesting**

Roads have a significant impact on hydrology, concentrating flows and interrupting surface and groundwater flows. Roads can increase soil erosion especially downstream of culverts, landslides, flooding and water scarcity. Roads (especially unpaved roads and road-river crossings) are vulnerable to flood damage which accounts for most maintenance costs. However, there roads also provide are significant opportunities to harvest water from roads and turn a problem into a solution leading to more local water availability.

### ***Implement road water management and harvesting***

Together with the Uganda Roads Authority and the districts an expert organization should be engaged to pilot roads water harvesting to show increased availability of water and demonstrate how the technology reduces road repair and rehabilitation costs. Rural access roads such as the road from Kotido to Moroto have a lot of opportunities to store water in borrow pits or other small ponds. Additionally, the strengthening of bridges and elevation of drifts (Irish bridges) or culverts in the north will make bridges function as a water retention structures, temporarily retaining water for instance at the bridge at 2° 59.936'N 34° 1.763'E as well as 2° 59.746'N 34° 5.529'E and if roads are to be established at the crossing 2° 58.100'N 34° 0.908'E, a lot of floodwater can be stored and redistributed. Once a number of best practices are established the District Councils can set up programs to embed roads water management in their plans.

#### **6.5.6 Alternative sources of income**

##### ***Promote alternative economic activities***

With inwards investment, we propose the development of enterprises and market revenues in the catchment which will benefit the people and landscape of the catchment in a sustainably way. Inward investment seeks revenue from resource abstraction from the catchment. With the improved security situation and investment in roads and rural electrification, there are business opportunities opening up that weren't feasible 10 or 15 years ago. This includes tourism, especially small-scale eco-tourism based on appreciation of the catchment's unique cultures and ecosystems and establishment of hotels and conference centres and mining.

Alternative economic activities foreseen here include the stimulation of (eco)tourism based on appreciation of the catchment's unique cultures and ecosystems. Currently Kaabong can be a good entry point for Kidepo, but Kotido still has a lot to offer. Kraals and villages can be visited or people can even stay for the night, but capacity of community groups needs to be improved to handle revenue from these activities and distribute it equally between villagers. Ecotourism is not directly beneficial to the catchment, only if taxes on tourism and hotels make it back to the maintenance of infrastructure or into innovation funds which stimulate sustainable growth.

Alternative livelihoods and alternative business opportunities include fish, poultry and beekeeping. These are not at the core of catchment management but these alternative livelihoods can prevent people from resorting to charcoal or goldmining. As a by product of agricultural production dams the prospects of fish farming need to be recognised in the bigger dams. The CMC can take an active role in the promotion of economic activities that are in line with the catchment objectives and priorities. This includes the decrease of dependency on natural resources for income generation specifically targeting the youth. Poultry or beekeeping can be income generating activities which offer an alternative for non-sustainable business which harm the ecosystem health and service provision.

The CMC can actively support the establishment of small enterprises by offering low-cost trainings on how to develop a business, collaboration, governance, financial management skills and marketing. These trainings should target, among



others, local artisans like hand pump mechanics, manual borehole drillers, constructors of shallow wells, constructors of rooftop rainwater harvesting systems. The CTC, District Production Officer and also NGOs often have experience in offering this kind of support.

Furthermore, SMEs and newly established enterprises could highly benefit from formal financial services. The CMC together with the existing financial sector, NGOs and development partners, should explore financial products for this target group, including value-chain financing.

#### Box 8: VSLA to support alternative business

With support from Cordaid and in partnership with GIZ, SOCADIDO formed and trained 20 village savings and loan association groups in Amero Parish, Acowa Sub-County, Amuria District. Each group was supported with savings kit. Members were self-selected and each group has 30 members. To date, groups have saved up to around UGX 45,000,000 and this money is revolving among members through lending. As a way of improving the monthly savings, group members access small loans, i.e. twice their savings for furnishing their businesses. Some of them have started businesses such as buying vegetables e.g. tomatoes, onions, cabbages, that they retail and make a small profit which is used at household level for necessities, buy seed (ground nut, cow peas, green grams etc.) for re-planting when rains return and for paying stipulated interest for the loan borrowed.

A member of the Apopong VSLA states: "starting alternative businesses is now an alternative means to fishing in River Kirik and rice growing in the small wetlands of Kobuin that feed into the Lokok Catchment in Amuria District, Acowa Sub-County. This is gradually contributing to the re-generation process of the wetlands."



## 6.6 Catchment transcending interventions

The CMP presents the interventions that are specific to Lokok Catchment and which can be implemented in Lokok Catchment. However, from the assessments, identified issues and options a number of interventions have been identified which exceed the borders of Lokok Catchment and are more applicable to water resources management in Uganda in general or deal with issues that are not the responsibility of a Catchment Management Organization, but rather of a higher-level institution within the Ministry of Water and Environment and other ministries. As such, these interventions are listed here and not further developed in the catchment management plan for Lokok.

- The country-wide IWRM expertise is insufficient to cover the capacity needs at the (lower) institutional level. Stakeholders indicate that the number of graduates is below what is needed to implement the plans. Suggestions are to have a critical look at the curricula of engineering schools/universities, and adjust in line with the IWRM approach where possible, and allocate funds to have more students involved in specific water management programmes. Educating water professionals and training experts at all levels, and employing them for water management and water services in the wider sense is the key for a sustainable CBWRM.
- Currently KWMZ and district technical departments do not have the staff to keep up with all their responsibilities, i.e. enforcement of regulations, supervision of implementation, monitoring and evaluation, etc. To solve most of the pressing issues additional human resources are direly needed at the lower government levels.
- Poor enforcement of the water permitting system currently undermines sustainable water resources management, as the reliability of water abstraction and waste water discharge data is low. Stakeholders were informed that mechanisms are being developed by MWE to address this issue. Proceeding with the development of these mechanisms is strongly encouraged.
- As was developed in this planning proceed, the water resources base is highly dependent on all kind of other factors which are under responsibility of other institutions than DWRM. Collaboration and coordination between directorates, authorities and departments is fundamental. It is highly recommended to (re)sign Memoranda of Understanding between DWRM, UNMA, UNRA, UWA, NFA and other relevant institutions, and at the same time establish improved coordination mechanisms between the different directorates and departments within MWE. The involvement of WSDF-E, KUWS and UWS-E in the catchment management planning processes, for example, should also be enhanced.



- Currently, poor access to reliable data undermines fact-based decision making by district technical officers and KWMZ. It is hence recommended to ease access to data from national databases and link data quantity and quality databases to ease integrated water resources management.
- Charcoal production is a root cause of deforestation, which in turn is a serious threat to long term water availability. The supply chain for charcoal goes far beyond the border of Lokok Catchment. It is, hence, advised to develop a national strategy to reduce the demand for charcoal, in which the Ministry of Energy and Mineral development should be involved.
- Safe water coverage is low, while boreholes and piped supply schemes are expensive in terms of construction, operation and maintenance. At the same time, shallow groundwater wells are currently banned from construction with ministerial funds by MWE, because water quality is not as good as deep groundwater and because the technology can be drought sensitive. As a consequence, many communities revert to the bad practice of using low quality surface water for domestic use. Since the quality of shallow groundwater is much better than surface water and the costs are relatively low, it is recommended to lift the “ban” on shallow wells, and instead promote best site selection, design and construction practices.
- Many boreholes are non-functional, polluted or dry due to poor siting, design and construction, and operation and maintenance. The recent decision of MWE to have all hydrogeology consultants and drillers registered is a huge step forward in this regard. It is, however, recommended to be even more strict, assess the capacity of these professionals, and strengthen the supervision during construction, and offer them the required trainings as part of lasting skills development.
- Operation and maintenance of water infrastructure is poor to a large extent because of the poor performance of the water user committees (WUCs). Various stakeholders indicated that this is in part because the guidelines do not match the reality in the field. It is unclear to what extent this is the case, but it is nonetheless recommended to consider a review/revision of the current guidance to check whether improvements can be made. Assess also whether it is possible to change the volunteering positions into paid ones, as this is probably the only manner in which WUCs could ever become really functional.
- Currently maintenance of water points is more expensive than needed. Often handpump mechanics could repair or rehabilitate water points at a much lower cost, but this is not possible due to their legal position. It is recommended to check whether it is possible to legalize handpump mechanics associations in the Water Act, and to adjust the Public Procurement and Disposal of Public Assets Act accordingly so that simple works can be commissioned to these associations.











## 7. SOURCES OF FUNDING

### 7.1 Traditional funding streams: government and civil society organizations

In Uganda, funding for natural resources management, livelihood improvement and developing public water related infrastructure in the catchment currently comes from government (both central and local) budgets and development partners for instance NGOs and UN agencies. For the financial year 2016, the Water and Environment Sector Performance Report MWE (2016) indicates that 62% (i.e. UGX bn 560.95) of the funding for the water and environment sector was from the government budgeting process. Of the remaining 38% a large proportion (UGX 285.04 bn) was from revenues generated by the National Water and Sewerage Corporation. Civil Society Organisations (CSOs) in the sector mobilised UGX 59.13 bn. Such traditional funding streams can continue to finance implementation of (part of) the CMP.

Line ministries and agencies of government can finance some of the interventions especially the large ones. Such projects include large valley tanks and valley dams, roads if carefully designed to harvest water, etc. For this to happen government agencies need to be convinced of the added value (or no/minimal added cost) of using the CMP as a guiding document during planning and implementation of their projects; they should embrace CBIWRM. This funding stream will be further assured if the CMP is given adequate legal endorsement for example by the water requiring all other agencies and actors to follow the CMP.

In addition, districts in the catchment can use their own budgets to implement some interventions especially if the DDPs and the CMP are aligned. For this funding source to be fully exploited, the CMP must always address the catchment issues/challenges affecting the districts and must be aligned with the development priorities of those districts. Further, the districts in catchment must commit themselves to implement the CMP when they become member of the CMO; this commitment is best secured if districts (are supported to) develop and sign a binding document for instance a partnership agreement or MoU that spells out the rights, roles and responsibilities of each district. Additionally, at a later stage, arrangements could be made by the central government to require that districts use the CMP as basis for district planning and budgeting.

NGOs and other development partners can continue to mobilize funding (from donors etc.) for implementing interventions in their areas of interest. This funding stream could be focussed more on the CMP, for instance by district councils conditioning their development partners and NGOs to align activities to the CMP and DDPs. In addition to the development partners and NGOs proving that they have the requisite technical capacities, they must demonstrate that the activities they propose to implement are supported or recommended by the CMP or otherwise present evidence that those activities are appropriate even if not recommended by the CMP. These agencies should comply to certain conditions e.g. sharing with the CMO (through the constituent districts) data, for monitoring purposes.

### 7.2 New funding streams

Similar to the previous years, the Uganda water and environment sector performance report 2016 (MWE, 2016) identifies limited funding as a key challenge which the water and environment sector faces in pursuit of the national and sector targets. Generally, the cost of managing water resources to achieve social, economic and environmental goals is increasing because of population and economic growth, urbanization, food needs and the threats of droughts and floods (EUWI-FWG, 2012). The consequence is that traditional funding streams (such as government budget and CSOs) will increasingly become inadequate for implementing the CMPs. New funding opportunities have to be pursued. Examples of such new funding sources, suitable for the catchment, are suggested below including ways of positioning the CMO and districts to attract and secure these funding streams.



### 7.2.1 Programme / project development and fundraising by the CMO

The CMO can source funding from donors for implementing (parts of) the CMP. The CMO needs a good resource mobilization officer who writes proposals –this officer can be stationed at the CMS or, before establishment of the CMS, at the KWMZ. Further the CMO needs an officer who can manage finances, but the finance department of the KWMZ can, in the meantime, play this role. When grants and funding is secured, implementation is done by districts (or depending on the kind of activity and mandates, other ministries like MAAIF, other departments of MWE like WfP, NGOs/CBOs/CSOs, UN-agencies, INGOs) and, if needed, consultants and/or technical personnel from the MWE. In addition, the CMS should have the legal mandate to source and manage funds. Generally, donors prefer to fund legal entities, therefore it is necessary for the CMO to have some sort of legal status for it to be able to attract external (i.e. non-government) funding. The CMO needs a good resource mobilization strategy (to attract funds from sources within and outside of the catchment or country) and a sound financial management strategy (incl. guidelines on transparency and accountability) with which to build and secure the trust of potential funders. Table 26, extracted from Claasen (2015) gives different funds that could potentially finance interventions in the CMP.

**TABLE 26: INTEGRATED LAND AND WATER INITIATIVES RELATED FUNDS**

Fund	Source of capital	Investment focus	Investment tools	Investment size	Engagement period
Althelia Ecosphere, Althelia Climate Fund	EIB, Finnfund, FMO and others	Forest protection and sustainable land use	Private equity in PPP framework	EUR 10 million	8 years
Eco Enterprises Partners II Fund	Divers, among others, TNC, FMO, IADB, EIB	Organic agriculture, eco tourism, sustainable forestry	Long term mezzanine finance in assets, growth and working capital	EUR 0.5 to EUR 3 million	5-8 years
GEF IAP on fostering sustainability and resilience for food security	GEF related investors	Land rehabilitation, governance, policy development	Grants to 12 sub Saharan African countries	EUR 3-9 million per country	5 years
IDH ISLA	Dutch Ministry of FA	Large scale land rehabilitation	Grants and contributions from private sector	EUR 1 million per landscape	4 years
Livelihoods Fund for Family Farming	Danone and MARS	Sustainable agriculture	Mutual fund in PPP framework	EUR 120 million (size of fund)	10 years
Moringa Fund	French based investors and others	Large scale agro forestry projects	Private equity and a grant program	EUR 4-11 million	6-10 years
Land degradation neutrality fund	Divers	Large scale land rehabilitation	Private equity	TBD	5-20 years
Commonland	Dutch based investors and NGOs	Land rehabilitation	TBD	TBD	20 years

### 7.2.2 Local taxes and the LED strategy

Linking catchment management to the water dependent economic activities (e.g. cattle markets) in the catchment creates a business case for (parts of) the CMP to be financed through Local Economic Development (LED). The local government development planning guidelines for Uganda (MFPED, 2014) recognises LED as one of the pillars of decentralisation. The Agency for International Development (undated) defines LED as follows:

*Local Economic Development is a process of strategic planning through partnerships between local government, the business community and NGOs. It aims at encouraging investments that will promote sustained high growth in a local community. LED focuses on the region's potential and identifies specifically what local stakeholders can and need to do to ensure their local community reaches its potential. (Agency for International Development, undated)*

In 2012 Uganda launched the LED policy whose goal is, “A transformed local government system linked to stakeholders at local and national levels that facilitates effective business-oriented locality development with a focus on poverty



*reduction and sustainable wealth creation.*” Therefore, it is imperative to integrate the CMP in the district LED strategies if water dependent economic enterprises and business development services are to get the visibility and due attention.

It is expected that district LED strategies will support the implementation of private sector-led economic interventions that will, for example, maximise the utilization of water for production infrastructures in the districts; tackle unemployment and enable Local Governments to generate their own revenue.

LED Strategy at District levels will serve as a framework for resource mobilization and capacity development for the Local Governments and municipal authorities to offer business development services to enterprises dependent on water for production such as cattle production. Cattle depend on water and pasture. Therefore, well-maintained water infrastructure (dams, valley tanks, ponds) and properly managed rangelands are vital to the sustenance of cattle production and consequently of cattle markets. There is a clear link between water and rangeland management and taxes from cattle markets. Without water (and pasture) there would be fewer (and lower quality) cattle to be sold in cattle markets and thus less tax for the districts. At present, it is understood that districts charge cattle markets a tax with which they for instance finance district council meetings. For the districts to sustain this important source of taxes, it would be logical to consider investing back a portion of the taxes into the establishment of maintenance of the water infrastructure and in promoting proper rangeland management.

For this funding stream to work effectively, the different stakeholders in the water sector need to be organized in such a way that they can offer business development services to the local communities who are organized into savings for investment groups and then use their savings at group level to capitalize their own cooperative societies or local private companies to act as investment vehicles on their behalf. The cooperatives and local private companies will need capacity building services in business development, to be able to deliver the services to the savings for investment group members. The CMO (through constituent District Local Governments and CSOs) should work closely with the business organizations (e.g. cooperatives and local private companies) owned by the local savings for investment groups to identify the appropriate business enterprises and business development needs of the people in their locality and offer them the services.

This source of funding includes permits, but also users' investments to improve conditions on their own plots of land. With regard to permits, arrangements that are applicable include abstraction permits for ground water and waste disposal permits (which go to central government at present), a proportion of which could be allocated to catchment protection. Also, tourists (domestic and foreign) could be charged a small percentage fee for the protection of tourist attractions. Private companies (from instance mining companies) deriving raw materials from the catchment could also be charged a small “catchment management/development” tax. Similarly, hotels and guesthouses in the catchment could be encouraged and required to charge their guests a small tax for protecting the catchment from which the hotels obtain water or discharge waste. Funds generated through this pathway could contribute to the consolidated “Catchment Innovation Fund” proposed and explained under section 6.3.5 as well as lessons learned from other (similar) funds for instance the Community Environment Conservation Fund implemented by IUCN.

Further, the practice of users of a borehole, for example, contributing money for its maintenance could be extended to other water infrastructure like valley dams, valley tanks, and ponds. An example exists in the Teso Region (Lower Lokok Catchment), implemented by the NGO TEDDO, whereby borehole maintenance is combined in the portfolio of Village Saving and Loan Associations (VSLAs). The borehole is made a member of a VSLA; all the user fees collected (on monthly or weekly basis) are saved in the VSLA under the name of that borehole.

Another approach would be to assign the management of water infrastructure (especially valley dams, valley tanks) to cooperative societies or private entrepreneurs that would charge from the users of the infrastructure a “user fee” while adhering to certain conditions as agreed with the districts. Livestock owners would be required to pay for the water their cattle drink from water for production facilities. More than 2 decades ago, the International Conference on Water and the Environment, in Dublin, adopted a statement (called the “Dublin Statement”) giving the guiding principles for managing water the environment. Principle number 4 of the statement is that *“water has an economic value in all its competing uses and should be recognized as an economic good”* (WMO, undated). Principle 4 is based on the realization that *“past failure to recognize the economic value of water has led to wasteful and environmentally damaging uses of the resource”* (WMO, undated). In practice, this means that water services providers (at the time of implementing, and later managing water infrastructure) must aim at running their business at full cost recovery and this must include payment by all users,



including agriculture and the livestock sector. The different modalities of payment, which are suitable and applicable to the context of the catchment, should be studied further.

Added to the user fees, permits and fines, there are interventions that the users can implement in their gardens or plots to, for example, improve yields of crops or pastures. These interventions, if done on a sufficient scale, have an impact on the water balance in the wider catchment. The prerequisite would be capacity building to the users to enable them implement such interventions; capacity building can be through demo sites, learning visits and practical trainings.











## 8. TOWARDS IMPLEMENTATION

An Implementation Plan is available as a separate document to guide the Lokok Catchment stakeholders in realising the Catchment Management Plan. The Implementation Plan is organised as a practical tool indicating interventions per thematic area, steps or sub-activities, locations (where applicable), project lead, possible partners for implementation, priority and budget for implementation as well as for structural operation and maintenance. Some of these fields are further introduced in the following paragraphs.

The Implementation Plan starts with an extra cluster of activities, additional to the four thematic areas of interventions, which relate to the finalisation of the current CMP planning process. Activities included relate to the engagement of stakeholder groups which were underrepresented in the 10-months CMP planning process and to the inclusion of recommended interventions from parallel studies, including the Capacity Development Plan for the Directorate of Water Resources Management of the Ministry of Water and Environment (Water Resources Management Sub-sector), which has been developed by PROTOS Belgium and co-funded by German Development Cooperation and DFID (under its Enhancing Resilience in Karamoja Project), implemented by Deutsche Gesellschaft für International Zusammenarbeit (GIZ) GmbH.

### 8.1 General prioritization of intervention

The CMP includes 4 thematic areas of interventions following the objectives developed by the stakeholders during the planning process and under each many interventions and activities are planned for. In the Implementation Plan the activities are prioritised per the urgency of implementation. The priority does not indicate the relevance, but rather an order of implementation in time. The priority is defined along the following timeframe:

- Critical: implementation should start immediately. The activities are conditional to any further implementation and key for sustainable catchment management. These most critical activities can be implemented within 1 year from CMP approval and are mainly related to institutional strengthening.
- High: the activities are of high relevance to key issues and with expected high impact on improving water resources management and stopping harmful practices. The activities should be implemented at short term, meaning within 3 years from CMP approval.
- Medium: activities that are planned to be implemented at intermediate term, within 3-5 years from CMP approval.
- Low: activities which can be implemented at the longer term, meaning within 5 to 23 years<sup>13</sup> from CMP approval.

### 8.2 Roles and responsibilities

In the implementation plan the roles of project leads and implementing partners are differentiated. A project lead takes the initiative or guides an activity that will be implemented. The project lead is not necessarily the funder or the actual implementer on the action. KWMZ and the CMC are the only possible project leads; however, many other actors can be involved for implementation and support.

The project lead should:

- Direct the project implementer to carry out those interventions which are planned for in the CMP.
- Guide the project implementer in stakeholder involvement.
- Provide the project implementer with applicable guidelines and check use.
- Guide the project implementer to set-up O&M systems for sustainable use.

Project implementers are implementing partners contributing to the implementation of the activity. Project implementers can again be KWMZ, the CMC, the district councils, but also other stakeholders. All stakeholder groups, from the water users as primary stakeholders up to development partners and corporate sector, can collaborate or contribute resources to the implementation of specific interventions included in the CMP. Table 27 gives guidance on potential partners. This table

<sup>13</sup> The CMP objectives are aligned to the Uganda vision 2040.



is distracted from the stakeholder matrix which is included in Annex C. Involved implementers or partners for each specific activity are included in the Implementation Plan.

**TABLE 27: PROPOSED STAKEHOLDER CONTRIBUTION TO CBWRM**

Category	Stakeholders	Envisioned contribution
Planning and development	<ul style="list-style-type: none"> <li>■ District Land Boards</li> <li>■ District Planning Units</li> <li>■ Urban Councils Works depts.</li> <li>■ CAOs</li> <li>■ Local Community Associations</li> <li>■ LC5s</li> <li>■ LC3s</li> <li>■ Area based NGOs e.g. Caritas Kotido, SOCADIDO, TEDDO</li> </ul>	Collaboration and leveraging of funds for: <ul style="list-style-type: none"> <li>■ Land planning</li> <li>■ Pollution control (waste management, wastewater &amp; storm water drainage)</li> <li>■ Sustainability and disaster risk mitigation planning</li> </ul>
Environment & natural resources	<ul style="list-style-type: none"> <li>■ Regional Wetlands Technical Support Units (RWTSUs)</li> <li>■ District Natural Resources Departments (NRDs)</li> <li>■ District Environment Committee (DEC)</li> <li>■ Local Environment Committee (LEC)</li> <li>■ District Production Department (DPD)</li> <li>■ District Land Board</li> <li>■ Urban Councils Works Departments</li> <li>■ Uganda Wildlife Authority</li> <li>■ National Forestry Authority</li> <li>■ Area based NGOs e.g. Caritas Kotido, SOCADIDO, KDF, TEDDO, Arid Land Dev't Programme, Warrior Squad</li> <li>■ Development partners: GIZ, IUCN, FAO, Mercy Corps, Conserve Uganda</li> </ul>	Collaboration and leveraging of funds for: <ul style="list-style-type: none"> <li>■ Awareness creation and stakeholder mobilization</li> <li>■ Ecosystem preservation and catchment protection</li> <li>■ Improving land use planning, practices, and soil and water conservation</li> <li>■ Wetlands management and boundary demarcation</li> <li>■ Permits compliance monitoring and enforcement</li> <li>■ Revenue generation from environment services</li> </ul>
Water services	<ul style="list-style-type: none"> <li>■ NWSC area offices</li> <li>■ WSDF</li> <li>■ TSUs</li> <li>■ UWS</li> <li>■ District Water Office (DWO)</li> <li>■ District Health Depts. (DHDs)</li> <li>■ District Water &amp; Sanitation Coordination Committees (DWSCC)</li> <li>■ District Works Depts.</li> <li>■ Health Services Depts.</li> <li>■ Town water boards</li> <li>■ Area based NGOs e.g. Caritas Kotido, SOCADIDO, KDF, TEDDO</li> <li>■ Development partners: UNICEF, UWASNET, UN FAO, GIZ, C&amp;D, Mercy Corps, Goal</li> </ul>	Collaboration and leveraging of funds for: <ul style="list-style-type: none"> <li>■ Awareness creation and stakeholder mobilization</li> <li>■ Catchment/water sources protection</li> <li>■ Public health and hygiene improvement</li> <li>■ Water supplies quality monitoring and general resource monitoring</li> <li>■ Water resources demand management</li> <li>■ Compliance monitoring and enforcement</li> <li>■ Revenue generation and collection</li> <li>■ Pollution control (waste management)</li> </ul>
Community services	<ul style="list-style-type: none"> <li>■ District Community Based Services Depts.</li> <li>■ Community Based Organisations</li> <li>■ Water User Associations</li> <li>■ Cultural and religious institutions</li> <li>■ UWASNET</li> <li>■ Area based NGOs e.g. TEDDO, Caritas Kotido, SOCADIDO, Arid Land Dev't Programme, DADO, Warrior Squad, KDF, WEDA</li> <li>■ Radio stations e.g. Etop, Karamoja FM, Nena FM, Kyoga Veritas</li> <li>■ Print media e.g. Etop</li> </ul>	Collaboration and leveraging of funds for: <ul style="list-style-type: none"> <li>■ Awareness creation and public sensitization and mobilization</li> <li>■ Advocacy</li> </ul>
Capacity development	<ul style="list-style-type: none"> <li>■ District Technical Depts.</li> <li>■ Development partners: GIZ, UNICEF, IIRR, UN FAO, IUCN, Cordaid</li> <li>■ OPM</li> </ul>	Collaboration and resource mobilization for: <ul style="list-style-type: none"> <li>■ Human resources development</li> <li>■ Institutional capacity development</li> <li>■ Sensitization and awareness within the work-force</li> </ul>



**TABLE 27: PROPOSED STAKEHOLDER CONTRIBUTION TO CBWRM**

Category	Stakeholders	Envisioned contribution
Research, data collection and monitoring	<ul style="list-style-type: none"> <li>■ DWO</li> <li>■ IUCN, UN FAO, C&amp;D,</li> <li>■ NaSARRI, Nabuin ZARDI</li> </ul>	Collaboration for: <ul style="list-style-type: none"> <li>■ Monitoring changes in the ecosystem</li> <li>■ Data collection on existing water sources</li> <li>■ Monitoring ground water levels</li> <li>■ Environment conservation</li> </ul>
Advisory	<ul style="list-style-type: none"> <li>■ NEMA, NWSC, DEA, DWD</li> <li>■ LC5s, CAOs, District Technical Heads</li> <li>■ Research institutions</li> <li>■ Development partners: RAIN, Acacia Water, WE Consult</li> </ul>	Collaboration for: <ul style="list-style-type: none"> <li>■ Policy and legal framework guidance</li> <li>■ Compliance with CBWRM guidelines</li> <li>■ Collaboration in building political will and acceptance</li> </ul>
Enforcement and Compliance	<ul style="list-style-type: none"> <li>■ Uganda Police Force (based in the region)</li> <li>■ Tourism Police</li> <li>■ Environmental police</li> </ul>	Collaboration for: <ul style="list-style-type: none"> <li>■ Enforcement of regulations including by-laws and ordinances</li> </ul>
Livelihoods enhancement and peace building	<ul style="list-style-type: none"> <li>■ DAO, DPO, NUSAF (OPM)</li> <li>■ Religious and cultural Institutions</li> <li>■ Operation Wealth Creation</li> <li>■ Area based NGOs e.g. TEDDO, Caritas Kotido, SOCADIDO, Arid Land Dev't Programme, DADO, Warrior Squad, KDF, WEDA</li> <li>■ Development partners: Mercy corps, CIDI, UNICEF, Goal, WFP, UNFAO, Cordaid, Save the Children, ACIDI-VOCA, IIRR, ACTED, World Vision</li> </ul>	Collaboration for: <ul style="list-style-type: none"> <li>■ Food and income security</li> <li>■ Resilience building</li> <li>■ Conflict resolution</li> <li>■ Employment</li> <li>■ Health</li> </ul>

### 8.3 Financial planning

As indicated before the CMP is a living document and part of a continuous management process. The CMP should be reviewed and updated periodically as described under the monitoring & evaluation activities and at least every 5 years in line with national and district planning cycles. The CMP is both an end and a beginning. The CMP marks the end of the planning process and a beginning to the realisation of actual catchment management. Implementation of the CMP requires financial resources. Potential sources for the finances have been suggested in Chapter 7 and activities are planned for to position the CMC to secure funding from those sources. The Implementation Plan provides guidance on the budget for implementation of the interventions as well as structural funding for so called “running costs” and operation and maintenance. In this section an indication of the total budget required to implement this CMP is given. Categories of costs included are staff, consultancies, travel, offices, meetings/conferences/trainings, as well as construction or so-called “hard ware”.



**TABLE 28: BUDGET SUMMARY (2017 – 2040)**

Thematic area of intervention	Intervention	Budget Implementation (UGX)	Budget for O&M (UGX)
CMP finalisation	Finalisation of the Catchment Management Planning Process	41,200,000	-
<b>SUB-TOTAL</b>		<b>41,200,000</b>	<b>-</b>
A. Institutional strengthening	A1. Strengthen the Catchment Management Organisation	668,875,000	264,000,000
	A2. Monitor and evaluate implementation of the CMP	82,250,000	214,250,000
	A3. Coordinate at district level	15,700,000	50,000,000
	A4. Sub-catchment, micro-catchment and community action planning	610,250,000	1,060,000,000
	A5. Funding of the Catchment Management Plan	458,750,000	-
	A6. Learning and knowledge management	919,325,000	586,015,000
<b>SUB-TOTAL</b>		<b>2,755,150,000</b>	<b>2,174,265,000</b>
B. Ecosystem protection and restoration	B1. Productive and protected forests and woodlands	2,065,146,429	270.790.000
	B2. Promoting productive and sustainable rangelands	1,766,857,143	43.450.000
	B3. Protecting wetlands and flood plains	993,020,015	62.950.000
	B4. Protecting rivers and river banks	170,813,571	-
	B5. Flood and water logging mitigation infrastructure	247,846,429	-
	B6. Regulation and enforcement	105,162,857	27.500.000
<b>SUB-TOTAL</b>		<b>5,348,846,444</b>	<b>404,870,000</b>
C. Water and sanitation	C1. Access to knowledge	290,942,857	45,651,429
	C2. Monitoring and planning of water services and resources	1,049,237,500	243,000,000
	C3. Piped water supply systems	40,768,500,000	2,030,400,000
	C4. Rural water schemes	8,901,312,500	428,259,375
	C5. Sanitation and hygiene	1,696,392,857	140,610,000
<b>SUB-TOTAL</b>		<b>52,706,385,714</b>	<b>2,887,920,804</b>
D. Economic development, particularly agriculture	D1. Improve livestock farming	19,458,650,000	185,000,000
	D2. Improve rain-fed farming	957,000,000	150,750,000
	D3. Promoting micro irrigation (<0.5 ha) and small-scale irrigation (<2ha)	620,500,000	-
	D4. Promote medium scale irrigation (>2 ha)	478,000,000	-
	D5. Promote road water harvesting	204,750,000	43,500,000
	D6. Promote alternative sources of income	451,750,000	-
<b>SUB-TOTAL</b>		<b>22,170,650,000</b>	<b>379,250,000</b>
<b>Grand total</b>	<b>UGX</b>	<b>83,022,232,158</b>	<b>5,846,305,804</b>











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# APPENDICES



## ANNEX A – ASSESSMENT REPORTS

- Inception report
- Water Resources Assessment report
- Stakeholder Assessment report
- Strategic Social & Environment Assessment report
- Options & Scenarios report



## ANNEX B – NO-REGRET IWRM MEASURES

**TABLE 29: PERCEPTIONS ON THE SUCCESS OF THE NO-REGRET IWRM MEASURES**

CODE	ACTIVITY	LOCATION	EXPLANATION	RECOMMENDATION FOR UPSCALING / DOWNSCALING
<b>DOPETH SUB-CATCHMENT, KOTIDO AND KAABONG DISTRICTS</b>			<b>IMPLEMENTED BY: CARITAS KOTIDO CONTACT PERSON: DR. PAUL LOCHAP, 0772 605 387, KOTIDOCARITAS@GMAIL.COM</b>	
1.1.1	Support to Develop Wetland Management plan and ensure the restoration and demarcation of depleted wetlands.	Kaelemuye and Kangorok in Kotido District	It is very important to understand the community perspective towards wetland management process. Appealing communities and their leadership to participate in a planning process enhances communal responsibility and ownership of the entire process of development of a wetland plan	This should be scaled-up
1.1.2	Facilitate the adoption and enforcement of controlled grazing in 4 riverine areas.	Kakamar, Loyoro in Kaabong District Rengen and Kotido in Kotido District	Requires an in-depth understanding of grazing areas and map out over grazed areas. This needs continuous engagement with kraal leaders, institution of elders at different levels for the herders to fully appreciate the need for controlled grazing.	Requires upscaling especially in areas where bylaws have been owned.
1.1.3	Promotion of integrated pasture production and management (Chloris gayana and Bracharia Mulato 1) for enhanced livestock production.	Lokatap and Kamoru in Kotido District	Pastures were planted and watered. Some splits dried up as a result of the dry spell. The strategy/approach on this has been to replace those that have dried.	Needs to be up scaled and replicated else where
1.1.4	Training on Improved pasture management of the model villages' representatives.	Lokatap and Kamoru in Kotido District	The trained community members were able to understand how to plant, and manage the newly introduced pastures.	It should therefore be up scaled and replicated
1.1.5	Facilitate the development of community bylaw to help the restoration of ecosystems and habitats.	Lodiko in Kaabong District Rengen in Kotido District	Engaging local communities and authorities on the development of community bylaws, creates ownership and leading to restoration of ecosystems and habitats	This needs upscaling and strengthening
1.1.6	Support the functionality of 4 environmental Management Committees, PMCs, and Environmental Savings Clubs.	Lodiko in Kaabong District Rengen in Kotido District	This activity is on going	A good one to upscale and replicate once completed
1.2.1	Establish community managed tree nurseries to promote the propagation and planting of indigenous tree species.	Lopotuk in Kaabong District Nakapelimoru in Kotido District	Community participation ensures that these facilities are not only established and fenced but also managed and owned by themselves. Procurement of the seeds for establishment of tree nurseries is complete and training is planned for mid-March.	Needs upscaling.



**TABLE 29: PERCEPTIONS ON THE SUCCESS OF THE NO-REGRET IWRM MEASURES**

CODE	ACTIVITY	LOCATION	EXPLANATION	RECOMMENDATION FOR UPSCALING / DOWNSCALING
1.2.2	Development of 4 community woodlots in the catchment. This will include trainings, procurement of seedlings and establishment of PMCs.	Loyoro, Lomusian, Lodiko in Kaabong Rengen in Kotido	4 community woodlots were established and planted with neem, Terminalia, Macamia Acacia Senegal tree seedlings involving community participation. Survivability of all the seedlings has not been easy due to the dry spell. However, Caritas is planning to replace those that dried up.	Needs upscaling
1.2.3	Promotion of live fencing with kei apple in 4 model villages: This will involve fencing of manyattas and gardens.	Rengen Sub-County	Communities have been re-engaged in replanting of the Kei apple in the target villages.	This activity needs to be up scaled not only in the project area but throughout the entire upper Lokok Catchment.
1.2.4	Promotion of farmer-managed natural tree regeneration practices (FMNTR) within the catchment. This will involve trainings, establishment fire lines, establishment of 4 Project Management Committees (PMCs) and 4 informal management structures. Four demonstration sites will be established.	Panyangara Sub-County	Community sensitization demands a good understanding of the importance this approach towards regeneration of ecosystems by the community. This is when communities can be able to appreciate and value their own ecosystems.	The approach should be promoted / up scaled
1.2.5	Promote the planting of Fidebia species woodlots in the riverine ecosystems to restore soil fertility and water conservation mechanisms within the catchment. Two demonstration sites will be established in Kotido and Kaabong.	Kaekar in Rengen Sub-County	This engaged communities in planting the tree species along degraded parts of river Dopeth in the area of Kaekar. This particular tree species has been noted to be one of the best in Soil Conservation especially along the riverine areas.	This needs upscaling and replicating in all entry points for livestock to the rivers.
1.2.6	Promote and provide training and enable access to information on alternative sources of energy and promote the adoption of energy saving practices/tools. This will involve construction of improved energy saving stoves and biogas production in institutions etc.	Loputuk, Nazareth in Kaabong Kotyang in Kotido	Majority of community members appreciate the importance of alternative energy practices. The biggest challenge is low adoption of some of these technologies especially in the villages being a new concept in the communities.	Need to be up scaled and replicated



**TABLE 29: PERCEPTIONS ON THE SUCCESS OF THE NO-REGRET IWRM MEASURES**

CODE	ACTIVITY	LOCATION	EXPLANATION	RECOMMENDATION FOR UPSCALING / DOWNSCALING
2.1.1	Construction of the Sand Dams	Loyoro Sub-County in Kaabong District	Although most of the community members in Loyoro have not yet recognized the importance of this technology being the first of its kind. Having communicated to the community on the importance and how the dam works, communities were able to up on the excavation work. The construction works are ongoing.	This particular approach of the 3R needs to be up scaled.
2.1.2	Construction of shallow well	Rengen Sub-County in Kotido District	The community in Napeet was fully engaged in the excavation work. Currently, the well is nearing completion.	Requires up scaling in other areas with high potential.
2.2	Introduction of quick maturing and drought tolerant seeds to 40 model HHs	Kaelemuye and Kangorok in Kotido District	This was done by procuring of the seeds from certified agricultural inputs shops/ suppliers and distributed to target HHs in the hot spot area around the wetland.	This particular activity has minimal impact in the community since it promotes dependency. Requires down scaling
2.3.	Promote beekeeping in 24 HHs	Kaelemuye and Kangorok in Kotido District	A local service provider from within was engaged to make the hives and later distributed to target HHs in the hot spot area around the wetland.	Requires scaling up in forested areas. This has a good potential to improve incomes of households.
2.4.	Promote local poultry keeping in 66 HHs	Kaelemuye and Kangorok in Kotido District	The chicken was procured locally from the community following the community procurement guidelines. Each HH received 4 birds and 1 improved cockerel.	Needs to be scaled down as the activity is sensitive to failure because of diseases.
3.1.	Rehabilitation of 8 non-functional water hand pumps	Kaabong Town Council and Nakapelimoru Sub-County in Kotido District	Some of the target boreholes need major repairs which cost a bit of more money. This was the justification for re adjustment of this particular budget line. The community is to contribute for labour of the hand pump mechanics.	There is need for up scaling this activity
3.2	Fencing off 5 water ponds and 14 hand pumps using vegetative materials (Ekadeli, Sisal)	Kaabong Town Council and Nakapelimoru Sub-County in Kotido District	Labour and local fencing materials were sourced from the community.	Requires scaling up since its 1 way of water harvesting.
<b>AWOJA SUB-COUNTY, AMURIA DISTRICT</b>			<b>IMPLEMENTED BY: SOCADIDO CONTACT PERSON: FATHER SILVER OPIO, 0772 683 899, SOCADIDO@YAHOO.COM</b>	
1.1	Develop Wetland Management plans		Engaging local communities and authorities on wetland management planning, enhances learning, ownership and limits frictions during implementation process of the wetland plan.	Should be up scaled and replicated
1.2	Promote Buffering and Zoning of Wetlands	Achanga, Ajesai, Ikobatum, Obureiteng, Amugei Apopong, Kokorio and Moruisiru villages	Tree seedlings have been locally raised and managed by communities. They (communities) expect to continue buffering & zoning when rains return. This serves as Pro-active measure for the likely to be encroached wetlands. The raised tree species include: Grevelier, Makhamia, White teak. The seedlings will first be distributed to the households free of charge, but in 2018, the tree nursery attendants will sell them to well-wishers for sustainability of the nurseries.	It should therefore be up scaled and replicated



**TABLE 29: PERCEPTIONS ON THE SUCCESS OF THE NO-REGRET IWRM MEASURES**

CODE	ACTIVITY	LOCATION	EXPLANATION	RECOMMENDATION FOR UPSCALING / DOWNSCALING
1.3	Establish tree nursery sites	Achanga, Ajesai, Ikobatum, Obureiteng, Amugei Apopong, Kokorio and Moruisiru villages	Tree nursery sites are locally managed; however, some loss is experienced due to the long dry spell that has dried up all the nearby water sources to the nursery sites, the nursery bed attendants have to walk for long distances in search for water which in some cases is not adequate. Ferro-cement tanks and roof water catchment systems are used to collect water to support farmers during dry seasons.	This activity is cost-effective, and increases access to tree seedlings by farmers especially during rainy seasons. It needs to be up scaled.
1.4	Construct shallow wells	Ikobatum and Apopong villages	Siting deep wells is quite challenging in Amuria district and in the event of a long dry spell some of the bore holes also dry up. Hydrological reports indicate that there is low water table in some parts of Acowa S/C.	It should be down scaled and government up scales extension of piped water to communities
2.1	Form & Train Wetland Management Committees	Achanga, Ajesai, Ikobatum, Obureiteng, Amugei Apopong, Kokorio and Moruisiru villages	The trained wetland management committees play a very critical role in sensitizing the communities and leading the implementation of the community wetland action plan.	Should be up scaled
2.2	Train communities on alternative energy and adoption of energy saving practices	Achanga, Ajesai, Ikobatum, Obureiteng, Amugei Apopong, Kokorio and Moruisiru villages	Although most of the community members recognize the importance of alternative energy practices, there is still low adoption of some of the technologies.	Need to be up scaled and replicated
2.3	Form and train Village Savings and Loans Associations (VSLA) groups	Achanga, Ajesai, Ikobatum, Obureiteng, Amugei Apopong, Kokorio and Moruisiru villages	This activity brings communities together and enhances community sensitisation sessions due to the fact that in most cases these groups meet regularly on weekly basis, it's easy to pass information to them and this has scaled up the dissemination of information on integrated risk management at community level.	Need to be up scaled and replicated



## ANNEX C – STAKEHOLDER CHARACTERISATION MATRIX

TABLE 30: STAKEHOLDER CHARACTERISATION MATRIX LOKOK AND LOKERE CATCHMENTS

TYPE	INTEREST / ACTIVITY RELATED TO CBWRM	SPECIFIC CATCHMENT (if not both)	INTEREST / INFLUENCE	ALLIANCES	CONFLICTS	SKILLS AND CAPABILITIES	RISKS / CHALLENGES	VALUES OF CBWRM (WHAT IS IN IT FOR THEM)
<b>PROCESS OWNERS</b>								
Ministry of Water and Environment (MWE)	Lead institution for the water and environment sector.							
Directorate of Water Resources Management (DWRM)	CBWRM, coordination and regulation, provision of water permits, monitoring and assessment of water quality and quantity							
Kyoga Water Management Zone (KWMZ)	Responsible for monitoring and assessment (of hydrology, surface and groundwater), water resources and water quality and zonal level.							
<b>STAKEHOLDERS (' GROUPS) FOR LOKOK AND LOKERE CATCHMENT</b>								
<b>LOCAL RESOURCE USERS</b>								
Farmers	Livelihoods (food security and income generation)		<b>Low influence / high interest</b> They are the primary resource users within the two catchments and therefore have a direct stake in conserving and properly managing the water and other natural	CBOs, district departments, NGOs	Their activities in the catchment are in direct conflict with the principles of natural resources management	- Local knowledge about the catchments - Determine the success of the project through their active participation	- Limited knowledge in Natural Resources Management including the related policies and laws - Limited livelihood options - Limited knowledge of disaster risk	Need knowledge to appreciate the proper use of natural resources and to sustainably benefit from them
Miners								
Fishing folk								
Firewood collectors / charcoal burners								



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TYPE	INTEREST / ACTIVITY RELATED TO CBWRM	SPECIFIC CATCHMENT (if not both)	INTEREST / INFLUENCE	ALLIANCES	CONFLICTS	SKILLS AND CAPABILITIES	RISKS / CHALLENGES	VALUES OF CBWRM (WHAT IS IN IT FOR THEM)
Bee keepers			resources. Their participation determines the success or failure of CBWRM projects.				reduction and climate change adaptation	
Cattle herders								
GOVERNMENT MINISTRIES								
Ministry of Agriculture, Animal Industry and Fisheries	Agriculture, livestock and fisheries		<b>High influence / high interest</b> Policy makers & have a direct influence on the catchment management. Agriculture and fisheries have a direct connection with natural resources.	They coordinate with other ministries, work with national statutory authorities, district local governments and with development partners	- Agricultural production versus land use / crop production in the wetlands and/or gazetted forest / woodland - Agricultural production versus wild life reserves	- Skilled in agricultural (fisheries, livestock and crop production technocrats) - Skilled in research, data collection and reporting. - Resources	- Limited resource allocation to departments at district level - Limited agricultural extension staff - Limited coordination with the other sectors	Agriculture needs water and agricultural activities impact heavily on water resources. CBWRM is a platform for exchange, collaboration and conflict management for the use of natural resources within the catchments.
Ministry of Lands, Housing and Urban Development	Land, housing, urban development and planning		<b>High influence / high interest.</b> Land is a major factor in CBWRM. Activities done on land directly affect water resources sustainability. Also registering land parcels and issues title deeds.	They coordinate with other ministries, work with national statutory authorities, district local governments and with development partners	There are always conflicts on land ownership and land use in the 2 catchments (e.g. mining versus agriculture, gazetted land for wetlands and wild life versus agriculture	- Skills in land surveying, land use planning and mapping - Resources for implementation of land related interventions	- Limited resource allocation to effectively implement land interventions (e.g. community sensitizations on land use) - Limited human resource at district level	Natural resources including land have to be managed sustainably in partnership with other sectors.
Ministry of Tourism and Wild Life	Wild life conservation and tourism		<b>High influence / high interest</b> The Ministry has gazetted big chunks of land within the 2 catchments for wild life, hence controlling natural resources like land and water necessary for wild life survival and tourism boost.	Work closely with the National Forestry Authority, environmental police under NEMA, Ministry of Agriculture, district local governments within the 2 catchments and NGOs	- Wild life conservation versus agricultural land for communities - Wild life versus human consumption of wild game	- Skilled personnel in wild life conservation - Resources like land	Encroachment on land in the reserves by communities for agricultural production, poaching, conflicts in land demarcation	Partnership for sustainability of natural resources is very important to their work and for conflict management on the use of natural resources.



TABLE 30: STAKEHOLDER CHARACTERISATION MATRIX LOKOK AND LOKERE CATCHMENTS

TYPE	INTEREST / ACTIVITY RELATED TO CBWRM	SPECIFIC CATCHMENT (if not both)	INTEREST / INFLUENCE	ALLIANCES	CONFLICTS	SKILLS AND CAPABILITIES	RISKS / CHALLENGES	VALUES OF CBWRM (WHAT IS IN IT FOR THEM)
OPM	Livelihoods, watershed management, water for production, infrastructure and disaster preparedness and management		<b>High influence / high interest</b> Government office in charge of a.o. Ministry of Karamoja Affairs and Ministry of Disaster Preparedness. Mandated to support development and humanitarian programmes in Karamoja region. Currently managing 3 major donors funded programmes in Lokok and Lokere: NUSAF3 funded by World Bank, Drylands Integrated Development Project funded by Arabian Development Bank, livestock resilience project funded by DFID/UKAID. It is a decision maker with high interest in catchment management under NUSAF3 programme.	- MAAIF, Ministry of Disaster Preparedness, Min. of Karamoja Affairs, MWE - District departments, Sub-Counties in Lokok and Lokere - primary resource users - DFID, EU, World Bank - INGOs and NGOs	It manages programmes parallel to other development programmes in the districts of the catchment. The approaches supported under the programmes of OPM, like Cash-for-Work or Food-for-Work, may promote more dependency of the communities to external aid.	- Heavily funded by donors and the government of Uganda. - Expertise in livelihoods programming, climate change adaptation programmes, DRR and emergency programmes. - Wide coverage in Lokok and Lokere - Political support from the state.	- Cash for work is not sustainable and stands a risk of making communities dependent on motivation and handouts as condition to any own investment. - Most of the projects have a short lifespan and therefore are likely not to have a sustainable impact. - Coordination with other development partners is not very clear.	- CMP will be a reference document for the OPM (and their implementing partners) guiding on which interventions or management options are fitting where in the catchment. - Cash for work approach can be used to implement some of the activities in Lokok and Lokere CMP. Though the approach is identified as a risk in the current situation because communities have not fully understood the approach, with proper sensitization and application of the approach it can be a motivating factor in community participation. - OPM participation may attract more political support and funding for the catchment from Government and the donor community. - The catchment may also benefit from their expertise.
Ministry of Local Government	Support district government for improved service delivery including access to water resources		<b>High influence / high interest</b> The local government sets standards and influences budget allocations.	Minister of finance, local government, MWE		- Build human and physical capacity for service delivery. - Support the decentralized policy implementation by local government. - Ensure local	- Limited financial resources - Human resources to technically support the local district government for coordination on	



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						governments comply with statutory requirements and adhere to national policies and standards - Provide technical assistance and backstopping for local government.	planning and budget control, etc.	
OTHER DIRECTORATES OF THE MINISTRY OF WATER & ENVIRONMENT								
Directorate of Water Development (DWD)	Water supply, hygiene, sanitation, provision of water for production		<b>High influence / high interest</b> DWD has a direct interest in water. DWD works on implementation of water infrastructure like valley tanks, valley dams, boreholes.	National Water and Sewerage Corporation, District Water Departments, District Engineering and Works Departments, water coordination bodies.	Inter-sectoral and cross-sectoral implementation conflicts	- All Directorates are mandated by the law to implement plans and policies on behalf of their mother Ministries. They have the powers on behalf of their ministries to formulate and set standards for water resources and environment management. - They have both the water and environmental management expertise.	- Inadequate financial resources and human personnel - Poor inter-sectoral and cross-sectoral coordination - Bureaucracy delays implementation of their activities. - There is less focus on water for production. - Weak enforcement of policies on water and environmental management.	- Partnership for sustainable natural resources management - Knowledge acquisition in CBWRM - Conflict management for water and other natural resources
Directorate of Environmental Affairs (DEA)	Environmental policy regulation, coordination, inspection, enforcement and compliance, education and awareness raising and restoration of degraded eco systems		<b>High influence / high interest</b> Their work is environment related.	Environment district departments, National Forestry Authority, Uganda Wild Life Authority, and development partners	Land use conflicts e.g. agricultural activities versus the use of forestry resources and wetlands, government economic interests versus natural resources degradation for private investment	- They have a wide presence in the catchments represented by the line district departments. - They have budget allocations from the government to implement their activities.		



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<b>STATUTORY BODIES</b>								
National Environment Management Authority (NEMA)	Coordination, monitoring, supervision and regulation of all environmental matters in the country		<b>High influence / high interest</b> Their work is environment related	Environment district departments, National Forestry Authority, Uganda Wild Life Authority, district departments, and development partners	Land use versus natural resources (e.g. construction in wetlands, allocation of land to private investors within the wetland zones), agricultural communities and wetlands	<ul style="list-style-type: none"> <li>- Have technical staff in environment planning and management</li> <li>- Have human resource for environment protection</li> </ul>	<ul style="list-style-type: none"> <li>- Wetlands encroachment</li> <li>- Limited financial resources</li> <li>- Political interference</li> <li>- Limited human resource</li> </ul>	<ul style="list-style-type: none"> <li>- Partnership for sustainable natural resources management</li> <li>- Knowledge acquisition in CBWRM</li> <li>- Conflict management for water and other natural resources</li> </ul>
National Water and Sewerage Corporation (NWSC)	Mandated by the Water Act to provide safe water supply to urban areas and manage waste		<b>Low influence / high interest</b> Their coverage in Lokok and Lokere is small.	UWASNET, WSDF, DWO, development partners, District Natural Resources Departments, drilling companies	Concentration in urban areas conflicts with the water needs and interests of those living out of the urban areas	<ul style="list-style-type: none"> <li>- Have water engineers and analysts, water equipment</li> <li>- Have a resource allocation for implementation of activities</li> <li>- Water database</li> </ul>	<ul style="list-style-type: none"> <li>- Water supply and waste management system is expensive; consumers do not want to pay bills</li> <li>- Poor coordination with other water sectors in the region and district</li> </ul>	
National Forestry Authority (NFA)	Management of central and local forest reserves		<b>High influence / high interest</b> They control forest reserves which influence water sources. The interest is high because they have to manage their forest reserves sustainably in Lokok and Lokere catchment	UWA, NEMA, District Natural Resources Departments, environmental NGOs	<ul style="list-style-type: none"> <li>- Control of forests versus government economic investment interests.</li> <li>- Community agricultural interests versus NFA</li> </ul>	<ul style="list-style-type: none"> <li>- Have technical staff in forestry management.</li> <li>- Are protected by the law</li> </ul>	<ul style="list-style-type: none"> <li>- Forest encroachment</li> <li>- Poor enforcement of the forestry policy</li> <li>- Poor coordination with other environmental bodies, including government departments</li> <li>- Resource constraints</li> </ul>	



TABLE 30: STAKEHOLDER CHARACTERISATION MATRIX LOKOK AND LOKERE CATCHMENTS

TYPE	INTEREST / ACTIVITY RELATED TO CBWRM	SPECIFIC CATCHMENT (if not both)	INTEREST / INFLUENCE	ALLIANCES	CONFLICTS	SKILLS AND CAPABILITIES	RISKS / CHALLENGES	VALUES OF CBWRM (WHAT IS IN IT FOR THEM)
Uganda Wild Life Authority (UWA)	Wild life and antiquities		<b>High influence / high interest</b> The two Catchments are habitats for the wild life who rely on water resources for survival. It is the implementation agency for Ministry of Wild life and Tourism. In Lokok and Lokere, they have gazetted big chunks of land. They are concerned with the conservation of the wild life resources.	Work closely with the National Forestry Authority, environmental police under NEMA, Ministry of Agriculture, district local governments within the 2 catchments and NGOs	- Wild life conservation versus agricultural land for communities - Wild life versus human consumption of wild game	- Skilled personnel in wild life conservation - Resources like land - Local representation	Encroachment on land in the reserves by communities for agricultural production, poaching, conflicts in land demarcation	
Uganda National Roads Authority <i>mapping to be completed</i>	Develop and maintain the national roads network, advise government on general roads policy and contribute to addressing of transport concerns, among others.		They are implementing big road projects in the area. Roads affect and are affected by water flows / regimes. Roads can act as catchments for water harvesting (at minimal / no extra cost). On Moroto - Nakapiripirt road UNRA has deliberately turned 3 borrow pits into ponds for water harvesting (which is good) and they are planning to continue doing so, to provide water for livestock. They have started working on Katakwi - Mororoto road.					
Uganda National Meteorological Authority (UNMA) <i>mapping to be completed</i>	Providing meteorological, hydrological and related services		Promote, monitor weather and climate. Provide weather predictions and advisories to government and other stakeholders for use in sustainable					



TABLE 30: STAKEHOLDER CHARACTERISATION MATRIX LOKOK AND LOKERE CATCHMENTS

TYPE	INTEREST / ACTIVITY RELATED TO CBWRM	SPECIFIC CATCHMENT (if not both)	INTEREST / INFLUENCE	ALLIANCES	CONFLICTS	SKILLS AND CAPABILITIES	RISKS / CHALLENGES	VALUES OF CBWRM (WHAT IS IN IT FOR THEM)
			development of the country.					
REGIONAL WATER INSTITUTIONS								
Water Sector Development Facility (WSDF) East	Focus on piped water systems in small towns (STs) and Rural Growth Centres (RGCs), expansion and rehabilitation of existing schemes in the participating districts.	Lokok	<b>High influence / high interest</b> WSDF has direct interest in water. Their influence in Lokok is high. WSDF has got a powerful steering committee chaired by the Director of DWRM and membership of representatives of chief administrative officers in the Lokok catchment. These are top decision makers who can influence matters related to water supply in the catchment. WSDF has had good impact in Kaabong, Kotido and Abim where they established water systems.	MWE, DWRM, district water office, CAOs, political leaders, local resource users.	Weak coordination with other water sector departments	<ul style="list-style-type: none"> <li>- Expertise in water technologies</li> <li>- resources</li> <li>- Work with technocrats at district level</li> </ul>	<ul style="list-style-type: none"> <li>- Reluctance and limited capacity for people to pay for the water permits</li> <li>- Inadequate funding to implement their activities</li> </ul>	Improved coordination for sustainable use of water resources
Karamoja Umbrella Organization (Umbrella Organizations for Karamoja)	They focus on Operations and Maintenance of piped water systems for small towns, metering of water systems, advocacy on user fees and training of Water Boards		<b>High influence / high interest</b> They are directly involved in water activities and able to influence water services delivery through community structures like the Water Boards represented at district and community level. They do capacity building for the Water User Boards, political and local	Political and administrative leaders at district and sub-county level, water resource users, UNICEF, media				



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TYPE	INTEREST / ACTIVITY RELATED TO CBWRM	SPECIFIC CATCHMENT (if not both)	INTEREST / INFLUENCE	ALLIANCES	CONFLICTS	SKILLS AND CAPABILITIES	RISKS / CHALLENGES	VALUES OF CBWRM (WHAT IS IN IT FOR THEM)
			government leaders and other water systems delivery alliances.					
Technical Support Unit (TSU) Mbale & Moroto <i>mapping to be completed</i>	Assists districts in water and sanitation planning issues		<b>High influence / high interest</b>					
DISTRICT DEPTS/OFFICES								
Natural Resources Dept.	Promotes and ensures sustainable natural resource use and management, implements natural resources policies and plans		<b>High influence / high interest</b> The district departments are decision makers mandated by the Local Government Act 1997, amended in 2000. They are also policy implementers in Lokok and Lokere Catchment. They have technical skills and implement district development plans. They have the benefit of data that can be used in natural resources management and other development programmes.	Line ministries, OPM, NARO, NFA, NEMA, community groups, GIZ, DFID, WFP, C&D, Mercy Corps, World Vision, ACTED	<ul style="list-style-type: none"> <li>- Conflicting interests with NGOs and politicians</li> <li>- Conflicts in implementation of sector activities</li> <li>- Operational conflict between district departments and donor funded projects like Operation Wealth Creation</li> </ul>	<ul style="list-style-type: none"> <li>- Mandated by law, policy implementers</li> <li>- Carry out capacity building</li> <li>- Have development plans</li> <li>- Are decision makers</li> <li>- Have technical skills</li> <li>- Have elaborate structures</li> <li>- Have sustained financial support</li> </ul>	<ul style="list-style-type: none"> <li>- Limited funding and delayed disbursements</li> <li>- Staffing Gaps</li> <li>- Limited budget support to Water and agriculture sector</li> <li>- Poor social and economic infrastructure</li> <li>- Weak enforcement of laws and policies.</li> <li>- Poor service delivery due to inadequate monitoring</li> <li>- Lack of capacity and insufficient coordination with other agencies and bodies</li> </ul>	<ul style="list-style-type: none"> <li>- Improved coordination for the sustainable management of natural resources</li> <li>- Learning through experience sharing</li> <li>- Optimisation of use of resources</li> <li>- Manage natural resource conflicts together</li> </ul>
a) District Environment Office								
b) District Forestry Office								
Community Based Services Dept.	Community development, gender and social welfare							
District Water Department	Water supply system and quality assurance							
Production Dept.	Food production and income security, including crop production, capacity building, extension & advisory services, policy guidance							
a) Agriculture Office	Agriculture development							
b) Livestock Office	Livestock development							
a) Fisheries Office	Fisheries development							
Planning Dept.	Departmental planning and resource allocation							



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Information Dept.	Information, mobilization and sensitization							
Health Dept.	Ensuring that communities have access to quality health services							
Engineering and Works Dept.	Support engineering works in the districts, supervise, monitor and coordinate engineering work in the district							
Chief Administrative Officers (CAO)	Is the accounting officer in the district, technical head in the district, head of civil servants in the district							
District Police Commander	Maintain law and order		<b>High influence / low interest</b> in terms of security within the catchments	Communities, NGOs, District Depts.	Conflicts with local resource users that conflict with the environment laws	Have overall authority over law and order within the catchments, have operational machinery for security	<ul style="list-style-type: none"> <li>- Limited resources to enforce the law</li> <li>- Little knowledge of CBWRM</li> <li>- Ignorance of communities about the environment policies and catchment management</li> </ul>	<ul style="list-style-type: none"> <li>- Knowledge acquisition on CBWRM</li> <li>- Information sharing</li> <li>- Proper management of natural resources</li> </ul>
Environment Protection Police Unit <i>mapping to be completed</i>	Enforce environmental laws and prevent the degradation of protected areas.							



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Operation Wealth Creation <i>mapping to be completed</i>	Enhancing household participation in commercial agricultural production through community mobilization, equitable and timely distribution of agricultural inputs, and facilitation of agricultural production chains							
<b>POLITICAL LEADERS</b>								
Local Council Leader (LC5)	Sanctioning of projects at district level, ensuring NGO compliance with the DDPs, monitoring service delivery and mobilization		<b>High influence / low interest</b> LC5 is the political head of the district. Derives his powers from the Local Government Act 1997. Has political support from the communities. Presides over the district council which approves development projects in the district. Can affect the project positively, but also negatively.	Communities, NGOs, district departments	Political interest versus those of the catchments	Have the mandate of the voters, mobilization, has political power	Have low interest in CBWRM	Knowledge acquisition in CBWRM and benefits of partnership and coordination in natural resources management
Local Council Leader (LC3)	Sanctioning of projects at Sub-County level, ensuring NGO compliance with the Sub-County Development Plans, monitoring service delivery and mobilization		<b>High influence / low interest</b> Can provide leadership in the catchments, but can also be blockers.					



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TYPE	INTEREST / ACTIVITY RELATED TO CBWRM	SPECIFIC CATCHMENT (if not both)	INTEREST / INFLUENCE	ALLIANCES	CONFLICTS	SKILLS AND CAPABILITIES	RISKS / CHALLENGES	VALUES OF CBWRM (WHAT IS IN IT FOR THEM)
Local Council Leader (LC1)	Sanctioning of projects at village / neighbourhood level, ensuring NGO compliance with the local Development Plans, monitoring service delivery and mobilization		<b>High influence / low interest</b> Can provide leadership in the catchments and mobilise communities, but can also be blockers.					
Resident District Commissioner (RDC)	Representative of the president in the district. Does mobilization and monitoring of government project. He is also the chairperson of the district security committee.		<b>High influence / low interest</b> RDC is the representative of the state in the district. He/she can influence the political environment in the catchment. The office is vital in monitoring catchment activities and can mobilize political will for catchment activities. Can determine the success or failure of the project. Can also be categorized as leaders but can also be blockers.	The state, District Internal Security Organisation (DISO), district departments, NGOs, LCs, DPCs	Defending state interests versus those of the catchments	- Derives his power from the state and is the presidential representative in the district - Is in charge of security including that of the catchment. - Can solicit state support.	- Limited knowledge of CBWRM and NRM - Office is poorly resourced	Knowledge acquisition in IWRM, and benefits of partnership and coordination in natural resources management
<b>UN AGENCIES</b>								
UN FAO	IWRM, CMP, livelihoods and environment		<b>High influence / high interest</b> Have high interest in CBWRM and are already involved in Catchment Management. Have reliable sources of funding. Have high levels of transparency and accountability. Have data / information on natural resources management. Support capacity building. Have extensive local and	Local NGOs, international NGOs, local government depts., communities, CBOs	- Conflicting approaches to development and natural resources management - Conflicting interests in their development work	- Have expertise in CBWRM - Have the capacity to leverage resources - Have information regarding IWRM - Have technical human resource - Extensive international, national and local networks	- Coordination challenges - Different interests within the catchments - Duplication of activities - Protectionism, competition for impact and visibility within communities - More emphasis on social needs at the expense of CBWRM	- Harmonization of activities for the sustainable management of natural resources within the catchments - Information and experience sharing - Optimisation of use of resources



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TYPE	INTEREST / ACTIVITY RELATED TO CBWRM	SPECIFIC CATCHMENT (if not both)	INTEREST / INFLUENCE	ALLIANCES	CONFLICTS	SKILLS AND CAPABILITIES	RISKS / CHALLENGES	VALUES OF CBWRM (WHAT IS IN IT FOR THEM)
			international networks. Have a sustained presence in Lokok and Lokere Catchments.					
UN WFP	IWRM, CMP, livelihoods and environment, watershed management		<b>High influence / high interest</b> It has the capacity to leverage resources for implementation of natural resources project components. It supports community livelihoods enhancement programmes which is an integral part of CBWRM. WFP has a long experience in humanitarian and development work in Lokok and Lokere Catchments. It has got extensive local and international networks, expertise in CBWRM, livelihoods and infrastructure development. It has a reliable funding source that can be tapped to support activities in the catchment.	DFID, government ministries, district local governments in Lokok and Lokere, World Vision, Caritas Moroto, Goal, C&D, MAP, Samaritan Purse, UN FAO, UNICEF, OPM	WFP implements some projects using cash for work approach which conflicts with other development approaches.	<ul style="list-style-type: none"> <li>- WFP has got very wide structures including its implementing partners.</li> <li>- They have expertise in watershed management, livelihoods programming, nutrition and emergency programmes.</li> <li>- They have a good working relationship with the districts local governments in the catchment</li> <li>- Have both soft and hard ware resources to support catchment activities.</li> </ul>	<ul style="list-style-type: none"> <li>- Poor attitude to development projects in the catchment and climate variability which affects the outcomes of the implementation of their livelihoods activities, such agricultural activities among communities.</li> <li>- Poor coordination with other NGOs especially in the areas of natural resources management.</li> </ul>	<ul style="list-style-type: none"> <li>- Improved coordination for sustainable use of natural resources</li> <li>- Information and experience sharing for best alternatives</li> <li>- Optimisation of resources for natural resources management.</li> </ul>
UNICEF	Water, child nutrition	Lokere	<b>High influence / high interest</b> Highly involved in water, health, nutrition and education	District Local Governments, NGOs, schools, health facilities and community structures, plus the ministries of Health, Education and Water		<ul style="list-style-type: none"> <li>- They have an extensive network of national and international partners in the areas of WASH, education, nutrition and health.</li> <li>- They are a multinational agency</li> </ul>	<ul style="list-style-type: none"> <li>- Rigid un hygienic practices by communities e.g. open defecation</li> <li>- Unreliable water supply in especially Karamoja</li> <li>- No direct funding support to the districts</li> </ul>	<ul style="list-style-type: none"> <li>- Improved coordination for sustainable use of natural resources</li> <li>- Information and experience sharing for best alternatives</li> <li>- Optimisation of resources for natural resources management.</li> </ul>



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TYPE	INTEREST / ACTIVITY RELATED TO CBWRM	SPECIFIC CATCHMENT (if not both)	INTEREST / INFLUENCE	ALLIANCES	CONFLICTS	SKILLS AND CAPABILITIES	RISKS / CHALLENGES	VALUES OF CBWRM (WHAT IS IN IT FOR THEM)
						with strong visibility and a strong resource base. - They can support fundraising efforts to the CMP and activities implementation.		
UNDP <i>mapping to be completed</i>								
Democratic Government Facility <i>mapping to be completed</i>	Democracy, voice and accountability		Supports state and non-state partners to strengthen democratisation, protect human rights, improve access to justice and enhance accountability in Uganda	ECO Uganda				
DONOR AGENCIES / FUNDERS								
DFID	Resilience building, climate change adaptation, livelihoods and good governance		<b>High influence / high interest</b> In its operational plan of 2011-2016, DFID committed to building resilience to the impacts of climate change, particularly in Karamoja region which forms most of Lokok and Lokere catchment. DFID is a funding agency, policy influencer, hence very influential in supporting the implementation of activities in the two catchments.	Government of Uganda, local and international NGOs, local government in Lokok and Lokere Catchments, local resource users.		- Climate change resilience, livelihoods programming, WASH. - They have the capacity to leverage resources for the catchment - Have high negotiation skills. - They have extensive multi-national networks.		Support to improved coordination and sustainable management of natural resources especially water and pasture that is important for improved animal nutrition



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TYPE	INTEREST / ACTIVITY RELATED TO CBWRM	SPECIFIC CATCHMENT (if not both)	INTEREST / INFLUENCE	ALLIANCES	CONFLICTS	SKILLS AND CAPABILITIES	RISKS / CHALLENGES	VALUES OF CBWRM (WHAT IS IN IT FOR THEM)
USAID <i>mapping to be completed</i>								
JICA <i>mapping to be completed</i>								
INTERNATIONAL (NON-GOVERNMENTAL) ORGANISATIONS								
GIZ	Water, IWRM, CMP, Climate Change and Adaptation, Renewable energy and energy, rural and agricultural finance, Water, Hygiene and Sanitation (WASH) and good governance.		<b>High influence / high interest</b> GIZ has been active in uganda funding development projects and programmes. GIZ supports security, reconstruction and peace programmes, sustainable infrastructure development, social development and governance and democracy. Currently GIZ is supporting projects in Lokok and Lokere catchment including the current project on improving integrated catchment management for increased community resilience in Lokok and Lokere catchment. In summary, they work closely with MWE, can conduct high level negotiations regarding CBWRM, are multinational in nature, are policy influencers,	MWE and other ministries, local NGOs, international NGOs, local government depts, communities, CBOs		<ul style="list-style-type: none"> <li>- Have skills and expertise in CBWRM</li> <li>- Have the capacity to leverage CBWRM resources</li> <li>- Have negotiation skills</li> <li>- Have international and national visibility</li> </ul>		Support to improved coordination and sustainable management of natural resources



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			they can play an advisory role in the Catchment.					
IUCN	IWRM, CMP, capacity building, data collection, environmental conservation		<b>High influence / high interest</b> Have expertise in CMP. Have a wide international network, which gives them a strong knowledge base. Have research skills in natural resources management. Have a strong partnership with national level ministries, statutory agencies and district local governments. Have resources and have expertise in rangeland management.	UN FAO, GIZ, DFID, District Local Governments, international membership, communities, national water and natural resources directorates (NEMA, NWSC)	- Conflicting development approaches - Sometimes conflict with politicians and the district local governments due to failure to share plans and budgets	- Have resources - Have data and expertise in catchment planning	Poor coordination leading to duplication of activities in the same geographical areas.	- Improved coordination for the sustainable management of natural resources - Learning through experience sharing - Optimisation of use of resources - Acquisition of knowledge
C&D	Water for consumption and production, data collection, monitoring of ground water levels, IWRM, CMP, governance, water analysis, Operation and Maintenance		<b>High influence / high interest</b> C&D has direct interest in water resources. It has a long experience of work in the catchment related to water resources. C&D has got very valuable soft and hardware resources related to water sources. They are grounded on community based structures, like the water user committees. They have got extensive local and international networks. They can leverage financial support for catchment activities based on their good working relationships with potential donors. They are	UNICEF, ICCO, UN FAO, district water depts., KWMZ, DWO, Dept. of Community Services, Kotido Catholic Diocese, local leaders, opinion and religious leaders, community water user committees, World Vision	Conflicts are basically related to approaches to community development.	- Expertise in water engineering - Water analysis laboratory for water quality analysis - Data base for water sources within the 2 catchments - Water drilling unit with technical human resource, - Geologists - Local human resource - Radio station based in Kotido for information dissemination - Ability to monitor ground water sources - Reliable funding source	Dependency attitude of the communities in the catchment affects their work.	- Optimisation of resource use - Knowledge acquisition - Information and experience sharing



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TYPE	INTEREST / ACTIVITY RELATED TO CBWRM	SPECIFIC CATCHMENT (if not both)	INTEREST / INFLUENCE	ALLIANCES	CONFLICTS	SKILLS AND CAPABILITIES	RISKS / CHALLENGES	VALUES OF CBWRM (WHAT IS IN IT FOR THEM)
			currently involved in some activities with KWMZ. Their influence in Lokok and Lokere catchment is therefore high.					
Mercy Corps	WASH, livelihoods, resilience, environment, peace and land governance		<b>High influence / high interest</b> Having carried out comprehensive studies on resilience building, Mercy Corps has rich data that can support resilience building in Lokok and Lokere. They have direct interest in CBWRM evidenced by projects which they run on WASH and O&M of water sources especially boreholes	USAID, GOAL, District Local Governments, local NGOs and CBOs, farmer groups and other community members	Resilience building activities are not properly understood by communities.	- Have expertise in resilience building - Have strong funders like USAID - Have technical staff in business development	- Poor attitude to development work by communities in the catchment - Poor coordination with other NGOs.	Harmonization of activities related to CBWRM
World Vision	WASH, integrated livelihoods, environment		<b>High influence / high interest</b> They support WASH, livelihoods and water related projects in the catchment. They have a wide geographical coverage in the catchment with extensive local networks. They have the capacity to leverage resources to support catchment activities related to CBWRM.	C&D, UN WFP, CBOs, District Local Governments and communities	- Emergency programmes conflict with other development projects. - Community participation is dependent on motivation.	- Have a strong funding base - Have strong experience in WASH	- Emergency programmes versus development projects. This has affected the outcomes of their projects. - Duplication of activities due to poor coordination with other development partners	- Coordination for effective management of natural resources. - They can learn from the expertise of other organizations.
Goal	WASH, integrated livelihoods	Lokok	<b>Low influence / high interest</b> Presence in Lokok and Lokere is still low though they have some interventions on CBWRM	Mercy Corps, USAID, CBOs like KAPDA, Abim Hand Pump Mechanics Association, Restless Development, VSO		- Have technical skills in WASH, livelihoods and health - Has strong funders		Harness experience in CBWRM from other participating organizations



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ACTED	Resilience building, drought early warning systems, health promotion, education, livelihoods, micro finance	Lokere		CBOS, District Departments, communities		Have strong skills in developing early warning systems and resilience building	- Delayed processing and dissemination of the early warning information to the intended users-communities and other stakeholders - Sometimes unreliability and inaccuracy of the weather information as it is based on predictions, inadequate resources for operationalization of the early warning information	- Information and experience sharing on CBWRM - Can benefit in terms of knowledge acquisition on natural resources management
IIRR	DRR and Climate Change Adaptation, WASH, research, capacity building, livelihoods and CBWRM	Lokere	<b>High influence / high interest</b> They have been involved in CMP and have carried out studies / assessments related to CBWRM together with IUCN. They have also implemented watershed management in Lokere Catchment	UN FAO, UNICEF, district local governments and communities	- Their thin presence in the catchment put them in conflict with district officials. - Poor coordination with other NGOs causes conflict on who is doing what and where.	Have expertise in DRR, research, capacity building	- Have a thin presence in the catchment. - It is yet to build capacity in project development and management	- Information and experience sharing on CBWRM - Can benefit in terms of knowledge acquisition on natural resources management
Cordaid	DRR, CCA, ecosystem management and restoration, livelihoods		<b>Low influence / high interest</b> Works through local partner organisations. Supports implementation of resilient livelihood projects, ecosystem management and restoration, climate-smart agriculture, alternative livelihoods. Member of Partners for Resilience alliance funded by Dutch	Min. of Disaster Preparedness, Caritas Kotido, Caritas Moroto, SOCADIDO, TPO Uganda, ECO Uganda, GIZ, RAIN, Wetlands Int., Acacia Water, Care, URCS, PELUM, Parliamentary Forum on Climate Change	No conflicts in relation to CBWRM	- Works through local partner organisations - Grant management - Financial resources - Expertise in DRR, CCA, EMR - Facilitation of multi-stakeholder processes / participatory planning	- Limited own presence / representation in the country - No represented in the Catchments	- Improved coordination for the sustainable management of natural resources - Learning through experience sharing - Optimisation of use of resources - Acquisition of knowledge



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TYPE	INTEREST / ACTIVITY RELATED TO CBWRM	SPECIFIC CATCHMENT (if not both)	INTEREST / INFLUENCE	ALLIANCES	CONFLICTS	SKILLS AND CAPABILITIES	RISKS / CHALLENGES	VALUES OF CBWRM (WHAT IS IN IT FOR THEM)
			government and lead in Uganda.					
ACDI-VOCA <i>mapping to be completed</i>	Agriculture, livelihoods, private sector development		<b>High influence / high interest</b> They support private sector development within the agriculture supply chain under RWANU - Resilience through wealth, agriculture and nutrition in Karamoja	USAID, Mercy Corps, Concern, District Local Governments, local private sector especially seed and fertiliser distributors				
Concern <i>mapping to be completed</i>	WASH		<b>High influence / high interest</b> They support WASH, livelihoods and water related projects in the catchment. Within RWANU they support borehole rehabilitation	USAID, Mercy Corps, Concern, District Local Governments, local private sector				
Save the Children <i>mapping to be completed</i>	Children - a.o. nutrition, livelihood and food security	Upstream (Kotido, Kaabong, Abim, Moroto and Nakapiripirit)						
WeltHungerHilfe <i>mapping to be completed</i>								
MSF-H <i>mapping to be completed</i>								
IRC (2008) <i>mapping to be completed</i>								
OXFAM <i>mapping to be completed</i>								



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Red Cross <i>mapping to be completed</i>								
Action Aid <i>mapping to be completed</i>								
WHAVER <i>mapping to be completed</i>								
Conserve Uganda <i>mapping to be completed</i>	Conservation and preservation of natural environment, fauna and flora							
<b>NATIONAL NGOS</b>								
Teso Diocesan Planning and Development Office (TEDDO)	Integrated livelihoods, WASH, DRR, energy and conservation	Lokere	<b>High influence / high interest</b> TEDDO is faith-based with a big following. It enjoys local legitimacy and is the biggest development organization in Teso Region. They have a high interest in environmental restoration and conservation. It has a focus on community resilience and enjoys extensive partnership with national networks and platforms as well as local community based structures.	DRRP4T, UWASNET, Uganda Rain Water Harvesting, Teso Peace Activists, Karamoja Teso Food Security Group, Makerere University dept. of gender, NASSARI, Appropriate Technology Centre, district officials and local leaders	- Sometimes conflict with local governments on report sharing and sharing workplans and budgets - Conflicting approaches to development	- Have expertise in bio gas technology, DRR and Climate Change Adaptation - Skills in livelihood development - Strong partnership with research institutions - Wide network of the church	Short funding periods, limited geographical coverage, un reliable funding, limited expertise in IWRM and CMP, susceptible to political interference, high operational costs, poor coordination with other development partners, weak accountability mechanisms, sometimes have poor management issues for projects	Knowledge acquisition on IWRM and CMP, Information sharing, proper management of natural resources, conflict management in natural resources utilization



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TYPE	INTEREST / ACTIVITY RELATED TO CBWRM	SPECIFIC CATCHMENT (if not both)	INTEREST / INFLUENCE	ALLIANCES	CONFLICTS	SKILLS AND CAPABILITIES	RISKS / CHALLENGES	VALUES OF CBWRM (WHAT IS IN IT FOR THEM)
Community Integrated Development Initiative (CIDI)	WASH, integrated livelihoods, environment, energy and savings	Lokere	<b>High influence / high interest</b> CIDI is a regional NGO. They have impact especially in Lokere Catchment in livelihoods programmes, energy and savings. They have direct interest in water, as it has constructed and rehabilitated water infrastructure in Katakwi and Napak districts. It has a good relationship with academic and research institutions, which can be useful in supporting catchment activities.	UWASNET, Uganda Farmers Common Voice Platform, Uganda National NGO Forum, PELUM, district officials and local leaders		<ul style="list-style-type: none"> <li>- Expertise in SMART agriculture</li> <li>- Technical agronomists and a water engineer</li> <li>- Programme staff skilled in participatory approaches</li> <li>- Subscribed to strong national networks and platforms like PELUM, UWASNET, DRRP4T</li> </ul>		
Caritas Kotido	Livelihoods, agriculture, livestock, Disaster Risk Reduction, governance, peace and justice, health and nutrition, WASH, Humanitarian Response, environmental conservation, CBWRM		<b>High influence / high interest</b> Have a long presence in the two Catchments. Have a direct interest in water resources for domestic consumption and production. Have experience and interventions on CBWRM. It is a faith based organization with wide structures for community mobilization. They have a good relationship with funding agencies.	UN WFP, UN FAO, CORDAID, CAFOD, DanChurchAid, church parishes, district local governments and communities		<ul style="list-style-type: none"> <li>- Expertise in DRR, resilience building and WASH</li> <li>- Strong presence in Lokok</li> <li>- Reliable funding base</li> <li>- Extensive partnerships</li> <li>- Wide church network</li> </ul>		



TABLE 30: STAKEHOLDER CHARACTERISATION MATRIX LOKOK AND LOKERE CATCHMENTS

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Caritas Moroto	Integrated livelihoods, Disaster Risk Reduction and Climate Change Adaptation	Lokere	<b>High influence / high interest</b> Have a long presence in Lokere Catchment. Have a great interest in WASH. Have community livelihood projects. Are faith based and have wide structures for community mobilization. Have good relationship with donors	CORDAID, CAFOD, UN FAO, district local governments, OPM and community groups		<ul style="list-style-type: none"> <li>- Experience in DRR, climate change adaptation, livelihoods programming</li> <li>- Wide geographical scope and influence in communities</li> <li>- Wide church network</li> <li>- Good working relationship with the district</li> </ul>		
SOCADIDO	Integrated livelihoods, Disaster Risk Reduction and Climate Change Adaptation, Natural Resources Management, Water Harvesting, Conservation Agriculture, advocacy		<b>High influence / high interest</b> It is a faith based organization with wide structures for community mobilization. Have a long presence in Lokere and Lokok Catchments. Have wide programmes covering a wide geographical scope. Have participated in DRR, climate change projects and have some knowledge and implementation experience of CBWRM through their ecosystem restoration activities.	CORDAID, TROCAIRE, DanChurchAid, Catholic Relief Services, Stromme Foundation, ICCO Netherlands, DRRP4T, district local governments and community groups		<ul style="list-style-type: none"> <li>- Experience in DRR, climate change adaptation, livelihoods programming, business development, CBWRM, ecosystems restoration</li> <li>- Funding partners</li> <li>- Wide geographical scope and influence in communities</li> <li>- Wide church network</li> <li>- Good working relationship with the district.</li> </ul>		
TPO Uganda	Integrated livelihoods, Disaster Risk Reduction and Climate Change Adaptation, Natural Resources Management, psychosocial support	Lokere	<b>High influence / high interest</b> Have a long presence in Lokere Catchment. Have a great interest in WASH. Have community livelihood projects. Have wide structures for community mobilization.	CORDAID, UNICEF, district local governments, community groups		<ul style="list-style-type: none"> <li>- Have expertise in livelihoods programming, DRR, Climate Change Adaptation, ecosystem restoration</li> <li>- Psychosocial support experts</li> <li>- Work well with</li> </ul>		



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			Have good relationship with donors.			district local governments and communities.		
Ecological Christian Organization (ECO)	Natural resources conservation, mining, DRR, livelihoods, climate change adaptation and development research.	Lokere	<b>High influence / high interest</b> Have a long presence in Lokere Catchment. Have a great interest in WASH. Have community livelihood projects. Are faith based and have wide structures for community mobilization. Have good relationship with donors.	CORDAID, GIZ, district local governments, community mining groups, IUCN		- Have expertise in natural resources management, DRR and Climate Change Adaptation - Work on mining issues and advocacy - Have reliable funders like CORDAID - Work well with district local governments and community groups		
Arid Lands Development Programme	Out of school empowerment project, food and nutrition security, agri-business, apiary, informal technical vocational education for the youths, community managed microfinance with women groups and environmental conservation.		<b>High influence / high interest</b> They have a wide geographical project scope - covering 5 districts of Karamoja Region. Have a direct involvement in environment activities, especially tree planting. Have a wide partnership network. Work with many community groups.	Woord en Daad based in Netherlands, Stromme Foundation, DFID, CBOs, youth and women groups, part of the Karamoja Nutrition and Food Security Sector, alliance with Karamoja Integrated Development Programme (KIDP), TEDDO, PAG, World Vision, WFP, farmer groups, VSLA groups, churches especially Catholic and Anglican, local government officials		Agri-business, environmental management, vocational training, livelihoods		



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Dodoth Agro Pastoral Development Organization (DADO)	Livelihoods, governance and accountability, peace building and environment	Lokok	<b>Low influence / high interest</b> It is a local NGO in Lokok Catchment. Have been involved in peace and conflict resolution activities and in livelihoods. They have no experience in CBWRM. They have a small geographical coverage.	KOPEIN, UN FAO, PAX Christo, VSF Belgium, OXFAM GB, Kotido Catholic Diocese, district local governments and community groups		- Have expertise in peace and justice - Agro-pastoralist human rights - Work with cultural institutions - Livelihoods programming		
Warrior Squad Foundation	Livelihoods, awareness raising on NRM, peace and justice, natural resources conservation	Lokok	<b>Low influence / high interest</b> It is a local NGO based in Lokok Catchment. It has been involved in peace building and livelihood activities. Have limited experience of WASH and no experience of CBWRM. They have a small geographical scope.	Open Society Initiative for East Africa, Save the Children International, Menonite Central Committee (MCC), DADO, Kotido NGO Forum and the district departments		Have experience of livelihoods programming, farmer managed natural regeneration approaches, governance and accountability and range land management		
Karamoja Development Forum (KDF) <i>mapping to be completed</i>	Land, pastoralism and governance							
Wera Development Agency (WEDA) <i>mapping to be completed</i>	Community health (WASH, HIV/Aids, malaria prevention & control), food security and income enhancement, education, organization and institution development		Act as a forum for community mobilization, capacity development and advocacy for improved service delivery and livelihoods in Teso region.					



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Kaabong Peace and Development Agency (KAPDA) <i>mapping to be completed</i>	Peacebuilding	Lokere	Works on fostering peaceful co-existence that enhances development by addressing human rights abuses, reducing food insecurity and conflicts in Kaabong district and the Karamoja region.					
<b>COMMUNITY BASED ORGANIZATIONS</b>								
WATESO	O&M of boreholes, WASH, agriculture, capacity building, health, education and training		<b>High influence / high interest</b> This is the first Water Cooperative in Uganda and in the 2 Catchments. It has big membership, technical people and have experience in water resources. Have a wide partnership at community and professional level. Have a big resource base with a close working relationship with Amuria District Local government.	Big membership of 201 water management committees, 4 local groups and associations, 12 institutions and 87 individual members, Makerere University- AFRISA, College of Vet. Medicine, Uganda Cooperative College Kigumba, Uganda Forestry College Nyapea, Post Bank, Centenary Bank, Amuria District Local Government	Often have internal management conflicts	- Technical expertise in WASH, Operation and Maintenance of boreholes, agricultural development, civil engineering, software and irrigation, IGA development and animal management - Laboratory techniques - Legal and corporate management - Food and nutrition - Lobby and advocacy	Membership based	- Knowledge acquisition on CBWRM - Information sharing - Proper management of natural resources - Improved coordination
Abim Women Together in Development	Wash and livelihoods	Lokok	<b>Low influence / high interest</b> CBOs represent community interests, but have limited resources and scope in their	GOAL, C&D	Their use of some of the natural resources conflicts with the principals of natural resources management		- Resource constraints - Poor management skills - Poor accountability mechanisms - Small coverage	
Hand Pump Mechanics Association (all districts)	Repair and maintenance of boreholes and other water sources			GOAL, hand pump mechanics members		Operations and Maintenance of boreholes		



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Amuria District Farmers' Forum	Coordination, information sharing, advocacy on farmers' rights	Lokok	activities, with low knowledge in CBWRM.	Farmer membership		Have knowledge of better farming skills and marketing		
Amuria Fish Farmers Association	Commercial fishing, training and advocacy			Fishing folk community members		Have knowledge in fish conservation, and marketing		
Abim Youth Association	Commercial farming			Youth membership		Have skills in commercial farming		
WERA Women Development SACCO	Savings, agricultural production, tree planting and energy conservation	Lokok	<b>Low influence / high interest</b> Some are involved in the direct conservation of the environment, but are limited in geographical coverage. Have limited resources and knowledge of CBWRM.	Women membership	Internal conflicts			
Morungole / Ikitoyan Conservation Group	Conservation and livelihoods			NFA Kaabong, UWA	Land conflicts, their interests conflict with community livelihood needs	Have knowledge of environment conservation and livelihoods		
TIMU Environment Conservation Group	Conservation and livelihoods			NFA Kaabong, UWA				
Voluntary Action for Development (VAD) <i>mapping to be completed</i>	Livelihood improvement, WASH, family economic empowerment		Implementing "Secure futures combating poverty through economic empowerment" project in Amuria district					
Karamoja Miners Association	Coordination, advocacy, income security and environment concerns	Lokere	<b>High influence / high interest</b> Its membership is wide - working with small scale artisanal miners, whose activities directly impact on the resources within the two catchments. They use water for their mining activities.	ECO, small scale miners' membership, Uganda Joint Christian Council, Safer World, Makerere University Department of Technology, Uganda Land Alliance, Earth Savers and Human Rights Watch	Land conflicts	Have knowledge of small scale miners' rights, and simple mining technology, advocacy and lobbying knowledge	<ul style="list-style-type: none"> <li>- Resource constraints</li> <li>- Poor management skills</li> <li>- Poor accountability mechanisms</li> <li>- Small coverage</li> </ul>	<ul style="list-style-type: none"> <li>- Knowledge acquisition on CBWRM</li> <li>- Information sharing</li> <li>- Proper management of natural resources</li> <li>- Improved coordination</li> </ul>
Interest Group Mining (IG)								



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<i>mapping to be completed</i>								
District Minerals Watch Platforms (DMWPs) <i>mapping to be completed</i>	Mining industry and project monitoring			ECO Uganda				
<b>CULTURAL INSTITUTIONS</b>								
Akiriket Council of Elders	Cultural cohesion, peace and justice, mediation and attitudinal change		<b>High influence / low interest</b> They are highly respected and listened to by communities. They promote cultural cohesion. They are involved in conflict resolutions on land. They can influence change of attitudes. Success in their work is based on very strong community cultural beliefs and values. They can be used as change agents. Most cultural institutions have an attachment to water resources. In Karamoja for example, cultural leaders have been used to influence communities to plant and conserve trees. They have wide structures up to grass roots level, which can be used for mobilization.	Communities, national and local leaders, district local governments, national and international NGOs	- Protection of cultural interests versus that of the catchments - Some of the cultural beliefs conflict with development practices	- Have community wide respect, trust and acceptance - Have resources from their subjects, as communities usually contribute money for the operations and development of cultural institutions.	- Limited knowledge of CBWRM and NRM - Poorly resources offices - They are less prioritized in development issues, yet have a high influence in communities	Orient them on CBWRM and the need to conserve natural resources
Iteso Cultural Union								
Ametho Cultural Gathering								



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<b>RELIGIOUS INSTITUTIONS</b>								
Catholic Church	Peace building and reconciliation, information dissemination, mobilization, and mediation		<b>High influence / low interest</b> Can be used as change agents. They have a big community following, have wide structures for mobilization, are trusted and can forge unity. Have interest in livelihoods, health and education. They have no direct interest in CBWRM.	Church members of their faith, national and local leaders, NGOs	Church interests versus those of the catchments	- Have community wide respect, trust and acceptance - Have resources from their church structures	Have limited knowledge in CBWRM and natural resources management	Knowledge acquisition in IWRM, and benefits of partnership and coordination in natural resources management
Church Uganda								
Islamic Faith								
<b>Media</b>								
Etop Radio	Information, education and entertainment		<b>High influence / low interest</b> They have a wide listenership in Lokok and Lokere Catchments. They communicate in local languages understood by communities. They can be used for community mobilization and information dissemination. Can be used to sensitize communities in the proper use and conservation of natural resources within the two Catchments. Can provide educative programmes on natural resources.	Community members, local leaders, cultural leaders, development partners	Desire for profit versus interests in natural resources management	- Have community listenership / audience within the two Catchments - They can easily disseminate information through news, radio talk shows, etc.	- Have low interest of CBWRM and natural resources management - Too much profit oriented at the expense of preserving natural resources - Limited knowledge in natural resources management	Knowledge acquisition in CBWRM so that they can communicate the right information to the listeners
Nena FM								
Karamoja FM Radio								
UBC Radio <i>mapping to be completed</i>								



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Kyoga Veritas <i>mapping to be completed</i>								
Delta FM <i>mapping to be completed</i>								
MTN	Tele-communication		<b>High influence / high interest</b> They have mobilized resources for constructing water sources in Moroto and Amuria therefore have interest in water resources. They have a wide telecommunications network in the two catchments and therefore can be used for community education and sensitisation on water resources management. CBWRM can be packaged as ring tones for people in the 2 catchments.	Community members, local leaders, cultural leaders, development partners, government departments, community members, private business entities, local and international NGOs, the donor community, schools	Emphasis on profit at the expense of CBWRM and community development	- Tele-communications - Resource mobilization - Have a national identity - Can be used for community mobilization, sensitization and education	Short term participation	- Optimisation of use of resources - Partnership for effective sustainability of natural resources use - Knowledge acquisition
Shamba Shape Up <i>mapping to be completed</i>	Framing information and education		<b>High influence / high interest</b> They produce weekly radio and video productions show casing farmers stories and farming innovations covering East Africa including Uganda	Supported by international donors working in small scale agriculture and linkages to many implementing NGOs and companies		Film and radio production targeting smallholder farmers		



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<b>PRIVATE COMPANIES</b>								
Enterprise Uganda	Skills training for income generation		<b>Low influence / low interest</b> Their presence in the two catchments is limited.	Youths, farmers and traders		Have IGA and development training skills	Have low interest in CBWRM and natural resources management	Knowledge acquisition in CBWRM
Tororo Cement	Large scale mining of limestone, marbel and gold respectively	Lokere	<b>High influence / low interest</b> They are mining natural resources and have impact on water resources: They extract large amounts of water for their mining activities. They have gazetted big chunks of land within the two catchments purposely for mining. Have resources that can contribute to management of water resources within the two catchments.	Communities (casual labourers), District leaders especially the natural resources department, transporters, ministry of energy, political leaders	Mining activities and profit interests versus proper natural resources exploitation and management	- Have financial resources - High level connections at district, national and international level	- Limited knowledge of CBWRM - Independent planning against the interests of the community members - Profit oriented	- Appreciate the need for proper natural resources management - Information sharing - Conflict management
DAO Marbel Limited		Lokere						
Africa Miners Limited		Lokere						
Morulem Gold Mining Group <i>mapping to be completed</i>								
Karamoja Agro-Business Association (KABA) <i>mapping to be completed</i>	Association of agro-dealers promoting interests of members, advertise on radio and talk showsa		<b>High influence / low interest</b> RWANU partner promoting agro-dealerships. They could expand into other agro-inputs such as micro-irrigation or borehole equipment	RWANU: USAID, ACDI-VOCA	Promotion of hybrid and GM seeds conflicts with promoting agro-ecology and seed security			CMP actions strengthen the profitability of small farmers
Golden Bees <i>mapping to be completed</i>	Honey production		<b>Low influence / high interest</b> RWANU partner promoting small-scale	RWANU: USAID, ACDI-VOCA				CMP actions strengthen investments in alternative livelihoods



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			commercial honey production					
Sumodoro Drilling Company <i>mapping to be completed</i>	Drilling company							
Drillco <i>mapping to be completed</i>								
Nile Drilling Company <i>mapping to be completed</i>								
DRACO <i>mapping to be completed</i>								
RESEARCH INSTITUTIONS & ACADEMIA								
NARO-NABUIN ZARDI	Generate, promote and disseminate appropriate agricultural technologies for improved production and productivity in Lokok and Lokere farming systems		<b>Low influence / low interest</b> They are not grounded at community level; they are not involved in community development and have expressed no interest in WRM.	NGOs, local government depts. (natural resources dept. and production dept.)	Focus on research at the expense of natural resources management	Have the research expertise, data, networks	- Limited knowledge on CBWRM - Poor information sharing - Limited presence in Lokok and Lokere Catchments	- Information sharing - Knowledge acquisition on CBWRM and sustainable natural resources management
NASSARI	Research on drought and pest resistant seed varieties (e.g. sorghum), capacity development for farmers and institutions, innovates appropriate agricultural technologies and offers advisory services to farmers and other institutions							



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Makerere University - Africa Institute for Strategic Services and Development (AFRISA)	Research and training in IGA skills and development	Lokok	<b>Low influence / low interest</b> Because of limited presence in the two catchments	WATESO, TEDDO, community groups	Focus on trainings at the expense of natural resources management	- Have skills in industrial and development education, science and technology at community level - They do mass skilling, enterprise development, employment and wealth creation. - They train in poultry and dairy industry, fish business, bee keeping, wild life animal industry and piggery.	- Limited knowledge of CBWRM - Limited knowledge of the context of the two catchments	- Information sharing - Knowledge acquisition on CBWRM and sustainable natural resources management
Makerere University - Department of Environmental Science <i>mapping to be completed</i>	Research related to watersheds / catchments							
Makerere University - Department of Civil Engineering (incl. hydrology) <i>mapping to be completed</i>								
Makerere University - Institute for Social Science and Economics <i>mapping to be completed</i>								
University Busetema <i>mapping to be completed</i>								



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Wera Technical Institute <i>mapping to be completed</i>								
St. Michaels Technical Institute <i>mapping to be completed</i>								
<b>Consultancy firms</b>								
WEConsult <i>mapping to be completed</i>								
Clide Consultancy <i>mapping to be completed</i>								
Sami-Arid Land Development Options (SALDO) <i>mapping to be completed</i>								
ACTAAS (Agricultural Technology and Agribusiness Advisory Services) <i>mapping to be completed</i>								



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Acacia Water	Consultancy services on water retention and storage in Karamoja Sub-region since 2013, design and construction of subsurface dam in Kotido, supporting the development of management plans for Lokok and Lokere catchments.		<b>Low influence/ high interest</b> Activities in the area are limited to consultancy services, highly committed to developing long term sustainable plans that are realistic in terms of implementation. Successful development of CMPs could lead to implementation of similar projects or parts of it in other areas (in Uganda or elsewhere)	KWMZ, international NGOs (Cordaid, GIZ), national NGOs (Caritas Moroto, TPO, Socadido), consultancy firms	Sometimes conflicting approaches to research and development	- Technical: hydrogeology, IWRM, remote sensing, GIS, management information systems - Methodological: active involvement stakeholders in research, measurement networks, and interpretation, evaluation and communication of facts and figures to stakeholders	Not based in Lokok/Lokere	- Learning of CBWRM in practice in the Ugandan context - Development of a huge knowledge base for northern Uganda - Integration of innovative solutions into the CBWRM-framework
RAIN	Consultancy and program development for sustainable land and water interventions. Particular focus on Retention, Recharge and Reuse, known for the Rwambu pilot and the work on CbWRM		<b>Low influence / high interest</b> Activities include consultancy services, program and proposal development, capacity development and training of local organisations. Interest is to develop and implement sustainable water management interventions and provide training/capacity development.	MoWE, KWMZ, WASH Alliance/UWASNET, Cordaid/PfR, Acacia, FAO. JESE, URWA, WHH. Working/collaborating with local organisations (Caritas Moroto/Kotido, Socadido, TPO, Tearfund, WHH)	No conflicts	- Implementers of CbWRM programs in Uganda - Incubators of innovative water harvesting programs - capacity development programs (international and National trainings. - One stop shop: program development, consultancy and implementation.	Limited presence in Lokok and Lokere Catchments	- Extending portfolio of Catchment Management Planning - providing further capacity development - engaging in partnerships for implementation of new programs



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Wetlands International	Championing landscape approaches towards CBWRM, supporting active and meaningful involvement of water resource users (esp. women), natural resource governance, community resilience		<b>Low influence / high interest</b> Works with and through diverse partners to implement CBWRM interventions. Supports local institutions and communities to build ecosystem resilience by using sound science and local knowledge to support decision making in CBWRM.	Dutch MoFA, Cordaid, Acacia Water, RAIN, IRC, Caritas Kotido, Caritas Moroto, UWASNET	No conflicts	<ul style="list-style-type: none"> <li>- Recognised as a credible institution in CBNRM</li> <li>- Expertise in DRR, CCA, EMR and IWRM</li> <li>- Financial resources to implement interventions</li> <li>- Proactively identifies and engages partners for collaborative action</li> <li>- Designing and implementing approaches to reconcile conservation and development (bio-rights approach)</li> </ul>	Limited presence in Lokok and Lokere Catchments	<ul style="list-style-type: none"> <li>- Information and experience sharing</li> <li>- Formation of partnerships for the design and implementation of sustainable CBWRM projects</li> </ul>



## ANNEX D – CMO MEMBERSHIP

**TABLE 31: CMO MEMBERSHIP AND RECOMMENDATION FOR ENGAGEMENT**

Institution	CMO membership	Recommendations for engagement
LOCAL RESOURCE USERS		
Farmers	No	<p>The local water users are the primary beneficiaries and their engagement is of great importance in order to take the right decisions to their vision, objectives and needs. Though their interest in potential benefit from CBWRM is very high, it is difficult to involve the water users as individuals.</p> <ul style="list-style-type: none"><li>■ The local resources users will not be invited to be part of a CMO body at individual level. They are represented in the CMO through different civil society organisations including CBOs, cultural and religious leaders.</li><li>■ NGOs can further support the local users by emphasizing their interests and strengthening their capacity and local NGOs.</li><li>■ Massive sensitization of primary stakeholders, through their community based organizations and groups, trainings, media and sensitization workshops, about catchment management to enable them to actively participate in the planning process and later in the implementation stage. The project and the need for participatory environmental conservation will motivate the involvement of local resource users in project implementation.</li><li>■ Sensitize the resource users about the government laws and policies through the government departments, the CSOs, local traditional structures (for the case of Karamoja) and other change agents like politicians.</li><li>■ Adopt participatory project implementation strategies. Mobilize and sensitize the respective resource users about the project objectives, impact and the relevance of their participation in conserving the water catchments. Involve them at all stages of project implementation.</li><li>■ Focus on increasing livelihood alternatives / options towards reducing the stress on the environment and its resources.</li></ul>
Miners		
Fishing folk		
Firewood collectors / charcoal burners		
Bee keepers		
Cattle herders		
GOVERNMENT MINISTRIES		
Ministry of Agriculture, Animal Industry and Fisheries	No	<ul style="list-style-type: none"><li>■ Ministry officials can form part of a National Technical Advisory Committee (NTAC) or other zonal representation and will work closely with KWMZ. KWMZ will communicate or facilitate their advice and input through the Catchment Stakeholders Forums, CMCs or CTCs at catchment level.</li><li>■ Consultation and advice on policies, visions and objectives.</li></ul>
Ministry of Lands, Housing and Urban Development	No	<ul style="list-style-type: none"><li>■ Participation in a NTAC or through other zonal representation.</li><li>■ Consultation and advice on policies, visions and objectives.</li><li>■ Need to broaden their scope and knowledge in CBWRM.</li></ul>
Ministry of Tourism and Wild Life	No	
OPM	No	
Ministry of Local Government	No	<p>The local government sets policies and standards for decentralised service delivery. Thus, they can assist in the catchment planning and resources allocation in collaboration with MWE.</p>
DIRECTORATES		
Directorate of Water Development (DWD)	No	<ul style="list-style-type: none"><li>■ Directorate officials have an important advisory and guiding role. They can form part of a National Technical Advisory Committee (NTAC) or other zonal representation and will work closely with KWMZ. KWMZ will communicate or facilitate their advice and input through the Catchment Stakeholders Forum, CMC or CTC at catchment level.</li><li>■ Consultation and advice on policies, visions and objectives.</li></ul>
Directorate of Environmental Affairs (DEA)	No	



**TABLE 31: CMO MEMBERSHIP AND RECOMMENDATION FOR ENGAGEMENT**

Institution	CMO membership	Recommendations for engagement
<b>STATUTORY BODIES</b>		
National Environment Management Authority (NEMA)	No	The statutory bodies should become part of a National Technical Advisory Committee (NTAC), or other regional representation, and will work closely with KWMZ. KWMZ will communicate or facilitate their advice and input through the Catchment Stakeholders Forums, CMCs or CTCs at catchment level.
National Water and Sewerage Corporation (NWSC)	No	
National Forestry Authority (NFA)	Yes	The local NFA and UWA representative can be part of the CMC.
Uganda Wild Life Authority (UWA)	Yes	
<b>REGIONAL WATER INSTITUTIONS</b>		
Water Sector Development Facility (WSDF) East	No	<ul style="list-style-type: none"> <li>■ The regional bodies and regional umbrella organizations will be part of a Zonal Advisory Committee (ZAC) as provided for in the DWRM guidelines and framework.</li> <li>■ Participation in catchment stakeholder forums</li> <li>■ Provision of technical expertise to the catchment</li> </ul>
Umbrella Organizations for Karamoja		
<b>DISTRICT DEPARTMENTS / OFFICES</b>		
Natural Resources Dept.	Yes	<ul style="list-style-type: none"> <li>■ For optimal sectoral expertise and vision, all district departments should be represented in all CO bodies.</li> <li>■ Equally the CMC should represent the different sectors thus district representation is recommended.</li> <li>■ Technical officers should represent the district line departments in the Catchment Technical Committee (CTC).</li> <li>■ Build the capacity of the local government officials in CBWRM through partnership with technical capacitated multi-national agencies and (i)NGOs.</li> <li>■ In the context of limited resources, there is need for coordination and synergy building among the different secondary stakeholders. This will facilitate optimal use of the limited resources for the good of community development and environment conservation.</li> <li>■ The district departments in Lokok and Lokere could work with CSO advocacy institutions like UWASNET for purposes of lobbying for more resource allocation from the line ministries to the different district departments.</li> <li>■ Reduce bureaucracy in service delivery.</li> <li>■ Central government should consider increasing budget allocation to districts especially the natural resources departments.</li> <li>■ Districts should scale up resource mobilization from other organizations and improve local revenue.</li> <li>■ Employ more staff to fill up the gaps especially technical staff.</li> <li>■ Address issues of corruption and conflict of interest.</li> <li>■ Improve coordination between ministries and statutory authorities, district technical staff and the political system.</li> <li>■ Improve the enforcement of laws and policies on CBWRM.</li> </ul>
a) District Environment Office		
b) District Forestry Office		
Community Based Services Dept.		
District Water Department		
Production Dept.		
a) Agriculture Office		
b) Livestock Office		
c) Fisheries Office		
Planning Dept.		
Information Dept.		
Health Dept.		
Engineering and Works Dept.		
Chief Administrative Officers (CAO)	Yes	<ul style="list-style-type: none"> <li>■ The CAOs together with representatives of other stakeholder groups will form the Catchment Management Committee (CMC).</li> <li>■ They can play a role as influencers and change agents, important for community acceptance of the project.</li> <li>■ Involve them in planning and engagement meetings, Stakeholder Forums and in CBWRM trainings.</li> <li>■ Sign MoUs to lay down commitments to the objectives and principles of CBWRM</li> <li>■ CAOs need to be oriented about the project and can play an important role in the inception phase of the project. However, their roles must be explicitly spelled out and their expectations levelled.</li> </ul>



**TABLE 31: CMO MEMBERSHIP AND RECOMMENDATION FOR ENGAGEMENT**

Institution	CMO membership	Recommendations for engagement
District Police Commander	No	Participation in the Catchment Stakeholders Forum meetings for regular updates and identify areas where security is much more paramount.
<b>POLITICAL LEADERS</b>		
Local Council Leader (LC5)	Yes	<ul style="list-style-type: none"> <li>Political leaders (LC5) together with representatives of other stakeholder groups will form the Catchment Management Committee (CMC).</li> <li>They can play a role as influencers and change agents, important for community acceptance of the project.</li> <li>Involve them in planning and engagement meetings, Stakeholder Forums and in CBWRM trainings</li> <li>Sign MoUs to lay down commitments to the objectives and principles of CBWRM</li> <li>Political leaders need to be oriented about the project and can play an important role in the inception phase of the project. However, their roles must be explicitly spelled out and their expectations levelled.</li> <li>Sub-County and lower level political leaders will take up similar roles at their respective sub or micro-catchments.</li> </ul>
Local Council Leader (LC3)		
Local Council Leader (LC1)		
Resident District Commissioner (RDC)	No	In an engagement meeting the specific roles for the RDC, the expectations and their commitment to CBWRM should be spelt out in a MOU.
<b>UN AGENCIES</b>		
UN FAO	No	<ul style="list-style-type: none"> <li>Catchment Management is firstly a local issue which should involve all local stakeholders. However, development partners like UN agencies have important capacities which can be of benefit of catchment management and CMP implementation. Therefore, specific catchment based technical people should be consulted by the CMC or CTC.</li> <li>KWMZ is advised to work closely with UN FAO as their activities are directly in line with the project to be implemented.</li> <li>The multinational agencies should harmonize their programmes with the District Local Governments and other development actors in terms of project sites and approaches through multi-stakeholder coordination.</li> <li>They should prioritize natural resources management integration into their development programmes.</li> <li>They have technical capacity and can support in capacity building of different stakeholders</li> <li>They can mobilize resources jointly for long term project implementation.</li> <li>They should develop long term development projects that can realize outcomes.</li> <li>They should provide employment to local communities.</li> <li>Should involve communities in all phases of their project cycles.</li> <li>Reduce indirect costs of the projects to increase impact.</li> <li>Aim at project impact rather than well written and nice reports.</li> </ul>
UN WFP	No	
UNICEF	No	
<b>DONOR AGENCIES / FUNDERS</b>		
DFID	No	Consultation and advice on policies, visions and objectives
<b>INTERNATIONAL NGOS</b>		
GIZ	No	<ul style="list-style-type: none"> <li>Catchment Management is firstly a local issue which should involve all local stakeholders. However, development partners like UN agencies have important capacities which can be of benefit of catchment management and CMP implementation. Therefore, specific catchment based technical people should be consulted by the CMC or CTC.</li> <li>Otherwise, GIZ should be part of a National Technical Advisory Committee (NTAC), or other regional representation, and will work closely with KWMZ. KWMZ will communicate or facilitate the advice and input from NTAC</li> </ul>



**TABLE 31: CMO MEMBERSHIP AND RECOMMENDATION FOR ENGAGEMENT**

Institution	CMO membership	Recommendations for engagement
		through the Catchment Stakeholders Forums, or CMCs and CTCs at catchment level.
IUCN	No	<ul style="list-style-type: none"> <li>■ KWMZ is advised to work closely with IUCN and C&amp;D as their activities are directly in line with CBWRM and the Catchment Management Planning process. As active actors on CBWRM with high influence and high interest, IUCN and C&amp;D should be consulted by the CTC and should be invited to CSF meetings.</li> <li>■ The iNGOs should harmonize their programmes with the District Local Governments and other development actors in terms of project sites and approaches through multi-stakeholder coordination.</li> <li>■ They should prioritize natural resources management integration into their development programmes.</li> </ul>
C&D	No	<ul style="list-style-type: none"> <li>■ Those with technical capacity can support in capacity building of different stakeholders</li> <li>■ They can mobilize resources jointly for long term project implementation.</li> <li>■ They should develop long term development projects that can realize outcomes.</li> <li>■ They should provide employment to local communities.</li> <li>■ Should involve communities in all phases of their project cycles.</li> <li>■ Reduce indirect costs of the projects to increase impact.</li> <li>■ Aim at project impact rather than well written and nice reports.</li> </ul>
Mercy Corps	No	<ul style="list-style-type: none"> <li>■ As significant development actors in the catchments, these iNGOs should be invited to CSF meetings. Through this forum they can bring forward the community perspective on catchment development vision, planning objectives and key issues, options and alternative scenarios.</li> <li>■ Need to broaden their scope and knowledge in CBWRM.</li> </ul>
World Vision	No	
Goal	No	
IIRR	No	With their in-depth knowledge and experience in the Catchment, their advisory services can be used for specific issues on request of the CMO or KWMZ.
Cordaid	No	With their in-depth knowledge and experience in the Catchment and their capacities on multi-stakeholder processes, their advisory services can be used for specific issues on request of the CMO or KWMZ.
<b>NATIONAL NGOS</b>		
Teso Diocesan Planning and Development Office (TEDDO)	Yes	<ul style="list-style-type: none"> <li>■ Local NGOs can represent the community interests and should therefore be represented in the CMC.</li> <li>■ Catchment Based Water resources management is quite a new development concept to many of the local NGOs. KWMZ is therefore advised to build the capacity of these stakeholders by orientation on the national environmental laws and policies.</li> </ul>
Community Integrated Development Initiative (CIDI)		
Caritas Kotido		
Caritas Moroto		
SOCADIDO		
TPO Uganda		
Ecological Christian Organization (ECO)		
Arid Lands Development Programme		
Dodoth Agro Pastoral Development Organization (DADO)		
Warrior Squad Foundation		



**TABLE 31: CMO MEMBERSHIP AND RECOMMENDATION FOR ENGAGEMENT**

Institution	CMO membership	Recommendations for engagement	
COMMUNITY BASED ORGANIZATIONS			
WATESO	Yes	<ul style="list-style-type: none"><li>■ CBOs can represent the community interests and should therefore be represented in the CMC.</li><li>■ Catchment Based Water resources management is quite a new development concept to many of the CBOs and CSOs. KWMZ is therefore advised to build the capacity of these stakeholders in the two aspects:<ul style="list-style-type: none"><li>a. Orient the CBOs and CSOs on the national environmental laws and policies.</li><li>b. CBOs and CSOs are conveniently located in communities, as such they could be used by KWMZ as change agents and early adaptors. They play an important role in community mobilization, sensitization and data collection.</li></ul></li></ul>	
Abim Women Together in Development	Yes		
Hand Pump Mechanics Association (all districts)	Yes		
Amuria District Farmers' Forum	Yes		
Amuria Fish Farmers Association	Yes		
Abim Youth Association	Yes		
WERA Women Development SACCO	Yes		
Morungole / Ikitoyan Conservation Group	Yes		
TIMU Environment Conservation Group	Yes		
Karamoja Miners Association	Yes	Karamoja Miners Association is the institution which groups the large number of small mining associations. As such they can represent of the mining associations in Catchment Management in the CMC.	
CULTURAL INSTITUTIONS			
Akiriket Council of Elders	Yes	<ul style="list-style-type: none"><li>■ Cultural institutions are important change agents, influence community attitudes and project acceptance. KWMZ is therefore advised to involve them in the project through sensitization and to work closely with those located in the project areas.</li><li>■ A cultural leader could be represented in the CMC.</li><li>■ Capacity building in CBWRM, data collection and documentation.</li><li>■ Facilitate traditional institutions for sensitization and information dissemination including mobilization regarding CBWRM.</li><li>■ Promote education among cultural leaders and their subjects.</li></ul>	
Iteso Cultural Union			
Ametho Cultural Gathering			
RELIGIOUS INSTITUTIONS			
Catholic Church	Yes	<ul style="list-style-type: none"><li>■ Religious institutions are important change agents, influence community attitudes and project acceptance. KWMZ is therefore advised to involve them in the project for sensitization and to work closely with those located in the project areas.</li><li>■ A religious leader could be represented in the CSF.</li><li>■ Build the capacity of the religious institutions in CBWRM and sensitize them on the national environmental laws and policies.</li></ul>	
Church Uganda			
Islamic Faith			
MEDIA			
Etop Radio	No	Use media to disseminate information for awareness raising within the catchments on CBWRM and sensitisation on the project objectives.	
Nena FM			
Karamoja FM Radio			



**TABLE 31: CMO MEMBERSHIP AND RECOMMENDATION FOR ENGAGEMENT**

Institution	CMO membership	Recommendations for engagement
MTN	No	<ul style="list-style-type: none"><li>■ Use telecommunications to disseminate information for awareness raising within the catchments on CBWRM and sensitisation on the project objectives.</li><li>■ Explore opportunities for funding CBWRM projects / interventions.</li></ul>
PRIVATE COMPANIES		
Enterprise Uganda	No	As their interest is not so much related to catchment management, there is no need to actively involve them in the CMO.
Tororo Cement	Yes	<ul style="list-style-type: none"><li>■ As actors with high interest in the natural environment of the catchment and as potential blockers for implementation of CBWRM in fear of restriction of their operations and economic outlook, the mining companies should be brought on board of the CMO. They should be invited to CSF meetings and be represented in the CMC.</li><li>■ Private institutions have resources that can be tapped into for the benefit of Lokere catchment. There is therefore need to mobilize and orient them about CBWRM, its benefits and its intentions. They can support the project initiatives in resource mobilization and any other relevant support as part of their corporate social responsibility.</li><li>■ Through the CMOs in the two catchments stakeholders can dialogue with them on better natural resources management, mobilize and involve them in trainings on CBWRM to make them appreciate its importance.</li></ul>
DAO Marbel Limited		
Africa Miners Limited		
RESEARCH INSTITUTIONS, ACADEMIA & LEARNING CENTRES		
NARO-NABUIN ZARDI	Yes	It is recommended to engage them in the CMC to develop their research interest in CBWRM, for synergy building and optimal resource utilization.
NASSARI		
Makerere University	No	Several departments of Makerere University are potential partners for research and knowledge sharing. The CMC should further explore the most relevant partners for knowledge management.
CONSULTANCY FIRMS		
WEConsult	No	<ul style="list-style-type: none"><li>■ These consultants with technical capacity can support in capacity building of different stakeholders.</li><li>■ They can take up specific assignments as part of CMP implementation.</li></ul>
Acacia Water		
RAIN		
Wetlands International		



# ANNEX E - LOKOK CATCHMENT MANAGEMENT COMMITTEE

TABLE 32: LOKOK CATCHMENT MANAGEMENT COMMITTEE (as per March 2017)

	Stakeholder group	Position	Name	District	Telephone	Email
1.	Chairpersons (LC5)		Hon. Lotukei Ambrose <i>CMC Chairperson</i>	Kotido	0789 125 025	ambrolingi@gmail.com
2.			Hon. Ochero Jimmy	Abim		ocherJimmy@outlook.com, ocherJimmy@gmail.com
3.			Hon. Abuku Mark	Kaabong	0782 422 165	kaadeperson@yahoo.com
4.	CAO		Mwayita Bruno	Napak	0702 580 846 0784 191 522	mwabruno@gmail.com
5.			Harriet Akiding	Amuria	0775 712 829	harrietakiding@yahoo.com
6.	Technical officers	DNRO	Okoi George	Abim	0772 988 826	
7.		DWO	Obaate Phillip	Amuria	0771 868 675	phillipobaate@yahoo.co.uk
8.		DCDO	Agan Maryapuun	Napak	0774 029 790	aganm73@yahoo.co.uk
9.		Production Officer	Abura Levi	Kotido	0772 844 497	leviabura@yahoo.com
10.		District Planner	Anyankun Charles Lotela	Napak	0782 210 544	clanyakun@gmail.com
11.		DFO	Lomongin Emmanuel	Kaabong	0774 143 374	emmylom@yahoo.com
12.		Livestock Officer		Kaabong		
13.		Fisheries	Olola Okello Sam	Amuria	0772 633 481	olokasam190@gmail.com
14.		DHO	Ochieng G. Malanda	Kotido	0773 283 322	ochiengmalanda@yahoo.com
15.		Information Officer	Olwit Nelson Otim	Abim	0772 921 750 / 0752 332 500	nelsonotim@yahoo.com
16.	Cultural institutions / elders		Namuya Charles	Kotido	0780 454 730	
17.			Vacant			
18.	Research institution / academia	Director	Dr. Okullu	Nabuin Zonal Agricultural Research and Development Institute	0782 502 940	
19.	Media	Journalist	Steven Ariong	Daily Monitor Karamoja	0789 416 171	steven.ariong@gmail.com
20.	CBOs	Cattle herder	Elijah Longole	KART-KOTIDO	0782 592 939	elijahlongoole@gmail.com
21.		Miner	Okech Basil	Morulem gold mining group	0782 861 552	abwonbasil1@gmail.com



**TABLE 32: LOKOK CATCHMENT MANAGEMENT COMMITTEE (as per March 2017)**

	Stakeholder group	Position	Name	District	Telephone	Email
22.		Farmer	Oryema Harrison Emoil	Integrated Development Network (IDN) / Kasimeri Engarakinos Farmers and Saving Group	0779 934 084	harrisonoryema@gmail.com
23.		Fisherman	Vacant			
24.	NGOs	Director	Dr. Lochap Paul	Caritas Kotido	0772 605 387 0772 835 724 (Lena Godfrey)	kotidocaritas@gmail.com lochajp@gmail.com lenagod51@gmail.com
25.		Director	Thomas Loquang	Caritas Moroto	0782 154 494	atomloquang@gmail.com
26.		Director	Father Silver Opio	SOCADIDO	0772 683 899	fropio@gmail.com
27.	Government agencies	Warden In charge of Matheniko Bokora	Katamigwa Wilson	UWA	0772 643 631 / 0702 643 631	katamigwa@gmail.com
28.			Vacant	NFA		
29.	Private sector		Epulu Richard	Water Welfare Agency and Transformational Economics and Sustainable Social Organisation - WATESO	0774903638/ 0700310600	richardepulu@gmail.com
29.			Vacant			

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## ANNEX F – STAKEHOLDER ENGAGEMENT

**TABLE 33: STAKEHOLDER PARTICIPATION IN CMP PLANNING PROCESS**

Step / CMP activity	Engagement type	Tools	Objective	Stakeholders involved	Target	Resources	Responsible	Start date	End date
<b>PRE-PLANNING PHASE</b>									
Project exploration	Consultation	General public forum	Inventory of issues and context	All stakeholders - open invitation	n.a.	GIZ	KWMZ	Aug-15	Jan-16
	Consultation	Bilateral meetings	Inventory of issues and context	Local government departments, Ministries, political leaders	n.a.	GIZ	GIZ	Aug-15	Jan-16
<b>PLANNING PHASE (CMP DEVELOPMENT)</b>									
1. Inception phase	Information	General public forum	Informing about project background, objectives, activities and outputs	All stakeholders - open invitation	1	GIZ	KWMZ	May-16	May-16
	Information	Project brief	Informing about project background, objectives, activities and outputs	All stakeholders	1	Project budget	Project team	Jun-16	Jun-16
	Consultation	Bilateral meetings	Better understand the context, issues and draft a basis for further stakeholder mapping.	Sample of stakeholders based on identified stakeholder groups in the CBWRM guidelines	Mission #1	Project budget	Project team	Jun-16	Jun-16
2.1. Water Resources Assessment	Consultation	Bilateral meetings	Acquiring input to water resources issues and potential	All stakeholders	Mission #2	Project budget	Project team	Jul-16	Aug-16
	Consultation	CSF	Acquiring input to water resources issues and potential	All identified relevant stakeholders (groups)	CSF #1	GIZ	KWMZ + project team	Sep-16	Sep-16
	Information	CSF	Presentation and validation of research findings	All identified relevant stakeholders (groups)	CSF #2	GIZ	KWMZ + project team	Nov-16	Nov-16



**TABLE 33: STAKEHOLDER PARTICIPATION IN CMP PLANNING PROCESS**

Step / CMP activity	Engagement type	Tools	Objective	Stakeholders involved	Target	Resources	Responsible	Start date	End date
2.2. Stakeholder participation framework	Consultation	Interviews	Acquiring input to stakeholder mapping	National and local gov't officials, local and INGOs, CBOs	Mission #2	Project budget	Project team	Jul-16	Aug-16
	Consultation	Focus Group Discussions (FGDs)	Acquiring input to stakeholder mapping	Community members and resource user groups (water user committees, fishermen, bee keepers, cattle keepers, farmers), CBOs, cultural and opinion leaders, LC1s	Mission #2	Project budget	Project team	Jul-16	Aug-16
	Consultation	Surveys	Acquiring input to stakeholder mapping	Community households, NGO staff	Mission #2	Project budget	Project team	Jul-16	Aug-16
	Information	CSF	Presentation and validation of research findings	All identified relevant stakeholders (groups)	CSF #1	GIZ	KWMZ + project team	Sep-16	Sep-16
2.3. SSEA	Consultation	Bilateral meetings	Acquiring input to SSEA	Institutional stakeholders (private sector, research and academia, LCs, CAOs, District Planning Units, District Water Officers, Water and Sanitation Technical Support Unit, Uganda Wildlife Authority, Environmental Officer and National Water and Sewerage Corporation	Mission #2	Project budget	Project team	Jul-16	Aug-16
	Consultation	Bilateral meetings	Identifying key environmental and social issues at the community level	All identified relevant stakeholders (groups)	Mission #2	Project budget	Project team	Jul-16	Aug-16
	Consultation	Ecosystem scoring	Determination of stakeholders' perceptions about the relative effect that each driver of change has on the catchments and its ecosystem services	Sample of communities	Mission #2	Project budget	Project team	Aug-16	Sep-16
	Consultation	CSF	Acquiring input to SSEA	All identified relevant stakeholders (groups)	CSF #1	GIZ	KWMZ + project team	Sep-16	Sep-16



**TABLE 33: STAKEHOLDER PARTICIPATION IN CMP PLANNING PROCESS**

Step / CMP activity	Engagement type	Tools	Objective	Stakeholders involved	Target	Resources	Responsible	Start date	End date
	Information	CSF	Presentation and validation of research findings	All identified relevant stakeholders (groups)	CSF #2	GIZ	KWMZ + project team	Nov-16	Nov-16
3. Options & scenarios	Consultation	CSF	Acquiring input on vision and objectives	All identified relevant stakeholders (groups)	CSF #1	GIZ	KWMZ + project team	Sep-16	Sep-16
	Consultation	Bilateral meetings	Acquiring input on issues and potential solutions	District officers (DNRO, DWO, DWO, Planning, LC5 CAO), some NGOS	Mission #3	Project budget	Project team	Sep-16	Sep-16
	Consultation	Assessment reports	Acquiring input on issues and potential solutions from stakeholder assessment, WRA and SSEA		n.a.	Project budget	Project team	Sep-16	Oct-16
	Information	CSF	Presentation of initial options and acquiring further input	All identified relevant stakeholders (groups)	CSF #2	GIZ	KWMZ + project team	Nov-16	Nov-16
	Collaboration	Workshop	Development of scenarios	CMC members	Workshop #1	Project budget	KWMZ + project team	Nov-16	Nov-16
	Information	Workshop	Presentation and validation scenario analysis	CMC members	Workshop #2	Project budget	KWMZ + project team	Jan-17	Feb-17
4. Catchment Management Plan (CMP) & Implementation Plan (IP)	Consultation	Assessment reports	Acquiring input from stakeholder assessment, WRA, SSEA and options & scenario's		n.a.	Project budget	Project team	Nov-16	Jan-17
	Collaboration	Workshop	Development of CMP & IP	CMC members	Workshop #2	Project budget	KWMZ + project team	Jan-17	Feb-17
	Information	CSF	Presentation and validation of CMP & IP	All identified relevant stakeholders (groups)	CSF #3	GIZ	KWMZ + project team	Mar-17	Mar-17
	Consultation	CSF	Process evaluation	All identified relevant stakeholders (groups)	CSF #3	GIZ	KWMZ + project team	Mar-17	Mar-17



## ANNEX G – DEVELOPMENT OF THE BEEF VALUE CHAIN

### Background to the beef sector in the catchment

The meat sector of Uganda is dominated by small scale enterprises and agro-pastoralists. Cattle account for 60-70% of the sector turn-over and livestock is mainly concentrated in the southern and western part of the country, accounting for about 80% of all cattle. The sector is becoming export oriented at a slow pace, spearheaded by the growth in the export of hides and skins. An estimated 90% of the national cattle herd is kept under pastoral and mixed small holder farming systems and commercial beef ranching accounts for less than 10% of the national herd. The main sources of meat are the culled animals and excess steers in the various farming systems.

**TABLE 34: ESTIMATED NUMBER OF LIVESTOCK PER DISTRICT IN SOME PARTS OF NORTH AND EASTERN UGANDA BY 2014**

No	Location	Cattle	Goat	Sheep	Pigs	Chicken	Turkey	Ducks
1	Eastern Uganda	11,408,750	12,449,670	3,410,370	3,184,310	37,385,800	348,330	1,458,250
2	Abim	13,635	37,229	8381	17354	61330	2213	3373
3	Amuria	171375	113110	35942	41318	545388	467	5703
4	Kabong	518465	525389	424729	33829	506583	1551	16849
5	Katakwi	136966	104932	25511	19381	286229	3423	4902
6	Kitgum	38457	54815	11509	38444	139286	1234	31949
7	Kotido	694247	535138	555688	1318	219598	3863	12737
8	Moroto	352867	380172	307028	5534	260997	3075	18834
9	Nakapiripit	674746	547365	389676	322	314308	1095	15653
10	Pader	57087	57087	6298	39430	150317	1144	43197

Source: National Livestock Census report 2014 (UBOS)

As can be seen in the table above, Kotido, Nakapiripit and Kabong feature top in the estimated livestock numbers. However, this does not mean that the marketing of beef from these districts is also highest. Unfortunately, statistics of how much beef is marketed from these districts is not available. Statistics on the meat consumption are available. According to Uganda Investment Authority (UIA), consumption of beef products, both in absolute terms and on a per capita basis, is very low in Uganda (TABLE 35). However, prospects for increased demand, hence increased production, are good as per capita purchasing power continues to increase. Household expenditure on animal products ranges between 20 - 30% of total expenditure and the price elasticity of demand (% change in quantity demanded as a proportion of % change in price of commodity) for meat is very high. The meat sub-sector grew by 3% (from Shs. 267 to Shs. 275 billion) between 2008/2011 (MAAIF, 2011).

**TABLE 35: PRODUCTION OF MEAT PER YEAR**

Source of meat	2011	2012	2013	2014	2015
<b>Cattle meat</b>	160,000	174,150	169,950	175,049	180,300
<b>Pig meat</b>	18,000	20,250	18,540	19,096	19,669
<b>Goat meat</b>	29,870	30,766	31,689	32,640	33,619

Source: Uganda National Beef Producers Association report (2015)



Regardless of the researches that have taken place over the past years it appears to be impossible to get good statistics on livestock sales from the catchment region (IGAD 2016). An assessment from Mercy Corps (2011) showed that the livestock market in Kotido, held on Wednesdays outside Kotido town, is the largest. More than 200 cattle and many smaller ruminants and poultry were sold there each week. The market has seen a dramatic decline in sales in the around 2010 as livestock numbers have fallen due to disease, raiding, and confiscation. In previous years, the market dealt in up to 700 cattle each week. Cattle are primarily sold to traders from outside Karamoja, including Pader, Lira, and Gulu. Given the migratory nature of pastoralism in the catchment it can be expected that cattle from the catchment will be sold on markets outside the catchment during times of distress when cattle keepers migrate to the south and south west. There is also some export trade to South Sudan, but this destabilized recently due to the conflicts. Figure 46 shows the markets from the catchment area

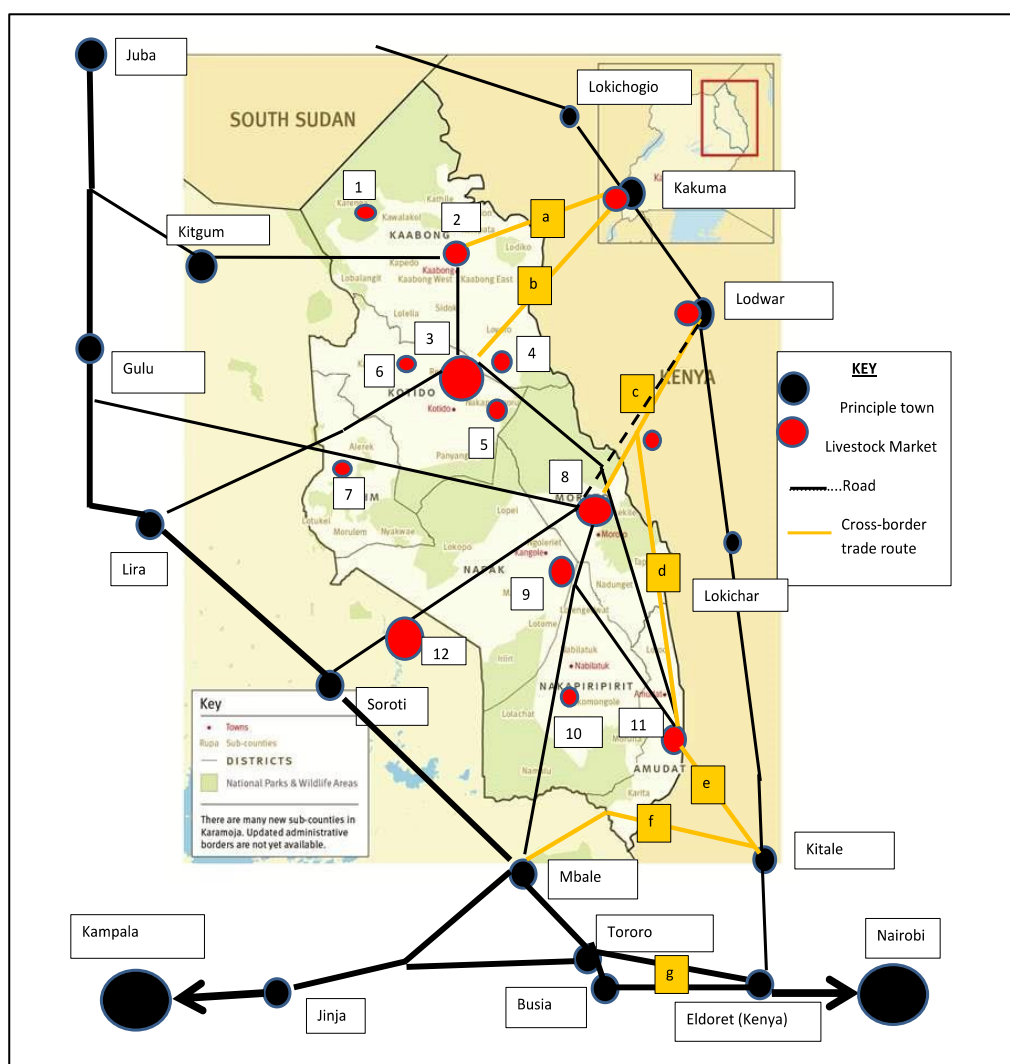


Figure 46: Main livestock markets around Karamoja (Source: IGAD 2016)

Transactions occur through individual negotiations and are often facilitated by a translator. Sellers accept cash or barter, particularly for sorghum. However, a shift towards a preference for cash has been observed in recent years as it is more flexible. Most cattle are sold for immediate slaughter and wholesale to butchers, though some traders are vertically linked to butchers themselves. A few young-stock are sold for fattening elsewhere (Mercy corps 2011 Uganda conflict and Economic development assessment Karamoja). The number of commercial investors in the beef sector is yet very few all concentrated within the Kampala City area that includes Quality Cuts, Top Cuts, Fresh Cuts, Kampala Meat Packers and Egyptian Foods in Bombo. Most of the population is served by un hygienic butcheries in the urban and peri-urban areas of Uganda, so leaving a considerable market share of over 70% with unmet needs in terms of quality meat products, which gives an adequate space a meat enterprise that draws from the catchment.



## The beef market

### Market constraints

There is a long misunderstanding that the pastoralist communities in the catchment do not sell cattle according to an economic logic and these constraints the market of livestock in the area. A recent study by IGAD (2016) outlined this as follows:

Karamojong (and other pastoralist) households do not tend to manage their herds/flocks to maximize productivity and profit. Rather, they tend to manage them like an investment portfolio with a variety of assets. Their primary objective is to increase the value of the portfolio (in this case, the herd/flock). The income received from the portfolio is in the form of capital gains: a combination of increased asset values, and dividend income. Essentially, Karamojong pastoralists do not derive income from the sale of animals. Instead, the sale of animals merely monetizes their income, converting capital gains into cash for one of two principal reasons:

- **To meet immediate cash needs.** Karamojong pastoralists sell animals to obtain cash for the purchase of staple grains, the payment of school fees, family obligations, and unanticipated expenditures such as medical expenses. This behaviour is well described in the literature. Livestock sold to meet immediate cash needs are generally surplus males and cull females (assets with limited future growth potential) whose sale has the least impact on the total value of the portfolio.
- **To “trade up”.** Although not described in the literature, this is readily observable in the market. Karamojong pastoralists take advantage of opportunities to sell assets with low growth potential (slaughter bulls), and use the proceeds to purchase assets with high growth potential (heifers). This investment behaviour increases the overall growth potential of their livestock portfolio.

What this means is that the cattle market from the pastoralist areas in the catchment needs to be understood not from a maximizing profit perspective but from a market logic that trades in livelihood products and trades off low growth potential assets. Furthermore, the market should focus on periods when prices for beef are low since these are the times when people want to sell a lot of cattle. It definitely does not mean there is a problem at the market from the supply side, but there are production and marketing constraints:

- Inadequate infrastructure for marketing of beef and its other products at the primary, secondary and tertiary market levels.
- Lack of information on local and international markets which leads to lack of continuity, sustainability and scaling up in the production and marketing trends.
- Limited investment has been directed to value addition, quality and standards of beef products so as to attract better prices;
- Weak enforcement of policies, laws, regulations and standards has led to spread of diseases and production of sub-standard products. This has limited access to highly integrated and competitive international markets;

### Market potential

Market segmentation for a meat enterprise is based on the market opportunity in greater Kampala area. This market is growing while the export from the catchment tends to go to other areas (see Figure 47) and some of these markets proved insecure such as the Juba market.



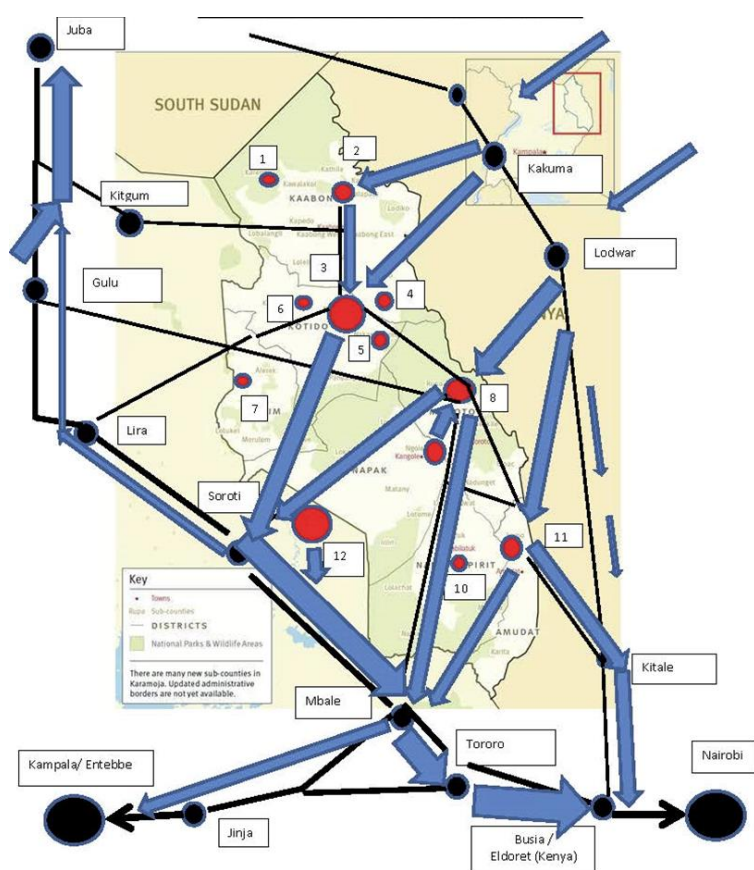


Figure 47: Movement of slaughter ready cattle across Karamoja (Source: IGAD 2016 Karamoja Livestock Market Assessment Report January 2016)

The following analysis can be made for the markets in Kampala and the growth rate.

**TABLE 36: MARKET ANALYSIS FOR MEAT PRODUCTS IN KAMPALA**

Potential Customers	Growth	Year 1	Year 2	Year 3	Year 4	Year 5	CAGR
High Income Kampala households	3%	9,000	9,225	9,456	9,692	9,934	2.50%
Medium income Kampala households	3%	25,000	25,625	26,266	26,923	27,596	2.50%
Neighbouring towns High Income households	3%	25,000	25,625	26,266	26,923	27,596	2.50%
Caterers	4%	25	26	27	28	29	3.78%
Restaurants	5%	60	63	66	69	72	4.66%
<b>Total</b>	<b>2.50%</b>	<b>59,085</b>	<b>60,564</b>	<b>62,081</b>	<b>63,635</b>	<b>65,227</b>	<b>2.50%</b>

### Competition

Competitions for proposed meat enterprise fall into the following categories:

- Butcher shops
- Grocery stores
- Big box retailers

The proposed meat enterprise will establish its competitive edge through the taste of beef from Karamoja and Teso regions in Uganda and could be marketed as such. A company set up to market beef from the catchment also needs to employ competent workers and managers who will come with the best existing relationships of the best suppliers of meat such Quality Cuts, Top Cuts as well as understanding of the craft of butchering. Coupled with the understanding of food services management, sales record in business to business sales, and financial acumen, the employees and the Board of Directors



of the company will have an edge over the markets' other butcher shops and grocery stores within its niche markets in Kampala and other surrounding towns in Uganda.

### The Kampala market

To further the market of beef from the catchment to the Kampala market, an enterprise needs to be promoted which can:

- Establish its retail location by signing a rent lease in Kampala once funding is secured
- Begin by targeting high income residents of Kampala and the surrounding towns, as well as medium income residents of Kampala, and business customers (upscale caterers and restaurants)
- Business customers and retail customers will be grown as separate revenue streams, but will reinforce each other.

The business will also sell to Wholesalers, Hotels and restaurants, and Supermarkets. This way of distribution is chosen for the following reasons:

- There unmet demand for packaged beef by the Wholesalers like Top Cuts, Quality Cuts and Kampala Meat Packers stands at 35%. This implies that they can still buy over 60% of the beef to be produced by the proposed enterprise.
- There is also high level of unmet demand for quality beef by Supermarkets and Hotels spread across Soroti, Mbale, Lira, Gulu and even Kampala due to the inadequate number of meat processing plants in the county despite the increasing population of the middle-income earners in the country.

**TABLE 37: PRODUCT, SERVICE OR RANGE OF PRODUCTS**

	<b>Beef</b>	<b>Goat meat</b>
<b>Quality</b>	Quality grades of the cattle beef shall primarily be determined by: <ul style="list-style-type: none"> <li>■ Prime maturity defined as those from 30-42 months of age.</li> <li>■ Intramuscular fat percentage level of 2.54 %/ 2.2%</li> </ul>	Quality grades of the goat beef will be determined by: <ul style="list-style-type: none"> <li>■ Prime mature of 15-20 months</li> <li>■ Superior carcass shall be: high proportion of muscle (lean), low proportion of bone and an optimal level of fat cover.</li> </ul>
<b>Colour</b>	Red beef	Red beef
<b>Size</b>	1 Kg per unit	1 kg per unit
<b>Packaging</b>	Metal cans, which are made of sheet steel with a coating of tin welded closed at the seams shall be used to deliver beef to Wholesalers Consumer plastic wraps and bags made from three major categories of plastics: polyethylene (PE), polyvinylidene chloride (PVCD), and polyvinyl chloride (PVC) shall be used to pack beef to be delivered to Supermarket and Hotels	As for beef
<b>Price</b>	10,000/= @Kg UGX	12,000/= @Kg UGX
<b>Reasons for setting this price</b>	To be able to meet customer expectations, make profits and also meet operational costs	As for Cattle beef

Source: NEFIMA LTD 2016

### Location

The business can have two sites, with one for butchering the live animals and another one for selling the packaged fresh meat in Kampala. The enterprise field office and store site is recommended to be located in Abim Town Council in Karamoja opposite to the modern Abim Town Council Abattoir constructed with funding from United Nations Capital Development Fund through the Ministry of Local Government. This location is chosen due to its being near the Abattoir so supply of meat to the processing plant will be easily accessible and cost effective. This location is also along the main cattle routes from the catchment to the west and can serve as a good outlet for cattle in times of drought.

### Financial considerations

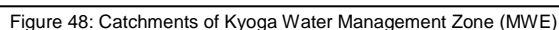
Funding for the launch of the business can be provided by the equity from the many saving for Investment Club members especially of the middle-income class in the region who will contribute in agreed shares from their savings to launch the business. The remaining financing will be made up of grants from impact investors, equity investors and temporary credit taken from the banks.



## References

IGAD 2016 Karamoja Livestock Market Assessment Report January 2016 (USAID East Africa Resilience Learning Project)  
Mercy Corps 2011 Cattle raiding in Karamoja, A conflict and market assessment (Karamoja June 2011)







# ANNEX I – LIST OF EXISTING WATER FOR PRODUCTION FACILITIES IN LOKOK CATCHMENT

TABLE 38: EXISTING WATER FOR PRODUCTION FACILITIES

No	Catchment	District	Source type	Name	Longitude	Latitude	Year of Construction	Functionality	Volume (m <sup>3</sup> )
1	Lokok	Kaabong	Dam	Longoromit Dam	631725	387214		Functional	1,400,000
2	Lokok	Kotido	Dam	NAKOLIMER	632525	334534	2008	Non-Functional	6,000
3	Lokok	Kotido	Dam	LOMEDO	631540	333888		Non-Functional	4,000
4	Lokok	Kotido	Dam	NANGOLASI	630923	335754		Functional	2,000
5	Lokok	Kotido	Dam	NAOI WATER POND	628786	328128	1963	Functional	
6	Lokok	Kotido	Dam	NATIMONGOR	632553	333589		Non-Functional	2,000
7	Lokok	Kotido	Dam	APAMARUK	628554	334046	1990	Non-Functional	11,000
8	Lokok	Kotido	Dam	NATAPAR	631102	329307	1960	Functional	
9	Lokok	Kotido	Dam	KALODOLA	630747	335132		Functional	2,500
10	Lokok	Kotido	Dam	NARIA	634111	332323	2009	Functional	2,600
11	Lokok	Kotido	Dam	ACHILLA	628894	334577		Functional	20,000
12	Lokok	Kotido	Dam	LOKORE	632754	332177		Functional	2,500
13	Lokok	Kotido	Dam	TIKIRING DAM	626668	321668		Functional	
14	Lokok	Kotido	Dam	NAKIRIONI WATER POND	628265	325857	1963	Functional	
15	Lokok	Kotido	Dam	NAOKOT	633771	330636		Functional	3,000
16	Lokok	Kotido	Dam	APALOWAS	634206	329784		Non-Functional	2,500
17	Lokok	Kotido	Dam	KALOKODANYANG	631508	334812		Non-Functional	3,600
18	Lokok	Kotido	Dam	NAKOL	631732	333888	2009	Non-Functional	4,200



TABLE 38: EXISTING WATER FOR PRODUCTION FACILITIES

No	Catchment	District	Source type	Name	Longitude	Latitude	Year of Construction	Functionality	Volume (m <sup>3</sup> )
19	Lokok	Kotido	Dam	NAKUCHOI WATER POND	628760	325948	1968	Functional	
20	Lokok	Kotido	Dam	APALOTAK	631444	330077		Non-Functional	3,000
21	Lokok	Kotido	Dam	KAU	633956	332927		Non-Functional	2,800
22	Lokok	Kotido	Dam	NAMERAGWE	631416	329581		Functional	2,800
23	Lokok	Kotido	Dam	NATAPARKIRION	633813	333359		Non-Functional	2,500
24	Lokok	Kotido	Dam	NAMOE	630169	333301		Functional	3,000
25	Lokok	Kotido	Dam	NATAPARAMONG	633108	333031		Non-Functional	2,060
26	Lokok	Kotido	Dam	KALOMURIA	630491	334552		Non-Functional	2,500
27	Lokok	Kotido	Dam	KALIAWO	633322	331876		Functional	3,000,000
28	Lokok	Kotido	Dam	NATAPAR APOLOND	628778	330989	1981	Functional	
29	Lokok	Abim	Dam	APEILETH	604697	279080	1968	Non-Functional	5,000
30	Lokok	Kotido	Dam	LOBURENGOLE	632120	328981		Non-Functional	2,050
31	Lokok	Kotido	Dam	NAYESE	632677	330245		Functional	2,000
32	Lokok	Abim	Dam	ATHEDER	598000	285000	2009	Functional	
33	Lokok	Kotido	Dam	NAWALE	633341	330983		Non-Functional	2,040
34	Lokok	Amuria	Dam	TUKUM DAM	592920	245685	1968	Non-Functional	6,000
35	Lokok	Kotido	Dam	Kailong 1	597436	319773	1950	Non-Functional	20,000
36	Lokok	Kotido	Dam	Kailong 3	597504	319600	1960	Non-Functional	30,000
37	Lokok	Abim	Dam	Bar-Galel	613689	276521	1960	Partially functional	30,000
38	Lokok	Abim	Dam	Lokanyum	613689	276521	1960	Partially functional	100,000
39	Lokok	Kotido	Dam	Kotukoi	631304	330510	1983	Non-Functional	10,000
40	Lokok	Amuria	Earth Dam	Olekat	583820	233738		Silted and empty	562,500
41	Lokok	Amuria	Earth Dam	Okwamo	589528	236865		Silted, absence of abstraction system	112,500



TABLE 38: EXISTING WATER FOR PRODUCTION FACILITIES

No	Catchment	District	Source type	Name	Longitude	Latitude	Year of Construction	Functionality	Volume (m <sup>3</sup> )
42	Lokok	Kotido	Rainwater Harvest Tank		624268	333046	2013	Functional (not in use)	10,000
43	Lokok	Kotido	Rainwater Harvest Tank		625469	336213	2009	Functional (not in use)	10,000
44	Lokok	Kotido	Rainwater Harvest Tank		625600	336093	2009	Functional (not in use)	10,000
45	Lokok	Kotido	Rainwater Harvest Tank	LOKEERIA LOCHODE	619027	331655	2006	Functional	10,000
46	Lokok	Kotido	Rainwater Harvest Tank	KOTIDO S.S HARVESTING TANK	620506	331989	2009	Functional	10,000
47	Lokok	Kotido	Rainwater Harvest Tank	KOTIDO S.S HARVESTING TANK	620575	332009	2009	Functional	10,000
48	Lokok	Kotido	Rainwater Harvest Tank		625475	336071	2009	Functional (not in use)	10,000
49	Lokok	Kotido	Rainwater Harvest Tank		625500	336306	2009	Functional (not in use)	10,000
50	Lokok	Kotido	Rainwater Harvest Tank		625509	336306	2009	Functional (not in use)	10,000
51	Lokok	Kotido	Rainwater Harvest Tank		625464	336070	2009	Functional (not in use)	10,000
52	Lokok	Kotido	Rainwater Harvest Tank		625552	336386	2009	Functional	10,000
53	Lokok	Kotido	Rainwater Harvest Tank	KANAWATH C. MISSION	620759	331803	1967	Functional	10,000
54	Lokok	Kotido	Rainwater Harvest Tank		625459	336071	2009	Functional	10,000
55	Lokok	Kotido	Rainwater Harvest Tank	ROCK CATCHMENT NASAPIR	610161	336781	2007	recom. for decommissioning	10,000
56	Lokok	Kotido	Rainwater Harvest Tank	KOTIDO S.S HARVESTING TANK	620452	331960	2009	Functional	10,000
57	Lokok	Kotido	Rainwater Harvest Tank	LOKORE	619431	334170		Non-Functional	10,000
58	Lokok	Kotido	Rainwater Harvest Tank		625477	336304	2009	Functional	10,000
59	Lokok	Kotido	Rainwater Harvest Tank		625625	336108	2009	Functional (not in use)	10,000
60	Lokok	Kotido	Rainwater Harvest Tank	KOTIDO S.S HARVESTING TANK	620507	331973	2009	Functional	10,000
61	Lokok	Kotido	Rainwater Harvest Tank	NAKIRIWO	621230	332069	2005	Functional	10,000
62	Lokok	Kotido	Rainwater Harvest Tank		625529	336368	2009	Functional (not in use)	10,000



TABLE 38: EXISTING WATER FOR PRODUCTION FACILITIES

No	Catchment	District	Source type	Name	Longitude	Latitude	Year of Construction	Functionality	Volume (m <sup>3</sup> )
63	Lokok	Kotido	Rainwater Harvest Tank		625451	336213	2009	Functional	10,000
64	Lokok	Kotido	Rainwater Harvest Tank	KOTIDO S.S HARVESTING TANK	620696	332104	2009	Functional	6,000
65	Lokok	Kotido	Rainwater Harvest Tank	KANAWATH CMISSION TANK	620751	331828	1988	Functional	10,000
66	Lokok	Abim	Rainwater Harvest Tank	ORETA P/S I	601538	275525	2009	Non-Functional	10,000
67	Lokok	Kotido	Rainwater Harvest Tank		609931	337071		recom. for decommissioning	10,000
68	Lokok	Abim	Rainwater Harvest Tank	LOPOPONGO P/S	597145	288361	2000	Non-Functional	10,000
69	Lokok	Kotido	Rainwater Harvest Tank		630641	334154		Non-Functional	10,000
70	Lokok	Abim	Rainwater Harvest Tank	ROGOM P/S	604900	279000		Functional	10,000
71	Lokok	Abim	Rainwater Harvest Tank	ROGOM P/SII	604866	279520	2009	Functional (not in use)	10,000
72	Lokok	Kotido	Rainwater Harvest Tank	KOTIDO S.S TANK	620508	332051	1967	Functional	10,000
73	Lokok	Kotido	Rainwater Harvest Tank	KOTIDO S.S HARVESTING TANK	620676	332007	2009	Functional	10,000
74	Lokok	Kotido	Rainwater Harvest Tank	KOTIDO S.S HARVESTING TANK	620720	332039	2009	Functional	10,000
75	Lokok	Abim	Rainwater Harvest Tank	NYAKWAE H/C III	605000	279300	2004	Non-Functional	6,000
76	Lokok	Kotido	Rainwater Harvest Tank		625532	336308	2009	Functional (not in use)	10,000
77	Lokok	Kotido	Rainwater Harvest Tank		625472	336072	2009	Functional (not in use)	10,000
78	Lokok	Kotido	Rainwater Harvest Tank	KOTIDO S.S HARVESTING TANK	620709	332070	2009	Functional	10,000
79	Lokok	Kotido	Rainwater Harvest Tank		625574	336377	2009	Functional (not in use)	
80	Lokok	Kotido	Rainwater Harvest Tank	KOTIDO S.S HARVESTING TANK	620452	331974	2009	Functional	10,000
81	Lokok	Abim	Rainwater Harvest Tank	NYAKWAE H/C III 1	605246	279424	2004	Non-Functional	6,000
82	Lokok	Kotido	Valley Tank	NASAPIR 1	610126	336576	2009	Functional	24,000,000



TABLE 38: EXISTING WATER FOR PRODUCTION FACILITIES

No	Catchment	District	Source type	Name	Longitude	Latitude	Year of Construction	Functionality	Volume (m <sup>3</sup> )
83	Lokok	Kotido	Valley Tank	LOJOM ANGINYANGSTOM	634939	354102	2014	Functional	10,000
84	Lokok	Kotido	Valley Tank	KANGIMANANG	640096	344362	2014	Functional	10,000
85	Lokok	Kotido	Valley Tank	NASAPIR	610111	336576	2009	Functional	24,000,000
86	Lokok	Kotido	Valley Tank	NATAPAR ALOIKAL	621834	342388	1968	Non-Functional	10,000
87	Lokok	Kotido	Valley Tank	KALOTIMEN NAKALES	623261	338402	1985	Non-Functional	60,000
88	Lokok	Kaabong	Valley Tank	KADUKUDUK	624752	373373	2008	Functional	1,000,000
89	Lokok	Amuria	Valley Tank	Atukukuut	583247	238485		Mechanical Problem and silted	10,000
90	Lokok	Amuria	Valley Tank	Anyamapesur	594216	234520		Mechanical Problem	22,500
91	Lokok	Kotido	Valley Tank	Kailong II	599102	317490	1960	Partially functional	10,000
92	Lokok	Kotido	Valley Tank	Kamorumoru	599115	305915	1980	Partially functional	3,000
93	Lokok	Kotido	Valley Tank	Komosing	603479	329128	2002	Partially functional	30,000
94	Lokok	Abim	Valley Tank	Olulung	603846	282122		Partially functional	1,800
95	Lokok	Kotido	Valley Tank	Aduko	604045	307685	1950	Partially functional	4,000
96	Lokok	Abim	Valley Tank	Amuninyang	604508	276159	1960	Partially functional	15,000
97	Lokok	Kotido	Valley Tank	Lopogor	617676	305941	1960	Non-Functional	10,000
98	Lokok	Kotido	Valley Tank	Natapar Aloikal	621789	342378	2006	Partially functional	50,000
99	Lokok	Kotido	Valley Tank	Kaloperobong	628996	323121	2004	Partially functional	10,000
100	Lokok	Kotido	Valley Tank	Lomogol	633376	336538	1980	Functional	20,000
101	Lokok	Kotido	Valley Tank	Lomogol	633376	336538	1980	Functional	20,000
102	Lokok	Kotido	Valley Tank	Lomogol	633377	336555	1964	Functional	
103	Lokok	Kotido	Valley Tank	Kalongolemuge	630505	334575	1964	Non-Functional	
104	Lokok	Kotido	Valley Tank	Kailong 2	626381	339151	1964	Functional	
105	Lokok	Kotido	Valley Tank	Kailong 3	626527	338764	1964	Functional	



TABLE 38: EXISTING WATER FOR PRODUCTION FACILITIES

No	Catchment	District	Source type	Name	Longitude	Latitude	Year of Construction	Functionality	Volume (m <sup>3</sup> )
106	Lokok	Kotido	Valley Tank	tikiring	626660	321660	2005	Functional	
107	Lokok	Kotido	Valley Tank	Katukenyang	621148	352536	2012	Functional	
108	Lokok	Kotido	Valley Tank	Waliwali	625989	351278	2014	Functional	
109	Lokok	Kotido	Valley Tank	Kangorok	610921	317433	2014	Functional	
110	Lokok	Kotido	Valley Tank	Kanginamanang	640096	344362	2014	Functional	
111	Lokok	Kotido	Valley Tank	Lojomanginyangatom	634939	354102	2014	Functional	
112	Lokok	Kotido	Valley Tank	Aduko	604529	317433	2014	Functional	



## ANNEX J – EXISTING PIPED WATER SUPPLY SYSTEM

TABLE 39: EXISTING PIPED WATER SUPPLY SYSTEMS

S/No	Location of piped water system	Functionality Status	Remarks
1	Kaabong Trading Centre	Functional	21 km distribution network, constructed by Water and Sanitation Facility East with funds from donors, solar panels + generator, good condition but some public stand posts vandalized
2	Karenga Town Board	Functional	Needs extension
3	Kapedo Town Board	Functional	Needs extension
4	Kathile	Non-functional	Needs extension
5	Lolelia	functional	Needs extension
6	Lokolia	Non-functional	Design is complete
7	Kotido Municipal Council	Functional (partly)	Constructed in the 1970s, rehabilitated twice by UNICEF, 19 km of network, ran by private operator, under responsibility of Kotido Water Supply and Sewerage Authority
8	Nakapelimoru	Non-functional	Two motorized boreholes, power failures, vandalism, user management committee is inactive
9	Kapadakoka in Panyanga Sub-county	Functional non	Solar panels stolen
10	Rengen	Functional non	Pumps broken
11	Lokitelaebu	Functional	-
12	Watakau Trading Centre, also known as Masula	Non-functional	Everything broken, tampered
13	Alerek	Partly functional	One pump house has problem
14	Kalapata Town Board	Non-functional	Pump spoiles, assessment done
15	Kopoth	Functional	-
16	Kanawat	Functional	-
17	Morulem	Functional	Extension needed



**TABLE 39: EXISTING PIPED WATER SUPPLY SYSTEMS**

<b>S/No</b>	<b>Location of piped water system</b>	<b>Functionality Status</b>	<b>Remarks</b>
18	Schools (e.g. in Kaabong District: Karenga Boys P/s, Kawalakol P/s, Kalongor P/s, Komukuny Boys P/s, Komukuny Girls P/s, Pajar P/s, Kathile P/s and Kalapata P/s)	Unknown	Could be extended
SOURCE: Compilation of databases and information from discussion with KUWS, DWO Kaabong and attendants CSF March 2017, website NWSC, inventory by Caritas Kotido during this project and assessment report water supply services by DARK for GIZ (2016).			



