FINAL REPORT

Nile Trans-boundary Environment Action Project (NTEAP)

Sio-Siteko Trans-boundary Community Based Wetland Management Plan

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APPROVAL PAGE

This Trans-boundary Management Plan has been reviewed by the Technical Teams from Busia District (Uganda), Busia District (Kenya) and Samia District (Kenya) plus other key wetland stakeholders and has been approved for implementation.

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District Chairperson **Busia District (Uganda)**	**Provincial Commissioner** **Western Province**
Date……	***Date .....……***

……	……
Minister of Water & Environment (Uganda)	**Ministry of Environment & Mineral Resources (Kenya)**
Date……	**Date ……**

This trans-boundary community based wetland management plan was developed from community and technical consultations in areas around the Sio-Siteko wetland system in Uganda and Kenya. The process was facilitated by two lead Consultants, Dr. Willy Kakuru from Faculty of Forestry and Nature Conservation, Makerere University in Uganda and Dr. Phillip Raburu from Moi University in Kenya.

ACKNOWLEDGEMENTS

Development of the Sio-Siteko trans-boundary community based wetland management plan was based on the vast knowledge and experience from local communities in the three Districts of Busia (Uganda), Busia (Kenya) and Samia (Kenya), including resource users, local administrators, political leaders and extension workers in the area. It is therefore prudent that special thanks be given to those local communities and other stakeholders, for freely sharing their experiences on how they use the Sio-Siteko wetland system, the existing problems and conflicts and going ahead to make suggestions on how to solve the problems and conflicts.

The Nile Basin Initiative, through the Nile Transboundary Environment Action Project (NTEAP) deserves special gratitude for identifying the Sio-Sioteko wetland system as a transboundary resource that needed special attention by way of participatory planning and going ahead to provide financial and technical support to the process. This is expected to contribute to the conservation and management of the Nile Basin, hence to the livelihoods of the relevant riparian communities. Special thanks go to the National Environment Authorities in both Uganda and Kenya for giving logistical support and guidance to the planning process.

The planning team is very grateful to Dr. Henry Busulwa, the Biodiversity and Wetland Specialist from NTEAP Khartoum office, Mr. Stephen Kigolo and Lily Isaka the NTEAP National Coordinators from Uganda and Kenya respectively, for developing the planning framework and acting as resource persons, giving logistical and technical guidance and mobilising the district teams, right from the initial planning stages to the end of the management planning process. The planning team is also grateful to the following Officers for their strong input through mobilising the communities, acting as resource persons during meetings and providing useful technical back-stopping during the management planning process: Vincent Barugahare and Julius Mafumbo from the Wetland management Department in Uganda, Emmanuel Nzimuli, Ms. Teopista Namajja, Stanley Ambasa, Palapala Mateshi, Fred Wakapisi. Thanks are also due to the team of Biodiversity Working Group Experts from Uganda and Kenya, who provided background information that had been collected through a rapid survey, at the beginning of the management planning process.

Lastly, all members of the planning team deserve special thanks for hosting the meetings in their respective areas and providing useful information that was brought together to produce this management plan.

Dr. Willy Kakuru, Lead Consultant (Uganda)

Dr. Phillip Raburu, Lead Consultant (Kenya)

FOREWORD

The Nile Basin Initiative (NBI) is a partnership between riparian countries of the Nile; namely Burundi, Democratic Republic of Congo, Egypt, Ethiopia, Kenya, Rwanda, Sudan, Tanzania, and Uganda. The NBI's shared vision is to "achieve sustainable socioeconomic development through the equitable utilization of, and benefit from the common Nile Basin water resources". To translate this shared vision into action, there are two complimentary programs: the Shared Vision Program (SVP) which creates a basin wide enabling environment for sustainable development; and the Subsidiary Action Programs (SAPs) engaged in concrete activities for long term sustainable development, economic growth and regional integration of the Nile Basin countries.

The Nile Transboundary Environmental Action Project (NTEAP), one of the projects under the Nile Basin Initiative's (NBI) Shared Vision Program, was mandated to provide a strategic environmental framework for the management of the trans boundary waters and environmental challenges in the Nile River Basin. One of the ways NTEAP met this objective was to prepare Sio Siteko Transboundary Wetlands Management plan which brings together stakeholders from more than one country in the management of a shared resource.

The Sio Siteko Transboundary wetlands management plan has been prepared with the contribution of stakeholders from Uganda and Kenya. It was interesting to see the active participation of the Regional and District leaderships together with the communities. The plan brings out the main issues that require attention by the various stakeholders ranging from use of the ecosystems and its resources, and cross border cultural and socioeconomic issues. In this plan everybody is a player. It requires a good understanding and development of appropriate plans of action to enable sourcing of resources for their implementation. Many of the actions prioritised herein can easily be integrated into the Districts Developmental Plans. For purposes of sustainability, the Nile Basin Initiative and other regional bodies like the Lake Victoria Basin Commission can facilitate coordination processes but the implementation has been designed to be carried out by the districts and the communities who directly benefit from the resources.

In addition to being a planning tool, the plan provides useful information on the wetlands hydrology, ecosystems and biodiversity together with their socio economic and cultural importance. The processes that have been used to develop the plan have also been included as a

guide to future development of similar plans at other sites. Hence, the plan is not only useful for management but can also be used for education, awareness and training purposes. The plan shall also improve people's livelihoods especially those who directly depend on the natural resources of the wetlands.

We hope that this plan will be useful to managers, communities, educators, NGOs, regional agencies and all stakeholders wishing to sustainably conserve and manage wetlands.

Gedion Asfaw
Regional Project Manager
Nile Transboundary Environmental Action Project

LIST OF ACRONYMS

AEWA	Africa-Eurasian Waterfowl Agreement
CAO	Chief Administrative Officer – Uganda
CBD	Convention on Biological Diversity
CBO	Community Based Organisation
CWMP	Community-Based Wetland Management Plan
DC	District Commissioner – Kenya
DEO	District Environment Officer
EAC	East African Community
IBAs	Important Bird Areas
KWS	Kenya Wildlife Service
LC	Local Council
LVBC	Lake Victoria Basin Commission
LVEMP	Lake Victoria Environment Management Project
LVFO	Lake Victoria Fisheries Organization
M&E	Monitoring and Evaluation
MDGs	Millennium Development Goals
MERECP	Mt Elgon Regional Ecosystem Conservation Programme
MOU	Memorandum of Understanding
NBI	Nile Basin Initiative
NELSAP	Nile Equatorial Lakes Subsidiary Action Plan
NEMA-U	National Environment Management Authority - Uganda
NEMA-K	National Environment Management Authority - Kenya
NFA	National Forestry Authority
NGO	Non Government Organisation
NTEAP	Nile Transboundary Environmental Action Project
PC	Provincial Commissioner - Kenya
RDC	Resident District Commissioner - Uganda
UWA	Uganda Wildlife Authority

EXECUTIVE SUMMARY

Development of the Sio-Siteko trans-boundary wetland management plan was initiated by the Nile Transboundary Environmental Action Project (NTEAP), as one of the tools, which can contribute to sustainable development by using the Nile Basin resources. The field work started in September 2008, with initial sensitisation and mobilisation of the District leadership from the districts of Busia (Uganda), Busia (Kenya) and Samia (Kenya) that was preceded by a rapid biodiversity assessment, which provided technical information that set the background for the planning.

The community consultation and discussion stages of the planning process involved stakeholder analysis, which identified different stakeholders with interest in the management and conservation of the Sio-Siteko wetland system.

From the key stakeholders, a planning team was selected, to represent the resource users in the resource analysis, visioning, management objectives formulation and development of actions with relevant interventions.

The communities around Sio-Siteko wetlands are mainly engaged in crop farming, with a small level of livestock farming and petty trade. The communities in the area derive a lot of their livelihoods from natural resources, including those from Sio-Siteko wetlands. However, the wetlands have had a lot of degradation, from encroachment for crop and livestock farming, pollution and over harvesting of some resources, affecting the benefits accruing from the area. This is compounded by the fact that being a trans-boundary resource, the wetland system needs concerted efforts from both Uganda and Kenya governments. All this is the basis for the management plan for Sio-Siteko, whose vision is to have **"A well conserved Sio-Siteko Wetlands, sustainably utilized for both socio-economic and ecological benefits in a harmonized trans-boundary relationship."** The vision will be achieved through implementation of seven key objectives that have been developed by the communities, which include:

1. To sustainably manage the fisheries of Sio-Siteko Wetland to increase productivity and alleviate poverty

2. To mitigate adverse effects of water pollution and reduce water borne diseases in Sio-Siteko wetland
3. To conserve wetland habitats to reduce wetland biodiversity loss
4. To reduce human – wildlife conflict through introduction of sustainable conservations measures and alternative sources of income
5. To improve livestock production and security through enhanced health care
6. To resolve conflicts and create a harmonious environment that promotes cross boarder trade
7. To set up, facilitate and monitor management plan implementation structures and mechanisms

The management plan proposes interventions and management actions that will lead to achieving the objectives and ultimately the vision for a healthy Sio-Siteko wetland system. The management plan proposes some ecological and socio-economic indicators to be monitored and implementation structures.

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PART I: BACKGROUND AND DESCRIPTION

1.0. INTRODUCTION

This management plan gives a community based perspective on how wetland resources in Sio-Siteko wetland system should be managed and conserved, in a participatory way. It is based on a modern approach to Community Based Natural Resource Management (CBNRM), where management efforts give due respect to the invaluable input from local communities around a particular resource and endeavour to involve them as much as possible.

The plan is organised in three sections; part I, part II and part III. Part I provides the background to the need for management efforts for the area, based on the ecological and socio-economic set up. It gives a description of the flora and fauna and socio-economic background, which has an impact on resource use. Part II draws on the background of the area and views from stakeholders in the area on how Sio-Siteko system can be sustainably managed. This is presented by way of objectives and management action, as suggested in the management planning process. Part III highlights management systems that are necessary for implementation of the management plan. It is based on existing administrative and social structures in the area.

1.1 Uniqueness of Sio-Siteko Wetland as a trans-boundary Natural Resource

The name Sio-Siteko wetland system in this management plan is used to describe a number of interconnected secondary and tertiary wetland sub-systems connected through a system that stretches in areas near the Kenya-Uganda border and draining into Lake Victoria along the Kenya-Uganda boundary (Fig. 1). For a clear definition of the boundaries for the planning area, the Sio-Siteko wetland system stretches along the District of Busia in Uganda and Busia and Samia District in Kenya.

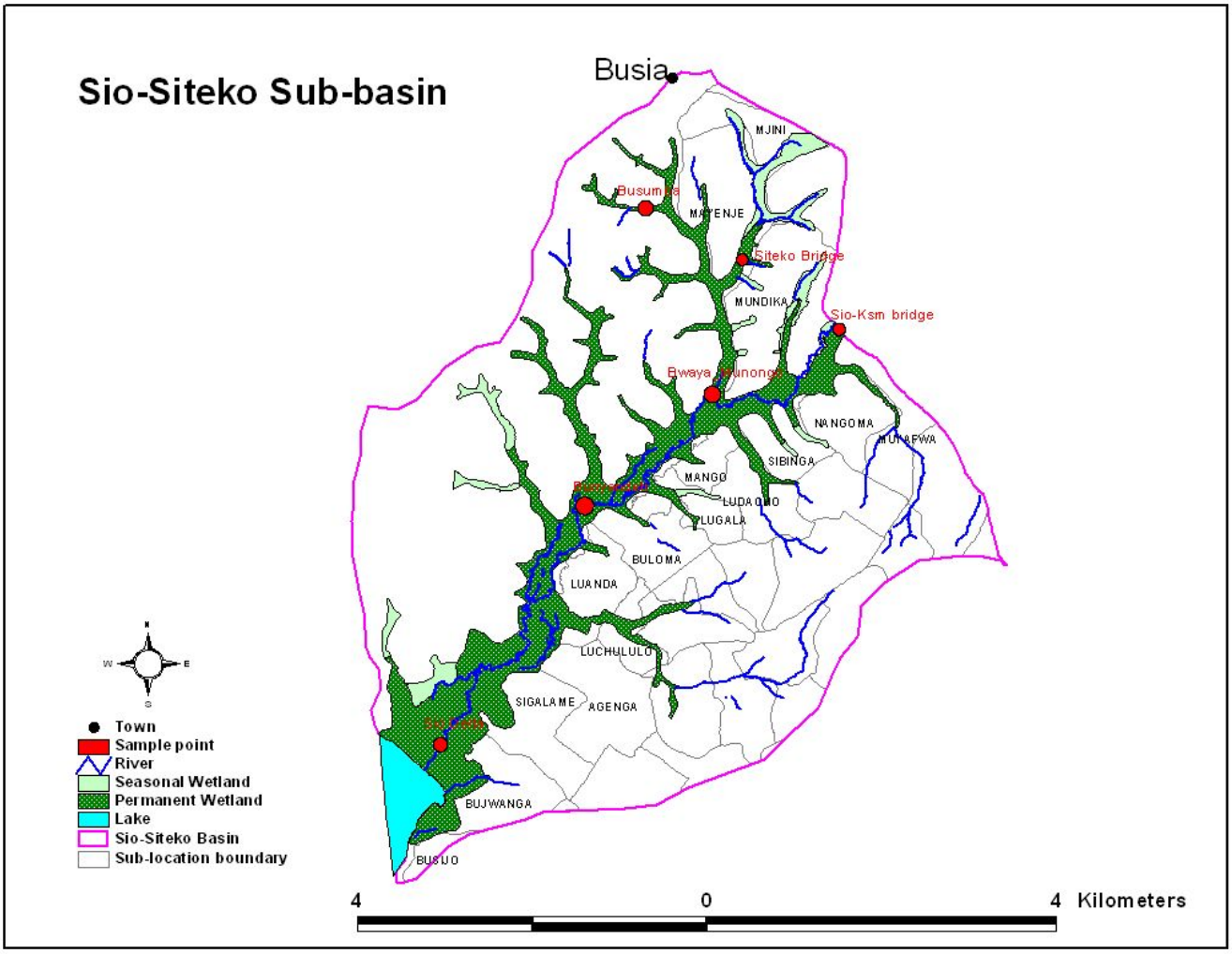

Fig.1: Sio-Siteko Sub-basin system

A rapid survey of the economic importance of Sio-Siteko wetlands indicated there are very important ecological and socio-economic values from the wetlands in the area. These range from use for extraction of construction and craft materials for example sand, clay, to grazing and fishing, which contribute a lot to the livelihoods of local communities in the area. The wetlands are also used for growing of yams, sugar cane, potatoes, maize and millet and to a small extent for fish farming. The Sio-Siteko wetlands provide water for domestic and livestock use and are appreciated for providing filtration and purification services, especially for polluted water from urban areas in addition to storage of water. Unfortunately, it was reported that the wetlands in the area are under a big threat from unsustainable utilisation of different benefits and destruction

through conversion for agriculture and burning. This calls for efforts to address the existing problems for sustainable use of the wetlands and sustainable livelihoods.

Wetlands are well recognised as important for a wide variety of flora and fauna and various functions and services. Some wetlands cross international frontiers and the species, which use them, are often migratory between the different countries. Like wise, the functions and services associated with such trans-boundary wetlands cut across more than one country. This is true for Sio-Siteko wetlands, which is a trans-boundary resource, shared by Uganda and Kenya.

The location of Sio-Siteko wetland system, along two countries, renders a big challenge in terms of specific administrative structures and legislative measures to guide management of such a resource. This is compounded by the fact that the environment management policy and legislative frameworks in Uganda and Kenya are not exactly the same. However, any effects of mismanagement of Sio-siteko wetland system is likely to be felt by communities in the area, irrespective of whether they are the cause of the problems or not. Sio-Siteko wetlands also drain in Lake Victoria, which is a trans-boundary water resource shared by Uganda, Kenya and Tanzania, and whose water ultimately flow to Sudan and Egypt. The management practices in Sio-Siteko therefore have an implication on resource values in the relevant Nile Basin States.

It was therefore found necessary that management of Sio-Siteko wetland should use a trans-boundary approach, which brings together input from the stakeholders from at least the 2 countries and harmonise the different structures and systems as much as possible. This management plan used a community based approach to identify the different benefits from wetlands in the area. Through a participatory approach, problems threatening the sustainable utilisation of the wetlands were also identified. This guided a process of identifying ways in which the wetland can be sustainably, utilised with minimal impacts, especially on the ecological values. The management planning team used in the whole planning process was selected from different stakeholders, who use the wetlands and those with a management role. The management planning team was found to be very knowledgeable in the current issues and had a number of options to manage the problems.

Throughout the process, the stakeholder views of Uganda and Kenya teams were harmonised and this was strengthened by bringing the stakeholders together in joint fora. The cross-border teams came to a consensus and developed strategies, which can be used to address the trans-boundary

management of Sio-Sioteko wetland system. At the last joint management planning session, comprising of both the Uganda and Kenya teams, and political and administrative representatives, the harmonised efforts were commended and it was the feeling of the meeting that similar efforts should be used for harmonising issues in other sectors, including security and business.

1.2 International, national and local policies on wetland conservation and management

1.2.1 International policies on wetland conservation and management

Wetlands are well recognised as important for a wide variety of flora and fauna and various functions and services. Some wetlands cross international frontiers and the animal species, which use them, are often migratory between different administrative boundaries including country borders. Like wise, the functions and services associated with such trans-boundary wetlands cut across more than one country and have impacts that affect different countries. This is true for Sio-Siteko wetlands, which is a trans-boundary wetland resource shared by Uganda and Kenya.

Given the trans-boundary nature of some wetlands, it is necessary that their management is governed by international conventions and agreements to deal with this problem. It is on this background that a number of conventions and agreements have been formulated. Some of the key conventions and agreements that have a bearing on management of wetlands include:

- The Ramsar convention on wetlands
- The African - Eurasian Water bird Agreement
- The Convention on Biological Diversity

The Ramsar convention on wetlands

The Ramsar convention on wetlands is an intergovernmental treaty adopted on the 2nd February 1971 in the Iranian City of Ramsar, on the southern shore of the Caspian Sea. It is the first of the modern global intergovernmental treaties which is specific on conservation and wise use of natural resources. The official name of the treaty, The convention on wetlands of International Importance especially as Waterfowl habitat, reflects its original emphasis on the conservation

and wise use of wetlands primarily to provide habitat for the water/birds. Over the years, however, the convention has broadened its scope to cover all aspects of wetland conservation and wise use, recognizing wetlands as ecosystems that are extremely important for biodiversity conservation and for the well being of human communities. Kenya and Uganda are signatories to this convention.

Uganda ratified the Ramsar convention in 1988 and currently has 11 wetlands designated as Ramsar sites. The convention advocates for preparation of management plans for important wetlands and promotion of sustainable utilisation, through the wise use principle. The Wise Use of wetlands is "their sustainable utilisation for the benefit of mankind in a way compatible with the maintenance of the natural properties of the ecosystem."

It would be useful if the opportunity for developing a management plan for Sio-Siteko wetland system could be used as an opportunity t have it designated as a trans-boundary Ramsar site.

The African - Eurasian Waterbird Agreement

This was an agreement developed in 1993 from deliberations of the Bonn Convection. The first consultative meeting of range states of African-Eurasian Water bird Agreement (AEWA) was held in Nairobi in June 1994. AEWA is another agreement that offers a good opportunity for the management and conservation of wetlands.

The Convention on Biological Diversity

Of strong relevance to the Ramsar Convention is the Convention on Biological Diversity (CBD), which acts very much as an overarching structure, to which other conventions with their own more precise focus, can and must relate and contribute. The world community's growing commitment to sustainable development has inspired this convention. It represents a dramatic step forward in the conservation of the biological diversity, the sustainable use of its components, and the fair and equitable sharing of benefits arising from the use of genetic resources.

1.2.2 Wetland management policies and legislation in Uganda

Wetlands in Uganda are vast, complex and are significantly appreciated as important ecosystems. Government, through the National Wetlands Programme (NWP), which was upgraded to the Wetland management Department, has succeeded to make this clear to the general public in Uganda, and has been able to have them protected through different policy and legislation.

Wetlands in Uganda are well articulated and protected in law by the Constitution (1995), the Land Act (1998), the National Environment Statute (NES, 1995), the Local Governments Act (1997) and the Wetlands Policy (1995). The Constitution in conjunction with the Land Act mainly guides on who has legal ownership of the land, but also endorses conservation and wise use of wetlands. The NES and Wetlands Policy deal mainly with how the wetlands may be used. The Local Governments Act devolves the right and responsibility for sustainable wetland management to districts.

Other laws such as the Water Statute provide extra protection by placing ownership of all the water in Uganda into government hands and closely restricting the uses and abuses of that water. The Water Statute regulates the quantity of water a user may abstract from a water source and the quality and quantity of any wastewater that may be discharged into a water system. The national policy for management of wetland resources recommends the promotion of the optimal and sustainable use of wetland resources. One major approach for promoting sustainable use of wetlands is through multiple-use management plans for wetlands, developed with the full participation of the wetland resource users, traditional and Local Council leaders.

There is no doubt that ultimately implementation of the relevant policy and legal provisions about wetland management in Uganda should translate into practical management that will need to involve the local users. This is so, because of the legal requirements under decentralised environment management, and more so because local level management is the only viable option because no centralised management system will ever be able to effectively control the large wetland surface area and all the wetland edges in Uganda. It is also now generally agreed that local level management, as opposed to a centralised system, will in many cases make the management regime more realistic and more geared towards the need of the local users. As such local level management systems will make direct and tangible contribution to the development

aims of individuals and the state. Development of the Sio-Siteko wetland management plan is therefore in line with the legal and policy strategies of wetland management in Uganda.

1.2.3 Wetland management policies in Kenya

Wetlands play an important role in regulating water flow, groundwater recharge, water storage, filtering of nutrients and pollutants, shoreline and microclimate stabilization and are of exceptional importance as habitats for large number of species especially birds. Wetland habitats are also of high economic importance for provision of water and fisheries. Wetlands in arid and semi-arid lands are an important refuge for grazing. However, wetlands are being drained for agricultural use at an alarming rate resulting in degradation of catchment areas, pollution and unsustainable harvesting practices. Given the fragility of wetlands there is an urgent need to strike a balance between the environmental functioning of wetlands and their use for livelihood. This requires management regimes which help maintain some of the natural characteristics of wetlands while also allowing for their wise use.

The development of a participatory management plan is also in line with the MDG goal 7 target 9, which seeks to promote integrating the principle of sustainable development into country policies and program in an effort to reverse the loss of environmental resources. At the regional level the East African Community supports the same ideals. Further the Nile Basin Initiative through the Sio Malaba Malakisi Investment Strategy has as one of its major objective to reverse the ongoing environmental degradation and restore the ecological integrity of the catchment (WREM, 2008).

It is unfortunate that to date Kenya does not have a wetland policy. However, there are authoritative documents that support the conservation of wetlands in the country. Such documents include the Environmental Conservation Management Act (EMCA) of 1999 (GOK, 2000), the draft Wetlands Conservation and Management Policy and most recently provisions in the Kenya Vision 20-30. The draft Wetlands Conservation and Management Policy for example states in part that the government, in collaboration with stakeholders will endeavour to map wetland areas countrywide and encourage and support development and implementation of catchment-based wetland management plans through a participatory process, develop and implement catchment-based management plans for all Ramsar sites through a participatory

process and ensure restoration of degraded wetlands, riverbanks and lakeshores where appropriate, promote and support establishment of constructed wetlands. Further it is clear from the draft policy that the government is committed to harmonising and coordinating the roles of various regulatory agencies charged with the management of wetlands (GOK, 2008). Apart from the draft Wetland Conservation and Management Policy, an authoritative blue print approved to guide the country in different sectors, the vision 2030 in section 5.4 address environmental issues outlines clearly what the government aims to achieve in environmental conservation in line with the MDGs (GOK, 2007).

1.3 Institutional arrangement for wetland management in Uganda and Kenya

In Uganda the lead institution is the Wetland Management Department (WMD) in the Ministry of Water and Environment, whose operations are guided by a 10 year framework, the Wetland Sector Strategic Plan (WSSP). The Department has evolved from the National Wetland Project to a Wetland Inspection Division and currently to WMD. This clearly indicates the commitment of the Government of Uganda to management the wetlands, which constitute about 13% of the land surface. The commitment was also motivated more by Uganda hosting the 9th Conference of Parties (COP) for the Ramsar Convention.

In Kenya, wetland management is supervised under the National Environment Management Authority (NEMA). A National Wetland Programme is also implemented under the Kenya Wildlife Services (KWS).

In both Uganda and Kenya, wetland management is devolved to districts and is mainly directly supervised by the District Environment Offices in respective districts.

1.4 Rationale for management planning

Management planning is a process of arriving at goals and objectives for managing a given resource in a defined area. A management plan guides the utilisation and management of resources within a given area and specifies the activities that should or should not be carried out or regulated by the various interested parties in specified parts of the planning area. The management plan spells out the roles and responsibilities of all stakeholders in the management

process, and the resources needed for implementation of the suggested management actions. A management plan therefore identifies management needs, priorities, approaches and procedures for implementation and monitoring.

Sio-Siteko wetland system is situated in an area where seasonal and permanent wetlands are being converted into farmland. Indeed, the wetland system is already threatened by increasing demand for agricultural land and other unsustainable utilisation practices. The low economic status of the surrounding communities has also increased the drive to exploit the wetland and to open up land for crop and livestock farming. Given the above considerations, a wide-scale plan for sustainable management and conservation of Sio-Siteko wetland is necessary. Efforts for conserving the Sio-Siteko wetland system were therefore initiated by the Nile Trans-boundary Environmental Action Project (NTEAP) to work out ways of ensuring sustainable use of the resources.

This management plan, which specifies what can be done and what cannot be done in different parts of the wetland will contribute towards the wide-scale management needs. Implementation of this management plan is expected to instil confidence and consistency in management, decision-making for the conservation and management of the wetland. It is against this background that the NTEAP has taken the initiative to work with the local communities and users, local authorities and district officials in both Kenya and Uganda to develop a management plan for Sio-Siteko. This has been seen pertinent, as the wetland is an important trans-boundary natural resource requiring wise use and conservation.

1.5 Method of plan development

A natural resources management plan can be defined as a set of processes that will help achieve mutually agreed objectives in the management of a resource in a specified area. The Sio-Siteko wetland management plan was formulated in line with Ramsar Convention guidelines, as a tool to guide the promotion of optimal and sustainable use of wetland resources. The plan is in line with Kenya and Uganda's national and regional policy and legal frameworks, which provide for collaboration between government and citizens. The plan was developed with the full participation of the wetland resource users and other key stakeholders interested in the sustainable management of the wetland system. Emphasis was given to the fact that

management plans should be developed within the context of the Ramsar Convention "wise use" concept, based three key objectives to:

- maintain the **integrity of the wetland**,
- promote **economic benefits**,
- encourage the **sustainable use** of resources so that present and future generations benefit.

The main goal of this plan is to work out ways of optimizing the use of resources and limiting the problems and conflicts due to resource use, in order to avoid degradation or abuse of wetlands.

The need to involve local communities in the whole process stems from the fact that:

- The local communities use the resources, most times in uncoordinated ways, and if not well guided can abuse the same resources.
- The local communities are custodians to the wetland resources and if they appreciate their benefits, can be devoted to sustainable management and conservation of the wetland resources.
- The local communities are very knowledgeable about the wetland resources they utilize the pertinent conflicts and associated problems in their respective areas.
- The local communities have detailed knowledge on the key issues and problems associated with the resources and their use.

It is therefore clear that the local communities in the areas surrounding Sio-Siteko are the right people to work out the problems associated with the wetlands and suggest solutions to these problems. Based on this background, the approach used involved facilitating the local communities to share ideas and experiences in resource use, problems and conflicts in the area and working out possible solutions to address the conflicts and problems as they plan to optimize resources use. The planning process therefore involved participatory approaches, which brought out ideas from local communities into the plan.

All the community-based wetland management planning meetings were held right from location and sub-county levels with mobilisation efforts from the relevant Extension Officers. Management planning meetings were conducted with a core planning team of, drawn from different institutions in both Uganda and Kenya including:

- Two Lead consultants
- Two NTEAP National Coordinators;
- Four District Technical Officers from Busia (Uganda), Busia Kenya and Samia Districts;

- Selected members from Resource User Groups representing crop farmers, livestock farmers, grass harvesters, water harvesters and other resources from the wetland.

1.6 Organisation of the plan

The lay out of the management plan takes into account the process that was used in plan development. The management objectives are presented within the document rather than at the beginning to make it possible for readers to relate the management rationale with its implementation and issues arising from the planning process. The plan is organised in three main parts, covering the background information on which the plan is based and the planning process, problems and conflicts in the area, objectives and management actions and the implementation strategy for the management plan.

Part I presents the general background information on wetland management and the description of Sio-Siteko wetlands. It also gives details of information gathered during the Resource Analysis and Stakeholder Analysis processes. Part II covers the general management objectives and strategies based on the conservation importance of the wetland, the problems and conflicts identified during the planning. Part III covers implementation, in which strategies for successfully achievement of proposed actions are given in form of implementation structures, a monitoring plan as a means of achieving the set objectives for the successful management and conservation of Sio-Siteko wetlands.

2.0. DESCRIPTION OF SIO-SITEKO WETLAND

2.1 The people

2.1.1 Busia District (Uganda)

Most of the data presented on population and natural resource use in this section is drawn from the Busia District State of Environment Reports (1999 & 2004). Busia District is composed of different ethnic groups, especially in the metropolitan Busia Town Council, which is the main administrative and commercial town and is one of the big entry points from Kenya to Uganda. The major ethnic groups are Samia, Bagwe, Iteso and Baganda. Other ethnic groups include Basoga, Bagisu and Karimojong, among others.

According to the National Housing and Population Census of 2002, Busia District had a total population of 228,181 people (109,924 males and 118,257 females). The District had a population density of 324 persons/ km2 and a population growth rate of about 2.85 per annum with a fertility rate of 7.1. The district is predominantly rural, with 84% of the population living in rural areas. The economy in the district is mainly based on environment and natural resources utilization, with the key resources supporting the economy including forests, wetlands, soils, fish, water, and minerals. This fast growing population therefore has a big impact on the available natural resources.

2.1.2 Busia and Samia Districts (Kenya)

Seven ethnic groups live near the Sio-Siteko wetland area, namely the Bukhayo, Samia, Teso, Bukenya, Bunyala, Luo and Ababuri. In the wetland area settlement patterns are mostly rural. Most people live in semi-permanent, and mud-walled and grass-thatched houses. Household sizes ranged from 2-10 persons with the range 5-7 persons being majority. The majority of the population falls within the age bracket of 25-44 years, with women making 52%.

2.2 Physio-geographical features

The Sio River rises at the foot slopes of Mt Elgon and has a total length of about 85 km with a catchment area of about 1390km^2. In its upper reaches the river flows in V-shaped valleys bordered by steep slopes. In its middle reaches it meanders in narrow valleys but with considerable discharge. In its lower reaches the gradient becomes flat and it meanders in a wide

floodplain. As it enters Lake Victoria, the river is about 20 meters wide. However, during the rainy seasons (March to May and October to November), the river widens considerably flooding an extensive area of flat land in its 5 km of the lower reach a mean annual discharge of the river is 10.3 m3/s.

2.3 Climate

The climate of the area is mostly influenced by movement of the Inter-Tropical Convergence Zone (ITCZ) whose effects are considerably altered by the presence of Lake Victoria and local relief features. In the catchment, rainfall varies between 1800mm in its upper catchment to 900mm in its lower reaches. There is no distinct dry season but there are two distinct rainy seasons, one from March-April and the other from late September-November. The high rainfall variability makes the area vulnerable to both droughts and floods (SMM-RBM, 2008). The mean maximum temperature is about 27.5 °C in the lowlands, about 5 degrees lower than in the upper reaches. Despite the wide range of temperature between the upstream and downstream parts of the catchment, the effect of Lake Victoria limits seasonal variation especially in the lower reaches.

2.4 Hydrology

Details on the hydrology of the Sio-Siteko wetland at selected sites were investigated during this exercise. Nangwe site, on Kenya-Uganda border, the wetland lies in a wide valley fed by several springs from adjacent hills. The springs combine to form rivers whose mean flow is about 0.318 m/sec with a total discharge of 0.292 m^3/sec. wetland drainage and reclamation were common. At Mayenje, the wetland has its source in Busia Town (Kenya). Several springs, including Lukonyi, empty into the wetland Sewerage ponds for Busia town also discharge its effluents into the wetland. Springs in the wetland supply local communities with water for domestic use, fish farming and irrigation (horticultural crops). Erosion from the road and surrounding farmlands contribute to sedimentation. In its middle reaches, river flows in a wide floodplain, about 200 m on both sides of the river channel.

Due to periodic flooding of the river's floodplain, a large riverine wetland has developed, which is important for livestock grazing during dry periods. During periods of heavy rains, riverbanks

overflow and the entire floodplain is flooded, sometimes up to 3 km. At Munongo, a Kenya-Uganda border crossing point, the wetland occurs in a wide valley bordered by undulating topography. The area is relative unimpaired and the mean water flow velocity is 0.08m/s. At Bunyandeti, the river meanders in an expansive area. The wetland is seasonal in nature and normally inundated during high flows. However the main river channel records fast flow of water during most parts of the year.

River Sio Delta site is located at the mouth the river as it enters Lake Victoria in an alluvial floodplain. The topography is flat with slopes of 0-2% and the river meanders in a floodplain developed from sediment deposition. Flow rate is low due to low channel gradient and backflow from the lake. As a result there is rapid sediment deposition which supports the growth of diverse macrophytes species. Sand harvesting is a common activity at the river mouth. Over harvesting of sand has led to erosion of the delta by lake water through backflow. These affect the wetland's supply of sediment and hydroperiod.

The main hydrological parameters determined during this survey are summarized in Table 1. Activities identified, which could affect the hydrological characteristics of the wetlands included; increasing the area of impervious surface (e.g. roofs, roads, parking lots), which in turn can increase the delivery time of water and fluctuations in water level thus affecting survivorship of plant and animal species and wetland reclamation by drainage, which can lead to increased sediment input into the wetland.

Table 1: Changes to wetland hydrology of the sites surveyed

Wetland Site	Topography	Sources of water	Causes of hydrological changes
Nangwe	Flat to very gentle slopes (0-2%), undulating adjacent topography (5-6%)	Precipitation, overland flow, Interflow, springs Urban runoff	Digging canals, down cutting
Siteko Mayenje	Flat to very gentle slopes (0-2%), Undulating adjacent topography (5-6%)	Precipitation overland flow, interflow, springs urban runoff	Culverts, down cutting

River Sio bridge	Flat to very gentle slopes (0-2%), undulating adjacent topography (3-6%)	Precipitation, overland flow, interflow, springs road runoff, agricultural runoff	Pumping
Munongo	Flat to very gentle slopes (0 – 2%), undulating adjacent topography (3-6%)	Rivers (Sio & Sango) Precipitation, overland flow, interflow, springs	
Muluanda	Alluvial flood plain, flat slopes 0-2%	River Sio, overland flow	
River Sio delta	Alluvial floodplain, flat slopes 0-2%	River Sio, overland flow	Sand harvesting

2.5 Ownership and tenure of the wetland

The Sio-Siteko wetland occurs in densely populated districts of Busia (Kenya) Samia (Kenya) and Busia (Uganda). Land tenure includes leasehold, freehold/ancestral or customary and landlord/tenancy regime. Family land ownership (47%) forms the majority of land ownership in the area. Inheritance is a major cause of land subdivision into smallholdings. The available agricultural land per person has diminished considerably from 0.56 ha per person in 1979 to 0.18 ha per person in 2005. The phenomena is also manifested in low agricultural production, low fish yields, lack of fuel wood, water pollution, loss of biodiversity and poor health caused by waterborne diseases.

2.5.1. Soils, land use and crops

River Sio catchment has a wide range of soil types whose fertility and drainage properties greatly vary. Fertile soils are confined to the upper reaches. These soils are volcanic in origin, young and rich in minerals. Along the river valleys and in wetland areas, the soils consist of a complex of improperly drained to poorly drained, very deep, very dark grey to brown, mottled, friable to firm, sandy clay to clay, often underlying a topsoil of friable sandy clay loam. In the upper half of the Sio-Siteko wetland the soils are mostly Dystric Planosols, dystric and vertic Gleysols and pellic Vertisols. In the lower half, the soils are Eutric Gleysols and pellic Vertisols, partly saline-sodic phase and: very poorly drained, deep, dark grey to black, half ripe clay, with a humic or histic topsoil; in many places peaty: Mollic Gleysols and dystric Histosols (Jaetzold et al., 2007).

The current cash crops grown in order of importance are sugar cane, sunflower and cotton. The same pattern repeats itself in the middle marginal sugarcane zone. However, water melons are common and tobacco replace sugarcane in terms of importance. In the lower cotton zone, conditions are suitable for the production of a variety of crops. Maize dominates, but yields per hectare have considerably declined, caused by declining soil fertility. Sorghum, finger millet, sweet potatoes and protein deficient cassava constitute the other important components of the diet. Legumes are dominated by beans. Fruits, vegetables and cash crops are similar to those in the middle marginal sugarcane zone. Very little or no fertilizer is used in the area, hence the potential for increased yields through use of adequate amounts of fertilizers and other farm inputs. Due to unsustainable agricultural practices that have led to cultivation of marginal areas, soil erosion has been aggravated. There is also clearing of large areas of forestland and riparian areas to expand agricultural land. This has led to further degradation of the catchment areas and increase in soil erosion and sedimentation of riverine ecosystems.

2.6 Ecological Values - Biodiversity

The favourable hydro-climatic conditions in River Sio catchment and its associated wetlands harbor a rich fauna and flora. A rapid survey was conducted along River Sio wetlands to generate information on species diversity, their conservation status, identify the potential use in management and to come up with recommendations guiding the selection of the hot spots for conservation.

2.6.1 Water quality and plankton communities

Different water quality parameters were determined *in situ* and during laboratory analysis. Water quality varied depending on habitat quality, land use within the riparian areas and the vegetation cover. At River Sio Delta, high turbidity and total dissolved solids recorded were due to heavy sand harvesting activities. High values for most of the parameters in the wetlands is due to declines in the buffering capacity against point sources (car washing, molasses) and non-point sources (deforestation, sand harvesting, poor farming). Several zooplankton and phytoplankton communities were identified (Appendix 2). Copepods, cladocerans and rotifers dominated the zooplankton community at the seven sites sampled. The phytoplankton community was dominated by Cyanophyta, Chlorophyta and Bacillariophyta (Diatoms).

2.6.2 Plant diversity

The Sio wetland system has varied habitat sub-types with a rich flora. In total 209 species of plants were recorded belonging to 47 families and 151 genera (Appendix 3). The dominant species were *Cyperus papyrus, C. latifolius and Phragmites mauritianum*. Other common species were *C. articulatus, C. dives, Echinochloa pyramidalis, Leersia hexandra, Mimosa pigra, Persicaria decipiens, P. setosula, and Typha domingensis*. Most of the species (72.1%) were herbaceous while shrubs and trees or woody climbers were few. Herbs constituted the largest proportion of species (47%). Plant species recorded were of local conservation concern. The invasive *Mimosa pigra* and *Lantana camara* common at the edge of the wetland can reduce species diversity (Cronk & Fuller 1995, Kalema & Bukenya-Ziraba 2005) and have been identified as the most challenging ecological problems of recent years (Sharma et al. 2005). Cultivation in the wetland has introduced a number of weed species, such as *Ageratum conyzoides, Digitaria ciliaris* and *Tagetes minuta*, into the wetland. There is, therefore, need to monitor the presence of invasive plant species by enacting by-laws to avert spread. There is frequent grazing in the floodplains and on the drier edge of the wetland.

The plant diversity of Sio-Siteko wetlands are of major economic importance. This include as sources of handcraft materials, medicinal herbs, vegetables, grazing of livestock, thatching materials for house construction and firewood. The vegetation is harvested for domestic use thus giving a mosaic of mature and young or sub-mature stands in patches. To preserve these socio-ecomic benefits monitoring programs should be developed to assess the impact of pollutants and anthropogenic activities of wetland plants.

2.6.3 Invertebrate communities

Invertebrates, the animals lacking a backbone, are important modulators in ecosystems at both macro and micro-levels in the aquatic, terrestrial, arboreal and subterranean settings. In these habitats they constitute part of the food chain and litter transformation as well as ecosystem engineering (Toyota *et al.*, 2006). While some enhance life processes, others provide checks and balance to ensure optimal ecosystem performance. In the aquatic environment invertebrates (for example copepods) are considered to be the main trophic link between primary producers and fish (Finlay and Roff, 2007). Aquatic invertebrates are also important bioindicators of

environmental degradation because of their wide distribution, diversity and tolerance to different impacts (Metcalfe and Smith, 1994). Some have cultural uses, like water skaters used breast development stimulation in Uganda. Apart from beneficial roles, some invertebrates have some harmful effects in the environment namely, transmission of disease-causing organisms such as Leishmania by sandflies, schistosomiasis by aquatic snails and release of toxic chemicals (such as cantharidin by blister beetles).

Results indicated that the Sio-Siteko wetland is rich with micro- and macro- invertebrate fauna in the aquatic, terrestrial, subterranean and on-the-ground habitats. The diversity, distribution and abundance of invertebrates collected during the survey are presented in Appendices 6-8. Mollusca dominated the macroinvertebrate samples followed by Crustacea. In the terrestrial, subterranean and on-the-ground habitats the most abundant were Hemiptera (Insecta), Hymenoptera (Insecta) and Acarina (mites), respectively.

Because of the problems associated with termites, communities have tried to use chemicals as a means of controlling them. This should be discouraged because of environmental pollution. Biological means of control should be used. Incidences of tsetseflies should be investigated and confirmed. If present the communities should be trained on their control. Occurrence of snails in the area should be investigated with respect to their potential of causing Bilharzia. Because their importance, invertebrates need to be conserved and monitoring programs developed to aid in overall maintenance of environmental quality.

2.6.4 Ichthyofauna (Fish)

Sources of fish for Sio-Siteko community include Lake Victoria and riverine wetlands. The different fish soecies are good sources of protein for many people. Fish data was collected by gill-nets, scoop nets, surveys of commercial catches, local knowledges, traps and seining. A total number of 11 families and 29 species were collected. Commercially valuable fish species were *Oreochromis niloticus, Lates niloticus, Labeo victorianus* and *Rastrineobola argentea.* There was decline in fish species as one moved upstream. This corresponded with low fishing activity. The major species in the catches were *Synodontis* spp. and *Barbus* spp. In addition *Protopterus aethiopicus, Clarias gariepinus, Synodontis afrofischeri* and *S. victoriae* were very common in the study area. Most cichlids were restricted to the lower reaches while most barbs occurred upstream, also recorded by Raburu (2003). Some threatened species were recorded, like

Momyrus spp., Gnathonemus longibarbis, Schilbe mystus and Bagrus docmac (Ojuok, 2005). Their occurrence in River Sio is a major indicator of the important role played by the river and its wetlands towards protection of endangered fish species. Introduced species in the wetland and in the river included *Lates niloticus Rastreonobola argentea* (a lacustrine species), *O. niloticus*, *O. lecostictus* and *Tilapia zillii.* The fishes need to be protected because of their important role in the food chain and as a possible biomonitoring tool of environmental quality. There is a decline in wetland fishery (fisheries in the wetland not done on commercial basis) as a result of overfishing, wetland degradation, illegal gears, and capture of juvenile fish for the bait fishery

2.6.5 Amphibians

Amphibians mostly comprised terrestrial or aquatic species, with only one arboreal species *Hyperolius kivuensis*. About 28 species of amphibians are suspected to occur in Sio-Siteko wetlands (Kigoolo, 1995), seven of which were recorded during this study. Concerning their conservation status Kigoolo (1995) had earlier observed that impacts on wetland quality affected species composition of amphibians. He found that papyrus and grass swamps had more species than rice fields. Of the species of amphibians recorded, none was of conservation concern, according to IUCN. However, local impacts on habitats have inevitable consequences for the survival of species at least on local scales and this should cause for conservation efforts. As with birds, amphibians in the area should be used to develop an environmental bio-monitoring tool by concerned authorities (KWS (K), UWA (U) Universities & Research institutions).

2.6.6 Reptiles

Data was collected through observations, collections, audio clues and use of local people to collect material for identification. During this survey, 8 reptile species were recorded in the Sio-Siteko wetland ecosystem (Appendix 6). All species except 3 (the Python, Crocodile and the Monitor Lizard) were recorded from actual presence record of either a specimen or from their vocalization. There is the problem of human attack by crocodiles along Sio River. Because of this there is need map out crocodile prone areas and identify the cause of the attacks (for instance fish-rich areas visited by crocodiles and man). This to be done by KWS, NMK, Fisheries Department on the Kenyan side and UWA, Local Government and Fisheries Department for Uganda. There is the potential of establishing crocodile farming as an economic activity in the area

2.6.7 Avifauna (Birds)

During the bird survey, Timed-Species Counts (TSC) method was used to make a quick inventory of the species and their relative abundance. In total, 87 species were recorded in Sio-Siteko wetlands representing 8.6% of Uganda's species list (Carswell et al., 2005). A complete species list with the common and scientific names and their mean scores are shown in (Appendix 1). Although birds can live in a variety of habitats, some species are habitat specific and thus vulnerable to habitat degradation and alteration. The wider Sio-Malaba-Malakisi catchment area represents an Important Bird Area (IBA) with over 300 bird species including the Papyrus Yellow Warbler (*Chrolopeta gracillostris)* and the Papyrus Gonolek (*Laniarius mufumbiri)*. In the study area, 18 birds were water specialists while 17 species were non-specialists. The Red-chested Sunbird and Blue-headed Coucal were the common specialist species. Two species, Papyrus Gonolek (VU) and Pallid Harrier (NT) recorded are globally threatened or Near-threatened (Bird Life International, 2008). Four species are threatened or near-threatened with extinction within the East African region, and thus are species of regional concern. These are: Hartlaub's Marsh Widowbird (VU), Grey Crowned Crane (NT), Grey Heron (NT) and African Marsh Harrier (NT). Papyrus endemic species included (Papyrus Gonolek, Carruthers's Cisticola and Papyrus Canary). The study findings also indicated that four species, Papyrus Canary, Carruthers's Cisticola, Papyrus Gonolek and Red-Chested Sunbird, are biome restricted to Lake Victoria.

Birds are of great economic importance as pollinators of crops. Some species are medicinal and act as a source of animal protein. In addition to these benefits, the Sio-Siteko wetland system is an important IBA for many bird species hence the need for protection. This can be done through identification of the area as a Ramsar Site. The many species of birds can also be used to develop monitoring programs for the area. This to be done by Nature Kenya, Nature Uganda, NEMA (K,U), KWS (K), UWA (U), universities & research institutions in both Kenya and Uganda. There is need for attitude change among the commuity towards the importance of birds in the area. Schools and NGOs should spearheard sensitization programmes in the area.

2.7 Socio-economic values

2.7.1 Busia District (Uganda)

More than 85% of the rural population in Busia District mainly relies on subsistence farming as their main source of livelihoods. The main crops grown are sorghum, millet, cotton, cassava, sweet potatoes, maize and beans. The agriculture is largely rain-fed and production is entirely dependent on use of traditional implements, with limitations in the quality and quantity of production. The productivity for major crops has been fairly low and has decreased over time, probably due to declining soil fertility and soil erosion. This has created a trend where the farmers resort to opening up new land for agriculture, with wetlands and forests falling target to land use change and degradation.

Livestock farming contributes significantly to the livelihoods of communities in Busia District. Cattle, goats, sheep are the major domestic animals kept for sale and are mainly indigenous and kept using the free range methods of farming. Most of the grazing is carried out in seasonal wetlands, especially during the dry season. The main source of water for the livestock is wells/springs, rivers and wetlands.

Tree growing on-farm (agroforestry), using different species, is a common practice in Busia District. The trees are grown in homesteads, on crop and livestock farms, and along boundaries. A study carried out by the National Agricultural Research Organization (NARO) identified Busia as one of the districts with a high potential for agroforestry. If promoted, agroforestry can serve a big role in providing the limited forest products, in addition to increasing agricultural production and reducing soil erosion.

Fishing, both in the lake and wetlands is one of the major economic activities in the district, given the closeness to Lake Victoria. The fishing industry in Busia district is quite underdeveloped, characterized by low mechanization. Reports from the local fishermen indicate that the boat sizes are small and thus limit fishing activities to the shoreline, with deeper waters being under exploited. One fish factory (Igloo Fish Industries) is located at Majanji and is involved in fish processing, mainly for export. The factory employs more than 300 workers. Fish farming is practiced on a limited scale and has a potential for boosting the fisheries resource sector.

The tourism industry in Busia District is not yet fully developed, though there are attractive tourist sites and some significant potential. The key tourist attractions include a beautiful Lake Victoria shore, Lake Victoria Islands, cultural sites, and Busitema Forests. There is only one recreation centre along Lake Victoria shores (Sangalo Sand Beach), which is located near Sio-Siteko wetlands.

2.7.2 Busia and Samia Districts (Kenya)

The main occupations of the households are farming and livestock rearing, petty trade and transportation (Boda boda) (Table 2). Majority of residents engage in wetland cultivation to supplement declining terrestrial production.

Table 2: Occupation of residents of the Sio-Siteko wetlands

Occupation	Wetland site						
	Bwamani	**Siteko**	**Munongo**	**BWI**	**Muluanda**	**Sio-Port**	**Total**
Farmer/Livestock	5	15	10	12.5	7.5	5	**55**
Formal employment	-	2.5	-	-	-	-	**2.5**
Trader	-	-	-	-	-	7.5	**7.5**
Artisan	-	2.5		-	-	-	**2.5**
Boda boda	-	5	-	-			**5**
Casual laborer	2.5	-	-	-	-	-	**2.5**
Brick making	-	2.5	-	-	-	-	**2.5**
Fisherman	-	-	-	-	-	2.5	**2.5**
Sand harvesting	-	-		-	-	2.5	**2.5**
Hand craft/mat	-	2.5	-	-	-	-	**2.5**
Others	-	-	10	2.5	2.5		**15**

2.8.2. Water supply, health and sanitation

The main sources of water include public taps, springs, rivers, rainwater, dams/pans and the lake. Surface water sources, such as rivers, lake, reservoirs, are very important for domestic supplies. Methods used to treat water include boiling, decantation, sieving and chlorination. Majority of residents (66%), use open pit latrines and dump their wastes in compost heaps (63%) instead of burying and burning (10%). Consequently, the area is very prone to water contamination.

Health standards within the region have deteriorated over the years due to high poverty levels, low access to safe drinking water, poor sanitation, gender imbalances and negative socio-cultural norms. Malaria is rampant in the area constituting 45.9% of all diseases. Access to health facilities is a problem, as the residents have to walk long distances to access medical services.

3.0. PARTICIPATORY RESOURCE ANALYSIS

3.1 Process used

The Sio-Siteko Community based Wetland Management Plan was developed using a participatory approach, where the planning team gave strong consideration to using the vast knowledge and experience from local communities. Composition of the planning team therefore ensured that there was strong representation of different resource users and stakeholders, identified during the initial sensitization, mobilization and stakeholder analysis stages of planning. Gender consideration was also given attention by ensuring that the planning team consisted of men, women, and youth from different areas around the Sio-Siteko wetland system (annex 2 and 3). Participatory resource analysis involved the following key activities:

- Identifying wetland resources in Sio-Siteko wetland;
- Ranking resource use;
- Identifying key wetland use benefits from different resources;
- Identify the key wetland resource user groups according to gender;
- Analyzing wetland resource use trends in the area over a period of about 40 years.

3.2 Key Wetland Resources (Goods/ products) from Sio-Siteko wetland system

Through a brain storming session, the planning team identified key wetland resources from Sio-Siteko wetland system. Consensus was reached that the priority list of wetland resources should include those that existed in the past and are now non-existent. The team also agreed to consider some potential resource uses that are not necessarily being currently utilized but can be useful in future. Special emphasis was also given to key wetland services/ functions provided by Sio-Siteko wetland system.

By using a voting system, the planning team ranked different resources from Sio-Siteko wetland, as perceived according to use and importance in their livelihoods. Through group discussions composed of mixed Resource User Groups (RUGs) and other stakeholders, lists were made of the key wetland resource uses in Sio-siteko wetlands. The planning team was also guided to provide more details on the specific benefits that were got from different wetland resources. Examples include grass as a resource, which can be utilised for different benefits, for example grazing, construction/ thatching, fuel wood and mulching. This was anticipated to have a bearing on management planning, because one resource may be having different threats, depending on

the use at hand, while some benefits from the same resource may not be having problems. The management actions will therefore be targeted at the particular benefit that is problematic.

A ranking exercise was conducted, to show the perceived relative importance of different wetland resources. Table 3 gives a summary of the ranked key resources from Sio-Siteko wetland system.

Table 3: Key resources from Sio-Siteko wetland system ranked according to perceived level of importance

Wetland Resource	Benefit	Rank
Water	Domestic use for cooking, drinking, washing, bathing; Livestock watering; Irrigation, Fishing; Brick making; Transport	1
Fish	Local consumption; Income; Medicine	2
Crops	Yams; Maize; Sugar cane; Rice; Cabbages; Tomatoes; Sukuma wiki; Carrots	3
Papyrus and wetland sedges	Construction; Roofing; Crafts (Mats, Ropes, Tables Baskets, Bags, Chairs, Carpets,); Income; Stakes; Fuel wood; Fencing; Fishing traps; Fish transporting baskets; Medicine; Coiled fish traps	4
Clay	Plates; Pots; Bricks; Construction; Statues	5
Grass	Pasture for livestock; Thatching; Mulching; Medicine; Ropes; Fishing baskets; Mattresses	6
Trees	Fire wood; Charcoal; Construction poles and Timber; Medicine; Rainfall attraction; Wind breaks; Shade	7
Sand	Building; Income; Water purification	8
Wild animals	Food; Medicine; Skins for sale	9
Wild fruits	Food; Income; Medicine	10
Birds	Food; Medicine; Income	11
Mushrooms	Food; Medicine	12
Fishing worms	Hooking bait	13
White Ants	Food; Income, Bait for trapping birds and fish	14

3.3 Key Wetland Services/ functions of Sio-Siteko wetland system

The planning team came to a consensus that wetland benefits from Sio-Siteko can be categorized in 2 classes as direct benefits (goods/ products) and indirect benefits (services/ functions). Whereas the goods/ products identified in section 3.2 can be harvested and utilized at home or sold in the markets, the services/ functions are not tangible though they contribute a lot to livelihood improvement. It was agreed that the services or functions are in most cases complementary in providing quality goods/ products already identified in section 3.2. The team agreed that the services/ functions provided by Sio-Siteko wetland system are therefore very vital

for the livelihoods of the communities in the area and beyond. Through a voting system, the services/ functions were ranked. Table 4 gives a summary of the key functions/ services from Sio-Siteko wetland system. After the exercise, the planning team appreciated the importance of the functions/ services, especially based on the likely impacts from loss of the relevant services.

Table 4: Key wetland services/ functions from Sio-Siteko wetlands.

Wetland Services/ Functions	Example of Resource serviced	Rank
Water storage	Enough water for domestic and livestock use and irrigation even during dry seasons	1
Water filtration and purification	Clean water for domestic use and livestock	2
Waste water and sewerage treatment	Clean water going to wetland areas downstream of Busia Town	6
Breeding ground for Fish	Provision of different types of fish from wetlands and Lake Victoria	3
Nutrient retention	Increased crop and livestock production	4
Habitat for wild animals and plants	Provision of food, medicine, construction and craft materials, pollinators	5
Recreation/ Tourism	Recreation areas for local people and visitors, e.g. Sangalo Beach	8

3.4 Identification of key wetland resource user groups

The planning team agreed to the fact that most of the resources are used by all sectors of society. They also noted that the relevant resource benefits are either harvested or utilized by different gender groups. Based on that fact, resource use in Sio-Siteko was disaggregated into use according to gender. Table 5 shows the key benefits from Sio-Siteko wetland system, analyzed by gender.

Resource use in Sio-Siteko is divided according to gender roles in different sectors of society. For example some activities are a domain of male adults (men), while some others are mainly dominated by women and youth. For example hunting and fishing are dominated by men. Women were reported to be active in the marketing of fish. Women and youth were reported to be the ones mainly responsible for fetching of water and firewood.

Different gender roles in the use of Sio-Siteko wetlands have a bearing on how to target interventions for management and conservation programmes. Concerns on decline of a

particular resource will be felt by the relevant key resource users, who can have a stronger commitment to work together to find appropriate solutions. Future management and conservation programmes in the area should therefore focus on different sectors of society.

Table 5: Wetland resource use in Sio-Siteko wetlands by gender

Wetland Resource	Benefit/Products/Values	Resource User Group by Gender**
Water	Domestic use for cooking, washing, bathing	F, MY, FY
	Livestock watering	M, MY
	Irrigation	M, F
Fish	Local consumption	M, F, MY, FY
	Income	M
	Medicine	M
Crops	Yams	M, F
	Maize	M, F
	Sugar cane	M, MY
	Vegetables e.g. tomatoes, cabbages, Sukuma wiki	M, F, MY, FY
Wild animals	Food	M
	Medicine	M
	Skins for sale	M
Trees	Fire wood	F, MY, FY
	Charcoal	M, MY
	Construction poles and Timber	M
	Medicine	M, F
Grass	Pasture for livestock	M, MY
	Thatching	M, MY
	Mulching	M, MY
Sand	Building	M, MY
	Income	M, MY
Clay	Bricks	M, MY
	Construction	M, MY
	Plates	F
	Pots	F
Birds	Food	M, MY
	Medicine	M, F
Papyrus and wetland sedges	Construction	M
	Roofing	M
	Crafts (Mats, Ropes, Tables Baskets, Bags, Chairs)	M, F, MY, FY
	Stakes	M
	Fuel wood	F, MY, FY

	Fencing	M
Wild fruits and vegetables	Food Income Medicine	M, MY M, MY M, F

*** M – Male Adults, F – Female Adults, MY – Male Youth, FY – Female Youth*

3.5 Historical trends for main activities carried out in Sio-Siteko wetland system

Based on the discussions about different resources and respective benefits, an analysis was made of the trends in use of the different resources over time. This was considered over a time frame of about 40 years, right from as far back as the 1960s, in time intervals of at least 20 years (1940s–1966, 1967-1986, 1987-2008). To get a rough picture of visualizing the periods over the 40 years, reference was made to some historical events that happened over the time, for example political events e.g. colonial times, independence, change in government regimes and notable weather events e.g. droughts and famine. Fortunately, it was realized that the communities neighboring Sio-Siteko from Uganda shared a lot of social relations and interactions with the Kenya communities and could easily recall and have memories of events in neighboring countries, for example independence in the Uganda and Kenya countries and Amin's regime.

Tables 6 and 7 give a summary of the key trends in wetland related activities in Sio-Siteko wetland system and appropriate linkages to some key wetland resources. The trends indicate increased resource use and a decline in availability for almost all resources.

Table 6: Historical resource use profile for Sio-Siteko wetland system

Wetland Resource	Significant changes and their causes		
	1940s – 1966	**1967 – 1986**	**1987 – 2008**
Water	Springs and wells were many along Sio-Siteko near swamp areas There was enough water in most areas	Uses of water increased Cattle used to drink from same wells for domestic use by people	Swamps were drained, mainly for agriculture and water levels reduced Some protected springs and wells run out of water in dry seasons Sand mining and brick making increased, leading to reduced water flow in swamps
Plants and animals	Wetland was impenetrable with a lot of vegetation and water Animals like, antelopes, wild pigs were many in wetland areas	Cultivation along the wetlands/swamps started Crafts from wetlands only made for use at home and few sold	Population increased Developed new skills of making things like mats, papyrus mats and chairs, for sale Trees along the swamps were cut for charcoal and to create space for cultivating crops
Fish	Fish had a lot of breeding grounds Trapped a lot of fish using hooks and locally made baskets	Cultivation on lake shores and in wetlands reduced fish breeding grounds Trapping fish with hooks and locally made baskets reduced Fishing using nets started	Over-fishing increased, including use of bad gear (small size nets and poison) Reduced fish in the wetlands/lakes Some fish ponds were put in place

Crops	Low population and much crop yield Only threat to crops was destruction from wild animals Good farming practices with guidance from Agricultural Officers	More sugar canes, vegetables and potatoes were grown in farms Soil erosion in the catchment areas Reduced guidance from Agricultural Officer leading to poor farming practices	Population increased more and crop production reduced Green vegetables, rice, maize, Eucalyptus trees, millet, yams grown more in wetland areas
Clay	Had not realized the importance of clay Few brick houses and some clay products bought from Tororo	Started using the clay e.g. for making pots Construction with brick at a very small scale	Increase in brick houses, especially in urban centres More clay harvesting, especially for bricks
Livestock grazing	There was grazing extensively on a free range basis, with many livestock watering points	Grazing declined due to Trypanosomiasis	Livestock farming being revived, but grazing land has reduced Limited areas for watering the cows
Herbal medicine	Used different types of trees and herbs from wetlands/swamps	Most wetland vegetation cleared and availability of medicinal plants reduced	Western medicine more used but not affordable to all people Traditional medicine herbs not easy to get though still necessary

Table 7: Key events around Sio-Siteko and their impacts and linkages to various sectors

Period	Key Event	Impact on Agriculture	Impact on people	Impact on wetlands and Lakes
1940 – 1966	Before independence for both Kenya and Uganda (Colonial times)	Population low Enough land Enough rain and soil fertility A lot of guidance from Agricultural Extension Officers Harvest good for most crops Enough grazing area	People were few Enough food and Income Life cheap Literacy promotion among the community e.g. through building of schools Few health facilities	Forest around Sio-Siteko swamps intact Enough fish A lot of hunting Much water in the streams and wetlands
67-86	A lot of illicit trade (*Magendo*) across the Uganda Kenya Border	Limited agricultural extension guidance Reduced crop farming and more interest in Magendo Reduced crop production and cases of famine	People had more access to education Reduced food High food prices	Agricultural activities increased in wetlands and lake shores Fishing activities increased more

1987-2008	Limited *Magendo* after, Uganda's current government came into power	Low production of agricultural and livestock products Low rains Land more scarce Two major cash crops (coffee and cotton) declined in production	Population increased, especially in Busia Town in Uganda and Kenya Diseases increased Less land and more land conflicts Less food and income Life too expensive	High construction of houses and schools Water pollution increased, especially near Busia Town Councils Poor farming methods and low guidance from agricultural extension Decrease in water Poor fishing methods used in wetlands and Lake Victoria Less fish

4.0. STAKEHOLDER ANALYSIS

Stakeholder analysis involved identification of primary, secondary and key stakeholders, assessment of their interests and determination of how these interests affect the viability and level of risk of a trans-boundary basin management initiative.

4.1 Process used

The task was introduced in a plenary session before they were divided into groups to discuss assigned tasks. Deliberations from the group work were presented and discussed in plenary sessions before coming up with a consensus.

Multiple approaches were used to make the process fully participatory. The first session involved presentations which were used to raise awareness among stakeholders on specific issues. The participants were taken through presentations on wetland management planning process, stakeholder participation in wetland management and Stakeholder analysis.

The presentation on stakeholder participation in wetland management planning focused on: Who is a wetland Stakeholder and Stakeholder participation in management of wetlands. Some of the key issues discussed covered the following:

- Planning within the wise use concept;
- Overall goal to achieve optimal utilization;
- Long term objectives of planning within the framework of National Wetland Policy;
- Optimization of the benefits from wetland services;
- Contribution to the wellbeing of all communities;
- Enhancement of fair distribution of wetland benefits; and
- Provide basis for monitoring and evaluation of wetland resource use, among others.

The stakeholders were enlightened on the contemporary approach used in the wetland management planning process. Adaptive Management Approach i.e." learning by doing" while taking into account factors that affect the features of the site, continual development of the processes and demonstration that the management is appropriate and effective was emphasized.

From the discussion, it was emphasized that it is the stakeholders who plan, design, implement monitor and evaluate the project. At this point different types of wetland stakeholders (direct, indirect and non-users) and how they impact on the wetlands (positively or negatively) was outlined. The rationale used to group stakeholders as primary stakeholders (those who benefit directly), secondary stakeholders (intermediaries) and key stakeholder (those who influence decision-making) depending on their interests was also clearly outlined.

Stakeholder participation in management of natural resources was outlined by clarifying the assumptions of Participatory Approaches and different types of participation. The purpose of this was to elicit the right kind of participation from the stakeholders. After the presentations, questions raised by the stakeholders were clarified setting the stage for educating the participants on the main objective of the Stakeholders Analysis Process.

After the presentations the stakeholders were engaged in group discussions. The tasks involved:

- Identifying and listing all potential stakeholders;
- Identifying stakeholder interests (both overt and hidden) in relation to the Trans-boundary wetland management (TBWN) problem and objectives;
- Assess the likely impact of wetland degradation (positive, negative, unknown) on each of the interests;
- Indicating the relative priority that should be given to each stakeholder to satisfy their interests.

The final output of the analysis was a matrix diagram with four groups (boxes) of stakeholders A, B, C and D. The categories of boxes A, B, C are key stakeholders that can significantly influence wetland management activities..

4.2 Stakeholder identification

A 'stakeholder' is defined as an interested individual, group or institution that may or may not be affected by decisions or actions pertaining to a specific resource, and may or may not be part of decision-making about the resource. During this process, stakeholders were identified by the participants and categorized into primary and secondary stakeholders. To ensure that the process was adequately done, the following checklist of questions was used as a guide::

- Have all primary and secondary stakeholders been listed?
- Have all potential supporters and opponents of the project been identified?
- Has gender analysis been used to identify different types of female stakeholders at both primary and secondary level?
- Have primary stakeholders been sub-divided into water user or occupational groups?
- Have the interests of vulnerable groups (especially the poor) been identified?
- Are there any new primary or secondary stakeholders that are likely to emerge as a result of the project?

Table 8 gives an example of the list of stakeholders identified in relation to Sio-Siteko Wetland system.

Table 8: List of Key Sio-Siteko Wetland Stakeholders

PRIMARY STAKEHOLDERS	SECONDARY STAKEHOLDERS
Food crops farmers (e.g. maize, sorghum, cassava, millet, beans, traditional vegetables, bananas, simsim, sweet potatoes etc.)	**Government Ministries/Departments**
	Water Resource Management Authorities
	National Irrigation Board
Cash crops farmers (e.g. sugarcane, Arrow roots, Rice etc.)	Water Service Providers
Fish farmers	National Environmental Management Authorities (NEMA-U & NEMA-K)
Horticultural crop farmers (e.g. vegetables, Tomatoes etc.)	Kenya Forestry Service (KFS) National Forestry Authority and (NFA)

Boat owners	Kenya Wildlife Service (KWS) and Uganda Wildlife Authority (UWA)
Fish mongers	Ministries responsible for Fisheries
Fishermen	Local Government in Uganda and Kenya including Provincial and District Administration, Village elders and Chiefs
Handicraft makers(e.g. furniture, baskets, ropes)	Min. responsible for Cooperative Development
Sand harvesters	Ministry responsible for Agriculture
Boat Transporters	Ministry responsible for Youth Affairs
Boda boda Transporters (bicycles and motorcycles)	Ministry responsible for Gender and Social Services
Brick makers	Ministries of Local Government
Slaughter houses	Ministries responsible for National Planning
Tree harvesters	Ministries responsible for Health and Medical Services, Public Health and Sanitation
Traditional Herbalist/Healers	Ministry responsible for Lands
Cultural practitioners e.g. Circumcisers	Ministries of Finance
Spiritual leaders (Baptism}	
Busia Municipal councils	Ministry responsible for Tourism development
Mushroom harvesters	Ministry responsible for Education
Palm harvesters	Political leaders (e.g. Members of Parliament and Councilors)
Primary school teachers	
Papyrus harvesters (Mat makers)	
Grass harvesters (roof thatching)	**International Non-governmental Organisations (NGOs)**
White Ant harvesters	Local NGOs
Pottery makers	Community Based Organisations (CBOs)
Firewood collectors	
Livestock farmers/grazers	
Local hunters and bee keepers	
Molasses dealers	
Maize mills owners	
Domestic water users (Direct and Shallow well owners)	

4.3 Stakeholder Interests

After identifying all the stakeholders, it was important to identify their interests within the Sio-Siteko Wetland. The interests of all stakeholders are often difficult to define, especially if they are 'hidden' (covert) or in contradiction with the openly stated aims of the individuals, groups or institutions involved. However, this is an important process as knowing the interest of a stakeholder is a key to their involvement and participation in the management planning and overall role in the management of the resource. A rule of thumb is to relate each stakeholder to either the problem that a project seeks to address or the established objectives of the project. It is after identifying the interests of stakeholders that an initial list of those to be involved in the process was drawn out. To ensure the interests of stakeholders was appropriately drawn; the following questions were used to guide the participants.

- What are the stakeholder's expectations of the project?
- What benefits are there likely to be for the stakeholder?
- What resources will the stakeholder wish to commit (or avoid committing) to the project?
- What other interests does the stakeholder have which may conflict with the project?
- How does the stakeholder regard others in the list?

Table 9 gives an example of the outcome of such a process in a section of the Sio-Siteko Wetland, where interests and potential impact of the individual stakeholders pose to the wetland.

Table 9: Identification of Stakeholder Interests and Impacts

STAKEHOLDER	INTEREST	POTENTIAL IMPACTS
PRIMARY STAKEHOLDERS		
Crop farmers (horticultural & cash crops)	Food production Income generation	Food security Improved livelihood Environnemental degradation (Drainage, pollution, erosion, deforestation)
Livestock keepers	Pasture and water Food production Income generation	Enough forage Food security Improved livelihood Improved soil fertility Soil erosion Sol compaction Water pollution (sprays)
Fisher folk	Food Income	Food security Improved standard of living Defaulting on the Fisheries Act Using prohibited gear Water pollution (chemicals and motor boat engines)
Handcraft makers	Income generation Building material Domestic purposes (e.g. chairs, thatching, brooms) Fuel	Improved livelihood Improved standard of living Sanitation Destruction of breeding sites Interferes with hydrological cycle
Sibale Sand harvesters	Income generation	Improved livelihood Good houses & shelter Soil bank erosion Destruction of fish breeding areas Contamination of water (pollution)
Transporters	Income generation Security Research purposes	Improved livelihood Improved security (people and water resources) Improved technology in enhancing wetland habitat Risks involved e.g. Drowning and boat capsizing
Fish mongers	Income generation	Improved living standard Price fluctuations
Brick makers	Income generation Construction	Improved livelihood Improved shelter Soil erosion Deforestation
Tree harvesters	Income generation Building material Wood fuel	Improved livelihood Shelter Cheap source of fuel Health hazard
Domestic water users	Domestic uses Income generation Irrigation	Water pollution
SECONDARY STAKEHOLDERS		
Ministry responsible	Provision of quality water	Attain safe drinking water

for Water and Irrigation	Conservation Capacity building	Improved water services Improved health standards Improved technology
Ministries responsible for Environment and Mineral Resources	Conservation and protection of environment Capacity building	Improved, clean & healthy environment Improved livelihoods Improved soil fertility Improved technology
Ministry responsible for Forest and Wildlife	Afforestation Capacity building Soil conservation Wildlife protection	Large forest cover Technology enhancement Soil fertility Carbon sink Human-Wildlife conflicts
Ministry responsible for Lands	Registration (Title deeds & permit certificates Capacity building	Land ownership Enhanced technology adoption
Ministry responsible for of Agriculture	Food production Sanitation Income generation	Food security Clean & healthy environment Improved livelihood
Ministry responsible for Livestock	Food production Improved animal health Capacity building	Food security Improved technology Improved incomes
Ministry responsible for Fisheries	Food production Income generation	Food security improved livelihoods Conflict with fishermen
Office of the President and Local Government Administration	Wetland administration	Arbitration of conflicts Security
Ministry responsible for Heath	Awareness creation Provision of health services	Control of disease outbreak

4.4 Analysis of Stakeholder Importance and Influence

4.4.1. Assessing Importance

Importance refers to those stakeholders whose problems, needs and interests are a priority of the Sio-Siteko trans-boundary Wetland Management Project. Some of these stakeholders may be unrecognized primary stakeholders, upon whom the management of the resource places high priority (e.g. fishermen, women and poor subsistence farmers). These stakeholders may have weak capacity to participate in the project and limited power to influence decisions but their needs must be addressed effectively for the management of the wetland to be successful. Answers to the following questions were used to cross check whether the "importance" of the stakeholders was appropriately assessed.

- Which problems, affecting which stakeholders, does the project seek to address or alleviate?
- For which stakeholders does the project place a priority on meeting their needs, interests and expectations?
- Which stakeholder interests converge most closely with policy and project objectives?

4.4.2. Assessing Influence

Influence refers the power a stakeholder has over the project to control what decisions are made, to facilitate project implementation or to exert influence which positively or negatively affects a project. Influence is best understood as the extent to which individuals, groups or institutions (i.e. stakeholders) are able to persuade or coerce others into making decisions and following certain courses of action. The power may be derived from the nature of a stakeholder's organization or their position relative to other stakeholders and may be formal or informal. It is also important to determine stakeholders whose power and influence may increase because of resources introduced by the trans-boundary wetland management project. The power and influence of the stakeholders were derived using the factors listed in Table 10.

Table 10: Variables affecting stakeholders' relative power and influence

Within and between formal organizations	**For informal interest groups and primary stakeholders**
Legal hierarchy (command & control, budget holders)	Social, economic & political status
Authority of leadership (formal & informal, charisma, political, familial or cadre connections)	Degree of organization, consensus & leadership in the group
Control of strategic resources for the project (e.g. donors & suppliers of services)	Degree of strategic control of strategic resources significant to the project
Possession of specialist knowledge (e.g. hydraulics)	Informal influence through links with other stakeholders
Negotiating position (i.e. strength in relation to other stakeholders in the project	Degree of dependence on other stakeholders

4.4.3. Combining Influence and Importance in a Matrix Diagram

Influence and importance of stakeholders was combined by participants using a matrix diagram divided into A, B, C and D (Plate 1). This helped in classifying the stakeholders into different groups with distinct assumptions and risks that need to be managed through the management planning design. This was done by positioning identified stakeholders in relative terms according to the two broad criteria (degree of influence and degree of importance) in a two-by-two matrix. This positioning exercise was able to help in indicating the relative risks posed by specific stakeholders, and the potential coalition of support for the project. Depending on the influence and importance the stakeholders were finally grouped into four categories as shown in the combined matrix in Figure 1.

Explanations of the categories are as follows:

- **Box A:** Stakeholders of high importance but with low influence = Require special mechanisms if their interests have to be protected;
- **Box B:** Stakeholders appearing to have a high degree of influence, who are also of high importance to the success of wetland management = Development of good working relationship among these stakeholders can ensure an effective coalition of support;
- **Box C:** Stakeholders with high influence, who can affect outcome of the management process BUT whose interests are not the target = these stakeholders may be a source of significant RISK and will need careful monitoring and management;
- **Box D:** Stakeholders in this box have low influence on and low importance to the project objectives = they require limited monitoring and management but they are of low priority.

Table 11 gives a summary of the different stakeholders in different categories. Almost all the primary stakeholders fell in category A. Some government departments and some civil society organizations fell in category B. Other government departments fell in group C with very few organizations falling in category D. This exercise gave the overall stakeholder situation in Sio-Siteko project area and was used to inform management plan design.

Table 11: Sample showing how the Sio-Siteko Wetland community assigned Stakeholders different levels of Influence and Importance

Box A: Low Influence -High Importance	**Box B: High Influence – High Importance**
Food crops farmers Cash crop farmers Fish farmers Horticultural crop farmers (e.g. vegetables, Tomatoes etc.) Boat owners Fish mongers Fishermen Handicraft makers(e.g. furniture, baskets, ropes) Sand harvesters Boat Transporters Boda boda Transporters (bicycles and motorcycles) Brick makers Tree harvesters Traditional Herbalist/Healers Cultural practitioners e.g. Circumcisers Spiritual leaders (Baptism} Palm harvesters Papyrus harvesters (Mat makers) Grass harvesters (roof thatching Livestock farmers/grazers Posho mills owners Domestic water users (Direct and Shallow well owners) Ministries responsible for: • Cooperatives • Tourism • Education International NGOs with few activities in the area Local NGOs with few activities in the area	National Environmental Management Authorities (NEMAs) KFS and NFA KWS and UWA Water Resource Management Authorities Local Government Adminsitration including Provincial and District Ministries responsible for: • Fisheries • Kenya Forestry Service (KFS) • Ministry of Agriculture • Livestock • Finance • Lands • Local Government • Health, and Sanitation • Planning • Gender and Social Services Nile Trans-boundary Environmental Action Plan (NTEAP) Busia Municipal councils
Box D: Low Influence – Low Importance	**Box C: High Influence – Low Importance**
Local hunters and bee keepers Pottery makers Slaughter houses Firewood collectors Ministry of Sports and Youth Affairs	Some Local CBOs Political leaders (Members of Parliament) Molasses dealers Primary school teachers (ECD &Adult) Swedish International Development Agency (SIDA)

5.0 ANALYSIS OF PROBLEMS AND CONFLICTS IN SIO-SITEKO

5.1 Analysis of problems related to wetland resources, coping strategies and suggested solutions

The planning team made a critical analysis of the key issues at stake that either affect optimal utilization or may jeopardize the sustainable utilization of Sio-Siteko wetland system. These were categorized as either problems or conflicts.

Table 12 outlines the key problems in relation to sustainable utilization of Sio-Siteko wetland system. The problems were ranked according to the perceived gravity of their likely impacts.

Table 12: Key problems related to utilization of the Sio-Siteko wetland

Problem	Rank	Main causes/ Remarks
Water drying up	1	Reduced water level Prolonged drought Interference with water sources Drainage of wetlands Overpopulation Cultivation in buffer zones Planting of eucalyptus trees Deforestation Planting of Eucalyptus
Fish reduction	2	Fishing using poison Poverty Lack of employment Catching undersize fish Destruction of breeding areas Reduced feeding grounds Predators (birds, animals) Poor enforcement of existing laws Water hyacinth infestation Water pollution Increased fishermen Reduced breeding grounds
No grazing areas	3	Poor farming along wetlands High human and animal population Reclamation of wetlands for alternative development activities Burning of wetlands Over-harvesting of plants for other uses

Problem	Rank	Main causes/ Remarks
		Personalizing grazing grounds
Reduced wild animals	4	Clearing and burning of wetlands Over-hunting and poaching Migration due to loss of habitat Poisoning of animals by people
Reduced crop production	5	Poor farming methods High cost of farm inputs Lack of crop rotation Climatic changes Increased population Pests and diseases Idleness/laziness of youths Use of poor seeds Poor timing during planting Lack of extension services Non-mechanized farming
Poor water quality	5	Poor methods of use of water sources Washing of vehicles and bikes in rivers Wastes from Jua Kali areas Poor sewerage and waste disposal from slaughter houses Animal drinking directly in rivers Use of poison when fishing Disposal of containers used for handling chemicals in water
Reduced tree cover	7	Charcoal burning Timber production Fuel wood used for brick ovens Clearance for cultivation
Drying up of springs and wells	8	Poor farming methods Reduced rainfall Increased population/water use Destruction of wetland plants Planting of eucalyptus trees in water sources Reduced rainfall
Reduced herbs	8	Burning and clearing of wetlands Unsustainable harvesting Farming in wetlands Grazing in wetlands Increased herbal clinics

Problem	Rank	Main causes/ Remarks
Soil exhaustion	10	Low crop rotation Poor farming methods Poverty among the community Soil erosion Overgrazing Overpopulation
Papyrus growing shorter and smaller	10	Less water Over-harvesting Frequent harvesting due to high demand Burning and clearing Over-grazing Burning Cultivating of wetlands
Domestic animals dying	10	Inadequate water, pasture and diseases Tsetsefly infestation Poor animal husbandry Lack of livestock extension officers Poverty
Disappearance of clay	10	Draining and cultivation in wetlands Overexploitation by brick makers Clearing of wetlands Siltation
Reduced sources of sand	14	Increased population Over-harvesting of sand Climatic changes Over-harvesting Reduced water flow in rivers
Wild food e.g. fruits and vegetables reduced	14	Cultivation of wetlands Burning of wetlands High demand caused by population increase Wild animals e.g. Monkies
Inadequate hand craft materials	16	Poor harvesting methods Increased demand
		Burning and draining of wetland areas
Spread of Diseases	17	Breeding areas for Mosquitoes, Snails & Tsetse Flies
Wetland Ownership	18	Non-uniformity in buffer zones near lakes and wetlands

It was agreed that whereas problems can be addressed by directly addressing what is observed as the main causes, in some cases, there is need to analyze the causes of problems and identify the root causes of the problems in order to effectively address the problem. For example, if the problem of reduced agricultural production is reduce water, directly addressing increasing rainfall may not be feasible. The pertinent problems in Sio-Siteko were therefore analyzed up to the level of root causes.

In order to suggest feasible solutions, it was agreed that consideration should be made to ways in which the local communities have been using the resources to cope up with the problems. Table 13 outlines the problem analysis matrix made for key problems in Sio-Siteko wetlands. Based on the problem analysis, some solutions were suggested for overcoming the problems, with reference to previous coping strategies.

Table 13: Problem analysis matrix for Sio-Siteko wetland system

Problem	Primary Cause	Secondary cause	Coping Strategy	Suggested solution(s)
Water drying up	Poor cultivation methods Deforestation Hostile climate Interfering with water sources	Diverting water through drainage Planting of Eucalyptus trees Poor methods of farming Human activities e.g. encroachment for agriculture Overuse of water Overpopulation	Sensitisation of communities along the wetlands Formation of water user groups for families along the wetlands Involvement of local leaders like LCs/ Elders Encourage afforestation	Capacity building of community on shallow well users. Law enforcement and capacity building Sinking of boreholes Monitoring and evaluation Bye laws Plant water friendly trees like *Mayekiyeki*
Water pollution	Poor Sewerage disposal Poor methods of use of water sources Encroachment of water sources Washing bikes and vehicles near water sources	Poor disposal of sewerage and other waste Poor disposal of human wastes from pit latrines Shallow and poor maintenance of latrines Topography – you can not dig deep toilets in some water logged areas	Promotion of good sewerage disposal methods Protection of springs and shallow wells Avoid overstocking Livestock water drinking areas to be identified and protected	Waste disposal bye-laws Sensitisation of communities to avoid constructing latrines near wetlands Promotion of eco-san toilets, especially in Busia Town Encourage zero grazing Bye laws to govern water sources
Fish reduction	Poor fishing methods Fishing using poison/ drugs Poor cultivation along the wetland Poverty Lack of employment Reduced breeding areas	Increased population of fishermen Reduced water levels Lack of sensitisation/ awareness on modern fishing methods Reduced feeding areas Presence of Nile perch	Good methods of fishing Planting of trees like Misiseta to restore wetland areas Fish farming e.g. fish ponds Sensitization Protection of feeding areas	Experts and fishermen to train and create awareness on good fishing methods Harmonized Bye laws Guidelines on fish farming Conservation of wetland and lakeshore areas at least 30 meters

Problem	Primary Cause	Secondary cause	Coping Strategy	Suggested solution(s)
	Reduced feeding areas Presence of fish predators (Nile perch) Illegal fishing gear Water hyacinth		Control of water hyacinth Introduction of *Synodontis* (Vidonge)	Build capacity of communities /BMU and local council Creation of alternative sources of income Enhance monitoring Fisheries department to control the amount of fishermen Rehabilitation / protection of buffer zones
Disposal of molasses	Lack of awareness on danger of molasses from brewing of illicit Gin (chang'aa) to human health and other resource users. Flexibility law enforcers	Ready market for the local gin (*Enguli* or *Changaa*)	Reporting cases to local authorities	Create awareness Enforce bye-laws
Reduced grazing areas	Dry season grazing Burning and clearing of wetlands Conflict of interests Pressure on land Overgrazing/overstocking	Overpopulation Personalizing of common grazing grounds Reclamation of wetlands for development Over flooding of grazing areas	Sensitization Promoting good farming methods Avoid overstocking Zero grazing	Bye laws Planting of fodder along the wetlands Promotion of zero grazing
	Clearing of wetlands and burning Deforestation Illegal hunting	Hunters are very many	Sensitization Diversification in resource use	Gazette wetlands Bye laws on hunting Sensitization Increase indigenous fruit and tree plants (*Masae, Chinduli,*

Problem	Primary Cause	Secondary cause	Coping Strategy	Suggested solution(s)
				*owayo,, Amasungwe, Masurungodi, Embama, Chikhwaig*e)
Reduced wild animals	Clearing of wetlands and burning Deforestation Illegal hunting	Hunters are very many	Sensitization Diversification in resource use	Gazette wetlands Bye laws on hunting Sensitization Increase indigenous fruit and tree plants (*Masae, Chinduli, owayo,, Amasungwe, Masurungodi, Embama, Chikhwaig*e)
Reduced crop production	Poor farming methods High costs of farm inputs Idleness among the youth Poor timing Low quality seeds	Soil infertility Soil erosion Diseases Poor farming methods Climatic changes	Sensitizing communities	Promote good farming practices Bye laws Planting certified seeds
Soil exhaustion	Over cropping Overgrazing Soil erosion Low crop rotation	Bush burning Overpopulation Lack of employment	Reafforestation Population control	Community sensitization Bye laws Promote agroforestry
Spread of Diseases	Permanency of the water Habitat for disease causing insects	Human activities e.g. agriculture	Sensitisation on insect control Gazetting grazing areas	Provision of shallow wells and boreholes
Human – Wildlife Conflicts	People getting water and fish from Crocodile prone areas, which are mainly fish breeding grounds		Sensitising communities to avoid the areas Use of big size canoes	Providing alternative water sources (e.g. boreholes and shallow wells) for communities near crocodile prone areas Discouraging fishing around

Problem	Primary Cause	Secondary cause	Coping Strategy	Suggested solution(s)
				the fish breeding sites
Utilisation and management and cross border resource use conflicts	Inadequacy of institutional capacities at local level	Limited staffing and facilitation to Local Governments	Seeking funding from Donors	Capacity building in different wetland conservation and Natural Resource Management aspects Facilitating Local Governments

5.1.2 Conflicts between various Resource User Groups, coping strategies and suggested solutions

The planning team appreciated the fact that in the process of utilization of Sio-Siteko wetlands, the different resource user groups, sometimes caused by clashes from different interests. Table 14 outlines the key conflicts identified from Sio-Siteko wetland system utilization. Traditionally, most of the conflicts have existed and have always been managed with some coping strategies. The Sio-Siteko community-based wetland management plan therefore makes suggested solution, with due consideration of the previously existing coping strategies, with an aim of having the conflicts managed in a better way.

Table 14: Major conflicts arising from utilization of Sio-Siteko wetland system

Conflict Analysis

Conflict (among enlisted Groups)	**Cause of conflict**	**Coping Strategy**	**Suggested solutions**
Crop farmers with herdsmen	Crop destruction Lack of grazing grounds Negligence of the herdsmen Undefined boundary Encroachment Sharing water sources	Meeting between the 2 groups Planting pasture grass Sensitization Clear demarcations Fencing	Bye-laws Zero grazing Agro forestry
Water users and the herdsmen	Water pollution Blocking water ways Trespassing to graze Lack of enough water	Sensitization Fencing Construction of more watering points	Separate watering points of animals from other water users
Plant harvesters and fishermen	Fish disappears Theft of fish Damage to clay/grass-fishermen digging trenches	Meeting between the 2 groups Sensitization Fishing in designated areas	Zoning resource use areas Bye laws

Conflict (among enlisted Groups)	Cause of conflict	Coping Strategy	Suggested solutions
Grass harvesters and clay miners	Stealing of grass Burning grass Covering clay	Meeting between the 2 groups	Bye-laws Sensitization Zonation of the wetland
Herbalists and crop farmers	Destruction of herbs	Sensitization	Bye-laws Awareness on sustainable harvesting Establishment of community herbarium
Cross border resource user conflicts		Promote and Formalize wetland community cross border meetings	Promote herbal gardens for the herbalists to deal with herbalist farmer conflict.

PARTII: MANAGEMENT OBJECTIVES AND ACTIONS

6.0. PROCESS

There is a very close link between the stakeholder Analysis, Resource Analysis and the Setting of Management Objectives. It is very important that the stakeholders understand the cause and effect of all the environmental issues affecting the wetland and the connection between their own (small scale) practices and individual or cumulative (large scale) effects on wetland values. The objectives set consequently should target the stakeholders who are most critical in the achievement of the same objectives. Focus was directed to what the relevant stakeholders need to know and provide information that increases that understanding and thereby build support either through communication or use of appropriate incentives. Management objective therefore focused on the value and interest of the stakeholders rather than exclusively on the ecological values, say biodiversity conservation.

Since Sio-Siteko is a trans-boundary Wetland, the objectives set were geared towards this goal and had to be done in a joint forum which brought together a broad representation of stakeholders identified from both Kenya and Uganda during stakeholder analysis.

The guidelines used to prepare objectives in a Wetland Management planning process was a stepwise process which includes Step 1: Description of site features, Step 2: Evaluation of features and selection of key features, Step 3: Formulation of long-term objectives for each key feature, Step 4: Formulation short-term operational objectives for each key feature. This process was clearly outlined to the stakeholders and the significance of each step explained to help them make informed decisions.

However, the approach used to set vision and management objectives recognized the above provision but varied to some extent. The focus was on what affects the people in the exploitation of the trans-boundary wetland. As such stakeholders from both Kenya and Uganda were given an opportunity to raise all the issues affecting them or causing conflicts within the Sio-Siteko Wetland which are of trans-boundary nature in a plenary discussion forum. Several issues were raised from both sides and it became apparent that both sides, Kenya and Uganda, contribute to the problems being experienced in the wetland. The issues casing conflicts / problems were then grouped into six thematic areas which included:

- Fisheries issues
- Water Pollution
- Human-Wildlife conflict,
- Livestock issues
- Cross-border Trade
- Environmental conservation.

The stakeholders were then randomly divided into the six groups and mandated to discuss the problems in detail, their causes and possible remedial measures that would help resolve the conflicts. They were also mandated to deliberate on long and short term management objectives for each identified issues. Each group of the groups also deliberated on what vision they wish to set for Sio-Siteko Wetland Management Plan.

7.0 VISION FOR SIO-SITEKO WETLAND

The following key words were identified by the stakeholders as the building blocks for the vision that they wanted of their wetland. They stakeholders wanted a Sio-Siteko Wetland which:

- Is well conserved;
- Have harmonized trans-boundary relationship;
- Is sustainably utilized;
- Provides economic benefits;

Seven different sets of visions were drafted by different groups during group discussions. After lengthy deliberations, all the stakeholders came up with a common vision, which focuses at attaining:

"A well conserved Sio-Siteko Wetland system, sustainably utilized for economic benefits in a harmonized trans-boundary relationship"

8.0. FORMULATION OF MANAGEMENT OBJECTIVES

The overall objective of Sio-Siteko community based wetland management plan was formulated by unpacking the vision by reflecting on aims for achievement and sustenance of benefits from Sio-Siteko, which had been reflected in the vision for Sio Siteko wetland:

"A well conserved Sio-Siteko Wetland system, sustainably utilized for both socio-economic and ecological benefits in a harmonized trans-boundary relationship."

The management objectives were set to address the major thematic areas and particular issues under the following thematic areas:

- Fisheries issues;
- Water pollution and water resource management
- Socio-economic issues, including human and wildlife conflict
- Livestock and Crop farming issues

- Cross-border trade
- Biodiversity and wetland loss

This process attempted to harmonize ideas on ways of addressing wetland related issues in the two countries, which led to the formulation of trans-boundary objectives that were set by stakeholders both from Kenya and Uganda. The following objectives were formulated:

1. To sustainably manage the fisheries of Sio-Siteko Wetland to increase food production and alleviate poverty
2. To mitigate adverse effects of water pollution and reduce water borne diseases in Sio- Siteko wetland
3. To conserve wetland habitats to reduce wetland biodiversity loss
4. To reduce human – wildlife conflict through introduction of sustainable conservations measures and alternative sources of income
5. To improve livestock production and security through enhanced health care
6. To resolve conflicts and create harmonious environment that promotes cross boarder trade
7. To set up, facilitate and monitor management plan implementation structures and mechanisms

9.0 FORMULATION OF MANAGEMENT ACTIONS AND ACTIVITIES

To achieve the intended objectives of management and ultimately the vision for Sio-Siteko wetland, the planning team unpacked the formulated objectives into actions/ activities/ interventions. Table 15 summarizes the key activities formulated under each of the objectives.

Table 15: Key activities for implementation of the Sio-Siteko wetland management plan

Objective	**Interventions/ Activities**
To sustainably manage the fisheries of Sio-Siteko Wetland to increase food production and alleviate	Awareness on co-management of fisheries resources and use of recommended fishing gear
	Formation of Beach Management Units/ Vigilante groups / Fisheries Associations and strengthening

Objective	Interventions/ Activities
poverty	of existing ones
	Establishment of community based bylaws to control theft and illegal fishing
	Establishment of micro-financing services / Village Banks
	Training on financial management & marketing strategies
	Demarcation of clear boundaries for fishing and breeding sites
	Construction of artisanal fish processing plants
	Set up a funding mechanism to boost initiative in natural and artificial fisheries
	Promote sustainable fish farming by improved access to quality seeds and feeds
	Training of fish farmers on good fish farming practices
	Develop guidelines for fish farming
	Establishment of monitoring team at sub-county level
	Provision of drugs to existing health facilities for water borne diseases
	Identify areas of linkages between BMUs and Sio-Siteko wetland management plan implementation
	Establish a rice growing zone
To mitigate adverse effects of water pollution and reduce water borne diseases in Sio- Siteko wetland	Education and Awareness creation on sanitation and proper waste disposal, & prevention of water borne diseases in community & schools
	Preparation of manuals/ brochures / posters on sanitation and proper waste disposal mechanisms
	Training on the construction and use of Ecosan toilets especially in Busia Town
	Trans-boundary bylaws on water pollution control
	Training for attitude change o n waste disposal and sustainable development issues
	Construction of protected springs and shallow wells
	Formation of wetland water User committee and strengthening them
	Construction of dams for livestock and irrigation
	Construction of health facilities
	Training of community health workers
	By laws on community health & enforcement

Objective	Interventions/ Activities
	mechanisms harmonized for Uganda and Kenya
	Monitor the effects of heavy metals on still births
	Use of constructed wetlands for wastewater before entering River Sio
	Carry out a study on water demand for Busia Township in Uganda and Kenya
	Proper land management to control non-point sources of pollution
	Use of ECOSAN Toilets, where the water table is high
	Construction of health facilities
	Pre-treatment to stop point-source pollution
To conserve wetland habitats to reduce wetland biodiversity loss	Education & awareness creation on sustainable management & restoration of wetland ecosystems
	Rehabilitation of degraded wetland sites
	Promotion of agro-forestry by growing of wetland friendly trees
	Establishment of community tree nurseries
	Promotion of growth of fodder on buffer zones
	Rehabilitation of sand & soil harvesting, and brick making pits
	Promotion of sustainable soil and water conservation farming techniques
	Training on flood water management
	By laws on trans-boundary environmental management
	Demarcate wetland and lakeshore zone protection for at least 30 metres in 10 pilot sites
	Develop and harmonise bye-laws on hunting and burning in wetland areas
To reduce human – wildlife conflict through introduction of sustainable conservations measures and alternative sources of income	Support income generating activities to reduce pressure from activities in the wetland and lake
	Prepare an ecotourism development plan for the area
	Establishment of Ecotourism Activities and facilities
	By-laws for delineation & protection of buffer zones to the wetland ecosystem

Objective	Interventions/ Activities
	Promote Bee keeping
	Fencing wild animal areas for ecotourism
	Monitoring of hippos and Crocodiles
	Monitoring of monkeys
	Promote horticultural production through organic farming
	Promote Agro-forestry practices near wetlands and catchment areas
	Establish tree nurseries for providing planting materials for rehabilitation of wetlands and catchment areas
	Production of value added wetland products
	Production of training manuals
	Training on all IGA's
	Awareness creation on wise use of wetland ecosystem
	Training of community workers on Agricultural extension services
	Support value addition to wetland products, e.g. crafts
	Protect ecotourism zones
	Awareness creation and community sensitization
	Fish farming
	Rice farming
	Horticultural farming
	Road networking for tourism promotion
	Identify and Mapping crocodile prone areas
	Foot path bridge for safe crossing over the river
	Explore possibilities of crocodile farming in the long-term.
	Awareness raising on wild life conflict copping mechanisms
To improve livestock production and security through enhanced health care	Education and Awareness creation on production, keeping of improved livestock breeds and attitude change
	Zero grazing of cattle
	Dairy goat keeping
	Construction of cattle dips

Objective	**Interventions/ Activities**
	Control of Tsetse flies
	Training of community based extension workers in animal husbandry
	Construction of livestock watering points
	Support value addition to wetland products
	Poultry production
	Pig production
	Branding / marking
	Separation of watering points for livestock and domestic use
To resolve conflicts and create harmonious environment that promotes cross boarder trade	Establishment of community based by-laws that promote cross boarder trade
	Education and Awareness creation on relevant government policies and taxation
	Clear demarcation of boundaries between Uganda and Kenya
	Zonation of wetland on both sides for various uses
	Improvement of rural access roads / bridges across the wetland
	Revolving fund for boat owners to improve boat transport
	Training on community leaders on conflict resolution
	Formation of local committees/ tribunals to resolve conflicts
To set up, facilitate and monitor management plan implementation structures and mechanisms	Launch the management plan in the two countries and in a joint function
	Set up management implementation committees in each country
	Facilitate management plan implementation committees monthly meetings and quarterly for the joint cross-border committee
	Conduct cross-border exchange tours to key interventions in the two countries
	Facilitate Annual planning and monitoring workshops

PART III: IMPLEMENTATION STRATEGY

10.0 PAST MANAGEMENT EFFORTS

Until the inception of the Malaba-Malakisi Project Nile Basin Initiative, there have been limited deliberate efforts targeted to the management of Sio-Siteko wetland as a trans-boundary wetland resource. The Lake Victoria Environment Management Project had some sampling sites in both Kenya and Uganda, but did not lay strong emphasis on the Sio-Siteko trans-boundary wetlands. The National Environment Management Authorities of Uganda and Kenya, through District environment actions have addressed wetland management issues in Busia Districts in Kenya and Uganda, with limited harmonization of efforts on the Sio-Siteko trans-boundary resource.

Implementation of the Sio-Siteko management plan interventions will therefore go a long way in initiating management efforts to a critical resource that has had previous limited management efforts. It would also serve as a model to the Nile Basin Initiative for a case where 2 countries work together to manage a trans-boundary wetland.

11.0 MONITORING AND EVALUATION

Monitoring and evaluation of the management plan should be a continuous activity following adaptive (experimental) management approach. This is because the management of wetland ecosystems, Sio –Siteko included is a new and dynamic discipline which is done along side generation of new information / data which must be fed into the system as time goes on. The action plan set for the wetland will therefore be evaluated regularly on the basis of information, data and knowledge generated by the implementation of the management plan, particularly in the thematic areas. The guiding principle for the whole process should target maintenance of essential values and functions of wetlands, preservation of the multi-functionality of the wetlands, taking into account the interrelationships between wetland and other ecosystems, integration all development agenda / investments with conservation and lastly by ensuring the full involvement of all the wetland dependent stakeholders.

The monitoring indicators are clearly stated in the action plan (Table 16), it is expected that the community members elected to oversee the implementation of the management plan will be directly involved in M and E in close collaboration with the local NEMA officials and the Sio-Siteko Wetland Management Plan Implementation Committees.

Table 16: Key monitoring indicators for Sio-Siteko wetland management plan

Objective	**Monitoring Indicators**
To sustainably manage the fisheries of Sio-Siteko Wetland to increase food production and alleviate poverty	Number of groups formed and active
	Number of awareness creation manuals in vernacular
	Number of developed and operational bylaws
	Number of offenders arrested
	Fish breeding sites demarcated
	Number of Fish ponds constructed
	Number of Artisanal fish processing plants put in place
	Number of Micro-financing services/ village banks in place and functional
	Number of patients treated for water borne diseases
	Number of dams constructed near wetland areas
	Wetland water user committees formed and functional
	Numbers of animals and bird increases
	Number of people using recommended fishing gears
	Number of Community hatchery units established and operational
	Number of artisanal fish processing plants
	Number of operational village banks
To mitigate adverse effects of water pollution and reduce water borne diseases in Sio-Siteko wetland	Number of awareness creation manuals
	Number of public meetings & schools visited
	Number of brochures, posters, newsletters
	Number of Radio programs aired
	Number of Ecosan toilets constructed & in use
	Number of protected springs constructed & in use
	Number of health facilities constructed & in use
	Number of community health workers trained
	Community health by-laws
	Number of patients treated for water borne diseases
	Number of dams constructed near wetland areas
	Wetland water user committees formed and functional
	Number of tsetse fly/ mosquito nets distributed
	Number of schools visited
	Number of community members trained on different health related aspects

	Number of reported water borne diseases
	Community health by-laws
	Number of constructed wetlands
	Community based pollution monitoring manual
	By laws on community health & enforcement mechanisms
To conserve wetland habitats to reduce wetland biodiversity loss	Education & awareness manuals
	Acreage of rehabilitated wetland sites and buffer zones
	Number of tree nurseries
	Number of indigenous trees planted per year
	Acreage of fodder established in buffer zones
	Sand harvesting/ brick making pits rehabilitated
	Number of trained community members
	Number of operational bye-laws
	Number of Radio Prpgrammes aired
	Number of flood management committees formed
	Amount of crop yields from irrigation
	Incidences of wetland burnt
To reduce human – wildlife conflict through introduction of sustainable conservations measures and alternative sources of income	Prepare an ecotourism development plan for Busia District, for the benefit of Sio-Siteko wetland
	Ecotourism site surveyed, delineated and protected for hippos and crocodiles
	By-laws for buffer zone protection
	Fish farms constructed and operational
	Number of bee hives Liters of honey harvested
	Number of value added wetland products sold
	Income generated from IGAs Number of training manuals developed
	Acreage of wetland sites rehabilitated / protected as buffer zones
	Number of public meetings and schools visited
	Awareness creation manuals in vernacular
	Ecotourism development plan
	Acreage of land under Horticulture and Agro-forestry activities
	Number of tree nurseries established
	Monitoring reports on hippos, crocodiles and monkeys
	Number of trained community agricultural extension workers
	Distance of improved road rural access roads to all

	weather status
To improve livestock production and security through enhanced health care	Awareness manuals
	Number of zero grazing units established
	Number of local goats served by the grade goats
	Cattle dips constructed
	Livestock watering points constructed
	Number of livestock branded
	Number of community livestock extension officers trained
	Number of incidences of tsetse fly infected livestock
	Income from poultry production units
	Income from pig production units
To resolve conflicts and create harmonious environment that promotes cross border trade	By laws on cross boarder trade
	Manuals on government policies and taxation
	Number of radio programmes
	Number of Artisanal fish processing plants
	Cold storage facilities constructed
	Clear zonation of conservation & resource use areas
	Credit facilities established for boat owners
	Number of bridges constructed across the boarder
	Number of community members trained in conflict resolution
Set up, facilitate and monitor management plan implementation structures and mechanisms	Number of meetings facilitated for management planning committees
	Number of exchange visits made
	Number of Cross-border MoUs signed
	M & E Manual

12.0 IMPLEMENTATION STRUCTURES

Coordination of implementation of the Sio-Siteko transboundary management plan will be vested on the direct supervision of the District Environment Offices of Busia (Uganda), Busia (Kenya) and Samia (Kenya). The District will form an implementation team composed of the key sectors relevant to wetland management including:

1. District Environment Officer
2. District Physical Planner
3. District Production Officer
4. District Fisheries Officer

5. District Community and Social Development Officer

Field implementation will be supervised by an implementation team representative of the key stakeholders, including the key resource user groups, local administration and extension agents. During the harmonisation meeting, it was agreed that the planning teams (Annex 2 and 3) be given an interim role for the implementation and be confirmed during the initial implementation meeting.

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ANNEXES

ANNEX 1: BIODIVERSITY CHECKLISTS FOR KEY TAXA IN SIO-SITEKO WETLAND

Fish species at the selected sites along River Sio; P designates presence of fish

Fish taxa (family)	Fish species	Mayenje Lubawo	Siteko	Sio (water in-take)	Sio-Siteko Confluence	Bunyadeti	Bunyide	Delta
Lepiosirenidae	*Protopterus aethiopicus*			P	P		P	P
Momyridae (Elephant-snoutfishes)	*Gnathonemus longibarbis*							P
	Mormyrus niloticus			P				
	Mormyrus kannume			P				P
	Marcucenius grahami							P
	Marcucenius nigricans			P				P
	Marcucenius petherici							P
	Petrocephalus catastoma			P				
Cyprinidae (Carps)	*Labeo victorianus*				P			P
	Labeo forskalii			P		P		
	Barbus altianalis			P		P		P
	Barbus trispilopleura	P	P			P		
	Barbus kerstenii kerstenii	P				P		
	Barbus jacksonii			P				P
	Barbus radiatus radiatus	P						
Characidae (Tiger-fishes)	*Brycinus sadleri*				P			P
	Rastrineobola argentea	P			P			P
Bagridae	*Bagrus docmac*	P			P	P		P
Schilbeidae	*Schilbe mistus*					P		
Clariidae	*Clarias gariepinus*	P	P	P			P	P
	Clarias carsonii	P	P				P	P
Morchokidae	*Synodontis afrofischeri*		P	P	P		P	P
	Synodontis victoriae		P	P	P	P	P	P
Centropomidae	*Lates niloticus*			P			P	P
Cichlidae	*Oreochromis niloticus*						P	
	Oreochromis leucostictus		P			P	P	

	Tilapia zillii							P
	Haplochromines			P				P
Mastacembelidae (spiny eels)	*Afromastacembelus frenatus*			P				P
Total no. of species		**7**	**6**	**14**	**7**	**8**	**8**	**20**

Bird Species recorded in Sio-Siteko Wetland

Species			B1	B2	B3	D1	D2	Rub	SC	SK	SR	Mean
White-crowed Coucal *Centropus superciliosus*	G		4	6	5	0	6	5	6	6	1	4.33
Common Bulbul *Pycnonotus barbatus*	F		4	6	6	6	6	2	0	6	2	4.22
Blue-spotted Wood-Dove *Turtur afer*	F		6	6	0	2	6	3	0	5	6	3.78
Red-chested Sunbird *Cinnyris erythrocerca*	W	R-RR	6	6	2	0	2	0	5	6	5	3.56
Speckled Mousebird *Colius striatus*	G		3	5	6	2	4	1	5	0	1	3.00
Tropical Boubou *Laniarius aethiopicus*	F		5	6	6	0	0	4	0	5	0	2.89
Blue-headed Coucal *Centropus monachus*	W		2	0	5	0	0	6	6	6	0	2.78
Tawny-flanked Prinia *Prinia subflava*	Fw		6	5	0	0	0	1	5	6	1	2.67
Red-eyed Dove *Streptopelia semitorquata*	F		0	6	6	0	4	6	0	0	0	2.44
Black-headed Gonolek *Laniarius erythrogaster*	F		0	0	1	6	6	6	0	0	1	2.22
Yellow-throated Longclaw *Macronyx croceus*	G		5	0	0	6	0	1	0	3	4	2.11
Northern Masked Weaver *Ploceus taeniopterus*	G		0	0	0	0	4	0	5	4	5	2.00
African Pied Wagtail *Motacilla aguimp*	W		0	0	0	6	6	0	0	0	6	2.00
Swamp Flycatcher *Muscicapa aquatica*	W		3	0	5	6	3	0	0	0	0	1.89
Hartlaub's Marsh Widowbird *Euplectes hartlaubi*	W	R-VU	2	0	4	4	6	0	0	0	1	1.89
Hamerkop *Scopus umbretta*	W		5	0	0	6	6	0	0	0	0	1.89
African Palm Swift *Cypsiurus parvus*	G		4	0	4	0	0	6	3	0	0	1.89
Copper Sunbird *Cinnyris cuprea*	Fw		0	6	0	1	5	0	0	2	2	1.78
Red-billed Firefinch *Lagonosticta senegala*	G		0	0	4	4	0	0	4	0	0	1.33
Bronze Mannikin *Lonchura cucullata*	G		0	0	0	0	0	4	4	4	0	1.33
Barn Swallow *Hirundo rustica*	Pw		0	0	5	0	3	0	0	0	4	1.33
Baglafecht Weaver *Ploceus baglafecht*	F		0	0	0	0	0	2	0	6	4	1.33
Yellow-mantled Widowbird *Euplectes macrourus*	G		0	6	0	0	0	1	4	0	0	1.22
Black-headed Weaver *Ploceus cucullatus*	G		0	0	4	0	0	0	6	0	0	1.11
Pin-tailed Whydah *Vidua macroura*	G		0	5	0	4	0	0	0	0	0	1.00
Little Bee-eater *Merops pusillus*	G		2	0	0	4	0	1	0	1	1	1.00
Woodland Kingfisher *Halcyon senegalensis*	A		2	0	6	0	0	0	0	0	0	0.89
Angola Swallow *Hirundo angolensis*	W		0	0	0	0	0	4	0	0	4	0.89

Species			B1	B2	B3	D1	D2	Rub	SC	SK	SR	Mean
Red-faced Cisticola *Cisticola erythrops*	W		0	0	0	5	0	0	0	0	2	0.78
Yellow-rumped Tinkerbird *Pogoniulus bilineatus*	F		0	0	0	0	6	0	0	0	0	0.67
Yellow Bishop *Euplectes capensis*	G		0	0	0	0	0	0	6	0	0	0.67
Snowy-headed Robin-chat *Cossypha niveicapilla*	Fw		6	0	0	0	0	0	0	0	0	0.67
Pied Kingfisher *Ceryle rudis*	W		6	0	0	0	0	0	0	0	0	0.67
Marsh Tchagra *Tchagra minutus*	W		0	0	1	0	0	0	0	0	5	0.67
Long-tailed Cormorant *Phalacrocorax africanus*	W		0	0	0	0	0	0	6	0	0	0.67
Little Swift *Apus affinis*	G		0	0	0	0	0	0	0	0	6	0.67
Levaillant's Cuckoo *Oxylophus levaillantii*	Af		0	0	6	0	0	0	0	0	0	0.67
Lesser Masked Weaver *Ploceus intermedius*	G		2	0	0	4	0	0	0	0	0	0.67
Grosbeak Weaver *Amblyospiza albifrons*	Fw		0	0	0	0	0	0	6	0	0	0.67
Crimson-rumped Waxbill *Estrilda rhodopyga*	G		0	0	0	6	0	0	0	0	0	0.67
Black-headed Heron *Ardea melanocephala*	W		0	0	0	0	0	6	0	0	0	0.67
Common Fiscal *Lanius collaris*	G		6	0	0	0	0	0	0	0	0	0.67
White-Headed Saw-Wing *Psalidoprocne albiceps*	F	R-RR	0	0	0	0	0	5	0	0	0	0.56
White-Headed Barbet *Lybius leucocephalus*	G		0	5	0	0	0	0	0	0	0	0.56
White-Chinned Prinia *Prinia leucopogon*	F		0	0	0	0	0	0	0	5	0	0.56
Variable Sunbird *Cinnyris venusta*	F		0	5	0	0	0	0	0	0	0	0.56
Singing Cisticola *Cisticola cantans*	G		0	0	0	1	0	4	0	0	0	0.56
Sand Martin *Riparia riparia*	PW		0	0	5	0	0	0	0	0	0	0.56
Ring-necked Dove *Streptopelia capicola*	F		0	5	0	0	0	0	0	0	0	0.56
Laughing Dove *Streptopelia senegalensis*	G		0	5	0	0	0	0	0	0	0	0.56
Klaas' Cuckoo *Chrysococcyx klaas*	F		0	0	0	0	0	5	0	0	0	0.56
Broad-Billed Roller *Eurystomus glaucurus*	Afw		0	0	0	0	0	5	0	0	0	0.56
Compact Weaver *Ploceus superciliosus*	Fw		0	0	0	0	0	0	0	5	0	0.56
Collared Sunbird *Hedydipna collaris*	G		0	0	0	5	0	0	0	0	0	0.56
Carruthers's Cisticola *Cisticola carruthersi*	W	R-RR	0	0	0	0	5	0	0	0	0	0.56
African Marsh Harrier *Circus ranivorus*	W	R-NT	0	0	0	0	5	0	0	0	0	0.56

Species			B1	B2	B3	D1	D2	Rub	SC	SK	SR	Mean
Wood Sandpiper *Tringa glareola*	PW		0	0	0	4	0	0	0	0	0	0.44
Winding Cisticola *Cisticola galactotes*	w		0	0	3	0	0	0	0	0	1	0.44
Slender-billed Weaver *Ploceus pelzelni*	fW		0	0	3	0	0	0	0	0	1	0.44
Papyrus Gonolek *Laniarius mufumbiri*	w	G-VU	0	0	0	0	4	0	0	0	0	0.44
Papyrus Canary *Serinus koliensis*	W	R-RR	0	0	0	4	0	0	0	0	0	0.44
Little Egret *Egretta garzetta*	W		2	0	0	0	0	0	2	0	0	0.44
Helmeted Guineafowl *Numida meleagris*	G		0	4	0	0	0	0	0	0	0	0.44
Diederik Cuckoo *Chrysococcyx caprius*	G		0	0	0	0	0	4	0	0	0	0.44
Common Waxbill *Estrilda astrild*	wG		0	0	0	0	4	0	0	0	0	0.44
Brown-crowned Tchagra *Tchagra australis*	G		0	0	0	0	1	0	3	0	0	0.44
Bronze Sunbird *Nectarinia kilimensis*	f		0	0	0	0	0	4	0	0	0	0.44
Black Crake *Amaurornis flavirostris*	W		0	0	0	0	4	0	0	0	0	0.44
Marico Sunbird *Cinnyris mariquensis*	G		0	4	0	0	0	0	0	0	0	0.44
Yellow-rumped Seedeater *Serinus atrogularis*	G		0	0	0	3	0	0	0	0	0	0.33
Long-crested Eagle *Lophaetus occipitalis*	F		0	0	0	0	0	0	0	3	0	0.33
Grey Heron *Ardea cinerea*	W	R-NT	0	0	0	0	3	0	0	0	0	0.33
Fan-tailed Widowbird *Euplectes axillaris*	w		0	0	0	0	0	0	0	0	3	0.33
Yellow White-Eye *Zosterops senegalensis*	f		0	0	0	2	0	0	0	0	0	0.22
Red-cheeked Cordon-Bleu *Uraeginthus bengalus*	G		2	0	0	0	0	0	0	0	0	0.22
Malachite Kingfisher *Alcedo cristata*	W		0	0	2	0	0	0	0	0	0	0.22
Grey-headed Sparrow *Passer griseus*	G		0	0	0	0	2	0	0	0	0	0.22
Grey Crowned Crane *Balearica regulorum*	WG	R-NT	0	0	2	0	0	0	0	0	0	0.22
White-throated Bee-eater *Merops albicollis*	Af		2	0	0	0	0	0	0	0	0	0.22
Black-crowned Waxbill *Estrilda nonnula*	f		2	0	0	0	0	0	0	0	0	0.22
Rüppell's Long-tailed Starling *Lamprotornis purpuropterus*	G		0	0	0	0	1	0	0	0	0	0.11
Pallid Harrier *Circus macrourus*	PG	G-NT	0	0	0	1	0	0	0	0	0	0.11
Lesser Striped Swallow *Hirundo abyssinica*	G		0	0	0	0	0	0	0	0	1	0.11
Brown-throated Wattle-Eye *Platysteira cyanea*	f		0	0	0	0	0	1	0	0	0	0.11
Striped Kingfisher *Halcyon chelicuti*	G		0	0	1	0	0	0	0	0	0	0.11
Hadada *Bostrychia hagedash*	w		0	0	0	1	0	0	0	0	0	0.11
Grey-backed Camaroptera *Camaroptera brachyura*	f		0	1	0	0	0	0	0	0	0	0.11

Key

B1 = Bunyadeti 1, B2=Bunyadeti 2, B3=Bunyadeti 3 D1 = Delta 1, D2=Delta 2 Rub = Rubawo SC = Sio Confluence SK = Sio (Kenya) SR = Sio River (Kenya)	A = Afrotropical migrant – a species migrating within Africa P = Palearctic migrant - species which breed in Europe or Asia F = Forest generalist – less specialized, also occur in small patches of forest f = Forest visitor W = Waterbird, specialist – normally restricted to wetlands or open waters w = Waterbird, no-specialist – often found near wate	G = Grassland species G-NT = Globally Near-threatened R-NT = Regionally Near-threatened R-RR = Regionally Restricted Range Species G-VU = Globally Vulnerable R-VU = Regionally Vulnerable

Herpetiles recorded for the Sio-Siteko ecosystem

Common and/or Scientific names of the Herpetiles recorded	**Sampling locations**						
	Bunyadeti	Confluence	Lubawo Swamp	Suwo Delta	Siteko	Sio Bridge	Conservation statuts
Amphibians							
Crowned Bull frog *Holobatrachus occipitalis*	√	√	√	√	√	√	LC
African clawed frog *Xenopus laevis*	√	√	√	√			LC
Mascarine frog *Ptychadena mascariensis*	√	√	√	√	√		
Common Toad *Bufo regularis*	√	√	√	√	√	√	LC
Phrynobatrachus natalensis				√	√		LC
Bufo kisoloensis					√	√	LC
Cricket Frog *Phrynobatrachus graueri*					√		LC
Steindactus toad *Bufo steindachneri*	√				√		LC
Hyperolius kivuensis					√		LC
Ptychadena anchietae					√		LC
Phrynobatrachus gutturosus						√	

Common and/or Scientific names of the Herpetiles recorded	Sampling locations						
	Bunyadeti	Confluence	Lubawo Swamp	Suwo Delta	Siteko	Sio Bridge	Conservation statuts
Reptiles							
Leopard Tortoise *Geochelone pardalis*					√	√	
Marsh Terrapin *Pelomedusa subrufa*				√	√	√	
House snake	√						
Pythons *Python* sp.	√						
Common Skink *Lacertus jacksonii*	√	√	√	√	√		
Thick tailed skink	√				√		
Monitor Lizard *Veranus niloticus*	√				√		
Crocodiles *Crocodilus niloticus*	√	√					

Checklist of plants in the Sio Uganda/Kenya trans-boundary wetland ecosystem

T = Tree; G = Grass; H = Herb;CL. H = Herbaceous climber; CL. W = Woody climber; SH = Shrub; D = Dominant
A = Abundant; F = Frequent; O = Occasional R = Rare; 1 = highly threatened; 2 = moderately threatened; 3 = Little threat

Family	Sub-family	Genus	Species	ssp./ var./ forma	Life form	Abundance	Conservation status	Remarks
Fabaceae	Papilionoideae	Abrus	canescens		CL. H	R	3	
Fabaceae	Papilionoideae	Abrus	precatorius		CL. H	O	3	Medicine
Malvaceae		Abutilon	mauritianum		SH	O	3	
Fabaceae	Mimosoideae	Acacia	polyacantha		T	F	3	Firewood
Acanthaceae		Acanthus	pubescens		SH	O	3	
Amaranthaceae		Achyranthes	aspera		H	O	3	
Asteraceae		Acmella	calirhiza		H	O	3	
Asteraceae		Acmella	oleracea		H	O	3	
Asteraceae		Adenostemma	perottetii		H	R	3	
Amaranthaceae		Aerva	Lanata		SH	R	3	Medicine
Fabaceae	Papilionoideae	Aeschynomene	elaphroxylon		T	R	3	Making floaters
Fabaceae	Papilionoideae	Aeschynomene	Indica		H	O	3	
Fabaceae	Papilionoideae	Aeschynomene	JK4200		H			
Zingiberaceae		Aframomum	angustifolium		H	R	3	Fruits eaten
Asteraceae		Ageratum	conyzoides		H	F	3	Weed of cultivation
Sapindaceae		Allophylus	africanus		T	R	3	Firewood
Sapindaceae		Allophylus	latifolius		SH	R	3	Firewood

Zooplankton species inventory

Taxa	Species	% compositions
Nangwe		
Copepods	Cyclopoida	10.
	Nauplii	20
Cladocera	*Moina micrura*	5
	Alona spp	25
	Chydorus spp	15
Rotifera	*Euchlanis spp*	5
	Asplanchna spp	5
Others	*Insect larvae*	15
Siteko		
Copepods	*Calanoida*	25.00
	Cyclopoida	25.00
Cladocera	*Chydorus spp*	37.50
Rotifera	*Euchlanis spp*	12.50
Sio Bridge		
Copepods	*Calanoida*	7.692
	Cyclopoida	46.154
	Nauplii	7.692
Rotifera	*Euchlanis sp.*	7.692
Others	*Ostracoda*	15.385
	Insect larvae	15.385
Munongo- Bukhweri		
Copepods	*Cyclopoida*	33.30
Rotifera	*Epiphanes spp*	66.70
Bunyandeti		
Copepods	*Cyclopoida*	53.85
Rotifera	*Brachionus angularis*	7.69
	Asplanchna sp.	7.69
	Epiphanes sp.	7.69
Others	*Ostracoda*	7.69
	Insect larvae	15.38
Muluanda		
Copepods	*Cyclopoida*	50
Rotifera	*Epiphanes spp*	25
Others	*Protozoa*	25
Sio Delta		
Copepods	*Calanoida*	12.5
	Cyclopoida	37.5
	Nauplii	12.5
Cladocera	*Ceriodaphnia cornuta*	25
Rotifera	*Brachionus angularis*	12.5

Phytoplankton species inventory

Taxa	Species	Individuals / L
Nangwe		
Cyanophyta	*Cylindrospermopsis africana*	2500.0
	Planktolyngbya limnetica	15000.0
Diatoms	*Nitchzia acicuralis*	2500.0
	Nitchzia palea	2500.0
	Cymbella sp	2500.0
	Navicula granatum	45000.0
	Navicula sp	5000.0
Chlorophyta	*Botrycoccus braunii*	2500.0
	Coelastrum microphorum	5000.0
	Cosmarium sp	2500.0

	Straurastum sp	2500.0
	Closterium spp	7500.0
Dinophyceae	*Glenoridinium pernardii*	2500.0
Euglenophya	*Strombomonous sp*	2500.0
Siteko		
Cyanophyta	*Anabaena flos aqua*	2631.6
	Chroccoccus turgidus	2631.6
	Microcystis aeruginosa	86842.1
	Microcystis wasenbergii	2631.6
Dinophyceae	*Glenoridinium pernardii*	5263.2
Sio at Bridge		
Chlorophyta	*Kirchneriella lunaris*	3.20
	Scenedesmus maximus	3.20
	Tetraedron arthrodesmiforme	12.90
Dinophyceae	*Glenoridinium pernardii*	19.40
Euglenophya	*Euglena acus*	25.80
	Phacus longicauda	3.20
	Trechelemonous armata	6.50

Taxa	**Species**	**Individuals / L**
Munongo-Bukhweri		
Cyanophyta	*Aphanocapsa rivularis*	9100
	Microcystis aeruginosa	69700
	Microcystis wasenbergii	3000
Diatoms	*Cyclotella kutzingiana*	3000
	Navicula granatum	9100
Chlorophyta	*Coelastrum microphorum*	3000
	Tetraedron arthrodesmiforme	3000
Bunyandeti		
Cyanophyta	*Anabaenopis tanganyikae*	5555.56
	Romeria elegans	16666.67
Diatoms	*Aulocosira ambigua*	5555.56
	Navicula granatum	38888.89
Chlorophyta	*Botrycoccus braunii*	5555.56
Dinophyceae	*Glenoridinium pernardii*	16666.67
Euglenophya	*Euglena acus*	5555.56
	Phacus sp	5555.56
Muluanda		
Cyanophyta	*Anabaenopis tanganyikae*	7142.85
	Microcystis aeruginosa	7142.86
Diatoms	*Navicula granatum*	42857.14
Chlorophyta	*Botrycoccus braunii*	21428.57
	Coelastrum microphorum	7142.86
Dinophyceae	*Ceratium brachycerus*	7142.856
Euglenophyta	*Trechelemonous armata*	7142.856

Taxa	**Species**	**Individuals / L**

Sio Delta		
Cyanophyta	*Aphanocapsa pulchra*	869.6
	Aphanocapsa rivularis	1739.1
	Cylindrospermopsis africana	869.6
	Microcystis aeruginosa	32173.9
	Microcystis wasenbergii	7826.1
	Planktolyngbya limnetica	6956.5
	Romeria elegans	11304.3
Bacillariophyta (Diatoms)	*Aulocosira ambigua*	869.6
	Cymbella sp	869.6
	Synedra cunningtonii	869.6
	Navicula granatum	869.6
Chlorophyta	*Botrycoccus braunii*	12173.9
	Cosmarium sp	2608.7
	Straurastum paradoxum	869.6
	Tetraedron arthrodesmiforme	5217.4
Dinophyceae Euglenophya	*Glenoridinium pernardii*	6087.0
	Glenoridinium pulvasititus	6956.5
	Phacus sp	869.6

Terrestrial invertebrates

Order	Family	No.	Genus / Species	Ecological. / Economic Importance	Common name
Lubawo site by Sweepnet and hand					
Diptera	Culicidae	2	Unidentified	Pathogen vectors	Mosquito
Diptera	Culicidae	2	*Culex*	Pathogen vectors	Mosquito
Coleoptera	Meloidae	1	*Decapotoma spp*	Causes Cantharidiasis	blister beetle
Coleoptera	Curculionidae	1	Unidentified	Tree weevil	Snout beetle
Coleoptera	Unidentified	3	Unidentified	Unknown	Beetle larva
Odonata	Unidentified	1	Unidentified	Env. Indicator	Dragonfly
Orthoptera	Acrididae	1	*Orthocthae*	Plant pests	Short-horned grasshopper
Orthoptera	Tettigoniidae	1	*Conocephalus*	Birds' food	Katydid
Hemiptera	Cercopidae	9	*Cordia*	Plant pests	Bugs
Hemiptera	Coreidae	2	*Homoeocerus*	Plant pests	Bugs
Hemiptera	Alydidae	1	*Miperus*	Plant pests	Broad-headed bug
Lepidoptera	Lycaenidae	1	*Zizina antanossa*	Pollinator	Clover Blue
Lepidoptera	Pieridae	1	*Eurema*	Pollinator	Angled Grass Yellow
Hymenoptera	Formicidae	2	*Pachycondyla*	Env. Cleaner	Stink ant
Hymenoptera	Formicidae	2	*Odontomachus*	Bio. Control, envi. Cleaner	Trap jaw ant
Araneae	Unidentified	1	Unidentified	Bio control	Spider
Acarina	Ixodidae	1	*Amblyomma*	Ectoparasite,vector	Tick
Acarina	unidentified	17	*Unidentified*	Unknown	Soil Mite
Myriapoda	Spirostreptidae	1	*Unidentified*	Prey/ predator; Ecosy engineering	African/Train millipede
Oligochaeta	Lumbricidae	30	*Lumbricus*	soil engineering	Earthworm
Isopoda	Oniscidea	1	*Unidentified*	Pest?	Woodlouse
Collembola	Entomobryidae	4	*Entomobryomorpha*	Prey/ predator; Ecosy engineering	Unknown
Collembola	Poduridae	1	*Podurid*	Prey/ predator; Ecosy engineering	Unknown

Order	Family	No.	Genus / Species	Ecological. / Economic Importance	Common name
Siteko Site					
Architaenioglossa	Pilidae	1	*Pila*	Vectors of helminthes	Apple snails
Oligochaeta	Lumbricidae	4	*Lumbricus?*	Food for fish	Earthworm
Myriapoda	Spirostreptidae	2	*Unidentified*	Prey/ predator;ecosystem	African/Train millipede
Acarina	Acaria	5	*Unidentified*	Acarina	Soil Mite
Collembola	Entomobryidae	1	*Entomobryomorpha*	Prey/ predator;ecosystem	Unknown
Collembola	Poduridae	1	*Podura aquatica*	Prey/ predator;ecosystem	Unknown
Collembola	Tomoceridae	1	*Tomocerus falcifer*	Prey/ predator;ecosystem	Unknown
Araneae	Unidentified	1	*Unidentified*	Bio control	Spider
Hymenoptera	Formicidae	2	*Tetramorium*	Ecosystem engineering	Ant
Coleoptera	Unidentified	1	*Unidentified*	Unknown	Larvae
Mundika Site (Kisumu Busia Bridge)					
Lepidoptera	Pieridae	1	*Mylothris*	Pollinators	Common Dotted border butterfly
Architaenioglossa	Pilidae	5	*Pila*	Vectors of helminthes	Apple snails
Coleoptera	Scarabaeidae	4	*Sisyphus*	Soil recycling	Spider dung beeetle
Coleoptera	Staphylinidae	1	*Paederus*	Causes skin rash	Nairobi fly
Coleoptera	Staphylinidae	1	*Unidentified*	Unknown	immature beetle
Hemiptera	Alydidae	1	*Unidentified*	Soil recycling	Broad-headed bug
Acarina	Acaria	12	*Unidentified*	Unknown	Soil Mite
Collembola	Poduridae	3	*Podura*	Prey/ predator; ecosystem	Unknown
Oligochaeta	Lumbiricidae	9	*Lumbricus*	Soil engineering	Earthworm
Hadoda Site					
Hemiptera	Cercopidae	1	*Cordia*	Pests	Spittle bug
Coleoptera	unidentified	1	*Unidentified*	Unknown	Beetle (tiny)
Orthoptera	Gryllidae	2	*Gryllus*	Prey	Garden cricket
Hymenoptera	Formicidae	4	*Messor*	Pests	Harvest ant
Hymenoptera	Formicidae	4	*Linepithema*	Pests	Ants
Hymenoptera	Formicidae	178	*Linepithema*	Pests of plants and insects	Argentine ant
Diptera	Muscidae	1	*Stomoxys*	Ectoparasite	Stable fly

Isoptera	Termitidae	5	*Odontotermes*	Food,pest,soil eng.	Termites, white ants

Order	**Family**	**No.**	**Genus / Species**	**Ecological. / Economic Importance**	**Common name**
Hymenoptera	Formicidae	3	*Formica*	Household pests	Sugar ants
Orthoptera	Acrididae	1	*Paracinema*	Pests, food	Shorthorned grasshopper
Collembola	Entomobryidae	1	*Entomobryomorpha*	decomposers,pests	Springtails
Collembola	Poduridae	4	*Podura*	decomposers,pests	Springtails
Acarinae	unidentified	17	*Unidentified*	Ectoparasites	Mites
Bunyandeti Site					
Acarina	Ixodidae	2	*Amblyomma*	Ectoparasite,vector	Tick
Acarina	Acaria	3	*Unidentified*	Unknown	Soil Mite
Acarina	Ixodidae	6	*Rhipicephalus*	Ectoparasite,vector	Tick
Araneae	Unidentified		*Unidentified*	Bio control	Spider
Coleoptera	Scarabaeidae	4	*Sisyphus*	Prey	Beetle
Coleoptera	Meloidae	1	*Decapotoma lunata*	Cotton pests	Lunata blister beetle
Coleoptera	Dermestidae	2	*Dermestes maculatus*	Pests, museum use	Hide/Museum beetles
Coleoptera	Unidentified		*Unidentified*	Pest	Leaf beetle
Coleoptera	Staphylinidae	1	*Dolicaon*	Prey on mites, Envi cleaner	Beetle
Diptera	Bombyliidae	1	*Unidentified*	Parasite,Pollinator	Bee fly
Diptera	Psychodidae	2	*Phlebotomus*	Vector of Leishmania	Sandfly
Diptera	unidentified pupa		*Unidentified pupa*	Unknown	Unknown
Hemiptera	Cercopidae	1	*Unidentified*	Plant pests	4-spotted brown spittle bug
Hemiptera	Cercopidae	7	*Cordia*	Plant pests	Bugs
Lepidoptera	Pieridae	1	*Mylothris*	Pollinator	Dotted borders
Lepidoptera	Nymphalidae	1	*Junonia terea*	Pollinators	Soldier Pansy
Odonata	Aeshnidae	2	*Aeshna*	Predators	Dragonfly
Odonata	Libellulidae	1	*Brachythemis leucosticta*	Predators	Dragonfly
Orthoptera	Acrididae	1	*Paracinema*	Pests, food	
Orthoptera	Tettigonidae	1	*Melidea*	Pests,food for birds	Katydids,
Orthoptera	Gryllidae	1	*Gryllus*	prey for birds	Garden cricket

Phthiraptera	Philopteridae	31	*Unidentified pupa*	Ectoparasite	Pig Lice
Phasmatodea	Bacillidae	1	*Maransis rufolineatus*	Prey	Grass stick insect

Order	**Family**	**No.**	**Genus / Species**	**Ecological. / Economic Importance**	**Common name**
Collembola	Entomobryidae	22	*Entomobryomorpha*	Prey/ predator; ecosystem	Unknown
Collembola	Poduridae	1	*Podurid*	Prey/ predator; ecosystem	Unknown
Collembola	Smintharidae	2	*Sminthurid*	Prey/ predator; ecosystem	Unknown
Collembola	Poduridae	1	*Podura aquatica*	Prey/predator; ecosystem	Unknown
Decapoda	Potamonautidae	2	*Potamon*	Food	Crab
Gnathobdellida	Hirudenea	5	*Hirudo*	Ectoparasites	Leeches
Hymenoptera	Formicidae	11	*Polyrachis*	pests	Ants
Hymenoptera	Formicidae	12	*Linepithema*	Household, plant pests	Ants
Oligochaeta	Lumbiricidae	2	*Lumbricus*	Soil engineer	Earthworm
Thysanoptera	Phlaeothripidae	3	*Unidentified*	Pests,vectors, predators	Thrips
Bunyide Site					
Lepidoptera	Pieridae	1	*Mylothris*	Pollinator	Dotted borders
Odonata	Aeshnidae	2	*Aeshna*	Predators	Dragonfly
Odonata	Libellulidae	1	*Brachythemis leucosticta*	Predators	Dragonfly
Coleoptera	Meloidae	1	*Decapotoma lunata*	Cotton pests	Lunata blister beetle
Coleoptera	Dermestidae	1	*Dermestes maculatus*	Pests, museum use	Hide/Museum beetles
Diptera	Bombyliidae	1	*Unidentified*	Parasite,Pollinator	Bee fly
Orthoptera	Tettigonidae	1	*Melidea*	Pests,food for birds	Katydids
Acarina	Ixodidae	1	*Amblyomma*	Ectoparasite,vector	Tick
Acarina	Acaria	3	*Unidentified*	Unknown	Soil Mite
Acarina	Acaridae	5	*Unidentified*	Unknown	Soil Mite
Hymenoptera	Formicidae	11	*Polyrachis*	Pests	Ants
Gnathobdellida	Hirudenea	2	*Hirudo*	Ectoparasites	Leeches
Collembola	Entomobryidae	3	*Entomobryomorpha*	Prey/ predator; ecosystem	Unknown
Araneae	Unidentified	3	*Unidentified*	Bio control	Spider

Order	Family	No.	Genus / Species	Ecological. / Economic Importance	Common name
Bunyandeti-Bunyawudo					
Collembola	Entomobryidae	13	*Entomobryomorpha*	Prey/ predator; ecosystem	Unknown
Collembola	Poduridae	1	*Podurid*	Prey/ predator; ecosystem	Unknown
Collembola	Smintharidae	2	*Sminthurid*	Prey/ predator; ecosystem	Unknown
Thysanoptera	Phlaeothripidae	3	*Unidentified*	Pests,vectors, predators	Tube-tailed thrips
Hymenoptera	Formicidae	10	*Linepithema*	Household, plant pests	ants
Coleoptera	Staphylinidae	1	*Dolicaon*	Prey on mites, Env cleaner	beetle
Acarina	Acaria	28	*Unidentified*	Unknown	Soil Mite
Diptera	Psychodidae	1	*Styomosis*	Vector of Leishmania	Sandfly
Gnathobdellida	Hirudenea	3	*Hirudo*	Ectoparasites	Leeches
Orthoptera	Acrididae	1	*Paracinema*	Pests, food	Grasshoppers
Hemiptera	Cercopidae	7	*Cordia*	Plant pests	Bugs
Coleoptera	Scarabaeidae	4	*Sisyphus*	Plant pests	Spider dung beeetle
Diptera	unidentified pupa		*Unidentified pupa*	Uknown	Unidentifeid
Orthoptera	Gryllidae	1	*Gryllus*	prey for birds	Garden cricket
Araneae	Unidentified		*Unidentified*	Bio control	Spider
Bunyandeti-Luhalali					
Acarina	Ixodidae	6	*Rhipicephalus*	Ectoparasite, vector	Tick
Acarina	Ixodidae	1	*Amblyomma*	Ectoparasite, vector	Tick
Acarina	Acaria	18	*Unidentified*	Unknown	Soil Mite
Phthiraptera	Philopteridae	31	*Haematopinus suis*	Ectoparasite	Pig Lice
Hemiptera	Cercopidae	1	*Unidentifeid*	Plant pests	4spotted brown spittle bug
Phasmatodea	Bacillidae	1	*Maransis rufolineatus*	Prey	Grass stick insect
Lepidoptera	Nymphalidae	1	*Junonia terea*	Pollinators	Soldier Pansy
Diptera	Psychodidae	1	*Phlebotomus*	Vector of Leishmania	Sandfly
Diptera	Psychodidae	1	*Phlebotomus*	Vector of Leishmania	Sandfly
Coleoptera	Dermestidae	1	*Dermestes maculatus*	Pests, museum use	Museum beetle

Order	Family	No.	Genus / Species	Ecological. / Economic Importance	Common name
Coleoptera	Unidentified		*Unidentified*	Pests	Leaf beetle
Araneae	Unidentified		*Unidentified*	Bio control	Spider
Collembola	Entomobryidae	1	*Entomobryomorpha*	Prey/predator; ecosy engineer	Unknown
Collembola	Poduridae	1	*Podura aquatica*	Prey/predator; ecosy engineer	Unknown
Hymenoptera	Formicidae	2	*Linepithema*	Pests of orchids	Ants
Oligochaeta	Lumbiricidae	2	*Lumbricus*	Soil engineer	Earthworm
Decapoda	Potamonautidae		*Potamon*	Food	Crab
Sio Delta Site					
Hemiptera	Cercopidae	8	*Cordia*	Plant pests	Bugs
Coleoptera	Scarabaeidae	1	*Hypopholis*	Plant pests	Chafer beetle
Coleoptera	Histeridae	2	*Macrolister*	Pest	Steel beetle
Coleoptera	Staphylinidae	1	*Dolicaon*	Predate on mites, Env cleaner	
Oligochaeta	Lumbricidae	3	*Lumbricus*	Food for fish	Earthworm
Isopoda	Porcellionidae		*Porcellio?*	Pest in garden/greenhouse	Woodlice (Crustacean)
Blattodea	Blatellidae	1	*Blatella germanica*	Food web	German cockroach
Araneae	Unidentified	2	*Unidentified*	Insect predator	Spiders
Bivalvia	unidentified	6	*Unidentified*	Animal food	Mussels
Collembola	Entomobryidae	2	*Entomobryomorpha*	Prey/ predator; ecosy engineers	Unknown
Collembola	Isotomidae	1	*Isotoma*	Prey / predator; Ecosy engineers	Unknown
Acarina	Unidentified	5	*Unidentified*	Pest	Soil Mites
Decapoda	Potamonautidae		*Potamon*	Food	Crab

Soil Invertebrates

Order / suborder	Family	No.	Genus / Species	Ecol. / Econ. Impo	Common name
Lubawo Site					
Hymenoptera	Formicidae	3	*Myrmicaria*	Ecosystem engineering	Drop-tail ant
Oligochaeta	Lumbricidae	30	*Lumbricus*	soil engineering	Earthworm
Siteko Site					
Isopoda	Porcellionidae	1	*Porcellio?*	Pest?	Wood louse (Crustacean)
Oligochaeta	Lumbiricidae	7	*Lumbricus*	Soil engineering	Earthworm
Mundika (Kisumu-Busia Bridge)					
Oligochaeta	Lumbricidae	11	*Lumbricus*	Food for fish	Earthworm
Odonata	Coenagrionidae	1	*Pseudagrion*	Predators	Painted sprite
Orthoptera	Gryllotalpidae	1	*Gryllotalpa africana*	Prey	Mole cricket
Orthoptera	Tridactylidae	1	*Tridactylus?*	Prey	Pygmy mole cricket
Hymenoptera	Formicidae	2	*Streblognathus*	Prey	ants
Hymenoptera	Formicidae	4	*Lepisiota*	House hold pest	sugar ant
Bunyandeti					
Acarina	Acaria	8	*Unidentified*	Unknown	Soil Mite
Acarina	Acaria	1	*Paratetranychus citri*	Citrus pests	Soil Mite
Araneae	Unidentified		*Unidentified*	Bio control	Spider
Collembola	Onychuiridae	2	*Unidentified*	Ecosystem engineering	Unknown
Hemiptera	Cercopidae	1	*Cordia*	Plant pest	Froghopper
Hymenoptera	Formicidae	1	*Linepithema*	Plant pest	Argentine ant
Hymenoptera	Formicidae	218	*Tetramorium*	Ecosystem engineering	Ant
Oligochaeta	Lumbiricidae	2	*Lumbricus*	Soil engineering	Earthworm
Orthoptera	Unidentified	1	*Unidentified*	Prey	Unknown Larva
Bunyide Site					
Oligochaeta	Lumbiricidae	3	*Lumbricus*	Soil engineering	Earthworm
Acarina	Acaria	8	*Unidentified*	Pests	Soil Mite
Collembola	Onychuiridae		*Unidentified*	Soil engineering	Unknown
Acarina	Acaria	1	*Paratetranychus citri*	Citrus pests	Soil Mite

Hemiptera	Cercopidae	1	*Cordia*	Plant pest	Froghopper
Hymenoptera	Formicidae	1	*Linepithema*	Plant pest	Argentine ant

Order / suborder	**Family**		**No.**	**Genus / Species**	**Ecol. / Econ. Impo**	**Common name**
Bunyandeti-Bunyawudo						
Hymenoptera	218	Formicidae	218	*Tetramorium*	Ecosystem engineering	Ant
Acarina	3	Acaria	3	*Unidentifed*	Pests	Soil Mite
Collembola	1	Onychuiridae	1	*Unidentifed*	Soil engineering	Unknown
Pulmonata	7	Planorbidae	7	*Biomphalaria*	Vectors	Snail
Bunyandeti-Luhalali						
Araneae	3	Unidentified		*Unidentified*	Bio control	Spider
Orthoptera	1	Unidentified		*Unidentified*	Unidentified	Unknown larva
Acarina	5	Acaria	5	*Unidentified*	Unknown	Soil Mite
Oligochaeta	2	Lumbiricidae	2	*Lumbricus*	Soil engineer	Earthworm

Aquatic invertebrates

	Site						
Invertebrates	**Lubawo**	**Siteko**	**Mundika**	**Hadoda**	**Bunyadeti-Luhalali**	**Bunyadeti-Bunyide**	**Delta (Majanje)**
Copepods							
Thermocyclops spp		√		√	√	√	
Tropocyclops spp	√						
Copepodites	√				√	√	√
Nauplii	√				√	√	√
Cladocerans			√	√			
Moina micrura						√	√
Alona spp	√				√	√	
Rotifers			√				
Asplanchina spp					√	√	√
Brachionus calyciflorons		√				√	

Chironomidae larvae	√	√

Aquatic Macroinvertebrates

Site	Order	Q	Family	Q	Genus	Ecol. / Econ. Impo.	Common Name
Lubawo	Gastropoda	1	Unidentified	1	Unidentified	Unknown	Snail
Siteko	Coleopterea	1	*Gyrinidae*	1	*Dineutes*	Insect Predators	*Water beetle*
Mundika	Architaenio-glossa	5	Pilidae	9	*Pila*	Vectors of helminthes	Apple snails
	Mesogastro-poda	5	Thiaridae	5	*Melanoides tuberculata*	Feed on algae	Trumpet snails
	Decapoda	1	Potamonau-tidae	1	*Potamonautes*	Food	Crab
	Hemiptera	3	Gerridae	3	*Gerris?*	Predator	Water striders
Hadoda		0		0			
Bunyadeti-Luhalali	Hemiptera	1	Nepidae	1	*Laccotrephes*	Predator	Common water scorpion
	Trichoptera	1	Brachycen-tridae	1	Unidentified	Food for fish	Caddisfly
Bunyadeti-Bunyide	Architaenio-glossa	10	Pilidae	10	*Pila*	Vectors of helminthes	Apple snails
	Hemiptera	1	Veliidae	1	*Rhagovelia*	Water scavengers	Water cricket
	Decapoda	1	Potamonau-tidae		*Potamonautes*	Food	Crab
Bunyadeti-Bunyawudo	Basommato-phora	5	Lymnaeidae	5	*Lymnaea*	Vectors of helminthes	Snails
	Architaenio-glossa	1	Pilidae	1	*Pila*	Vectors of helminthes	Apple snails
	Bivalvia	1	Unidentified	1	unidentified	Carbon sinks	Mussels
	Pulmonata	2	Planorbidae	2	*Biomphalaria*	Carbon sinks	Snail
Delta (Majanje)	Hemiptera	10	Veliidae	10	*Rhagovelia*	Water scavengers	Water cricket
	Decapoda	6	Atyidae	6	*Caridina*	Food for fish, humans	Fresh water shrimp
	Bivalvia	13	Unidentified	13	unidentified	Carbon sinks	Mussels
	Pulmonata	5	Planorbidae	5	*Biomphalaria*	Carbon sinks	Snail
	Architaenio-glossa	5	Unidentified	5	unidentified	Vectors of helminthes	Snail
	Decapoda	1	Potamonautidae	1	*Potamonautes*	Food	Crab

Physiochemical parameters measured at the sampling stations in Sio Mayenje wetlands.

WATER QUALITY parameters	Nangwe	Siteko	Sio (at the bridge)	Munongo-Bukhweri	Bunyandeti	Muluanda	Sio Delta
Temperature (ºC)	23.5	22.6	22.3	22.9	22.4	24.1	24.1
Dissolved oxygen (mg/l)	4.65	2.57	6.28	2.57	4.62	4.10	4.10
Conductivity (µS/cm)	115	76.4	34.3	98.5	70.1	76	76
pH	6.38	6.27	6.64	6.43	6.32	6.68	6.68
Turbidity (NTU)	100	52.8	990	42.1	192	241	241
Total hardness (mg/l as $CaCO_3$)	76	52	34	52	48	50	50
Total alkalinity (mg/l as $CaCO_3$)	86	56	28	80	48	54	54
Total Suspended Solids (mg/l)	6	2	12	210	20	20	20
Total Dissolved Solids (mg/l)	118	38	76	50	80	80	80
Chlorophyll a (µg/l)	9.7	12.7	13.1	6.5	10.7	12.5	12.5
Total Nitrogen (μgNl^{-1})	257.05	72.32	67.58	54.95	75.47	67.58	67.58
Nitrate Nitrogen (μgNl^{-1})	4.05	2.97	40.54	2.70	8.65	7.57	7.57
Ammonium Nitrogen (μgNl^{-1})	22.40	10.40	2.40	1.73	9.73	19.07	19.07
Total Phosphorous(μgPl^{-1})	59.71	74.00	191.14	135.43	74.00	65.43	65.43
Soluble reactive phosphorus (μgPl^{-1})	26.38	26.38	18.88	18.88	17.63	15.13	15.13
Soluble Reactive Silicates (SRSi) (mg SRSi l^{-1})	31.58	27.67	22.52	30.64	25.64	27.52	27.52

ANNEX 2: MANAGAMENT PLANNING TEAM FOR SIO-SITEKO WETLAND, UGANDA SIDE

BUSIA TOWN COUNCIL

Central Parish:

1. Craft makers — Beatrice Wanyala
2. Crop farmers — Musoke Abdallah
3. Livestock farmers — Mbulo Geoffrey
4. Fish farmer — Wafula Francis
5. Water User — Nangamba Erisa
6. Herbalist — Kisiski Kassim
7. Sand and Clay miners — Bwire Stephano
8. Hunter — Ogwai Samuel

South East

1. Craft makers — Erias Serwadda
2. Crop farmers — Okendo Peter
3. Livestock farmers — Achieng Lilian Linette
4. Fish farmer — Issa Wanyama
5. Water User — Saidi Nyausi
6. Herbalist — Musa Isabirye
7. Sand and Clay miners — Samanya Joseph
8. Hunter — Agutu Matilda

South West

1. Craft makers — Nanyanzi Christine
2. Crop farmers — Opili Richard
3. Livestock farmers — Barasa John
4. Fish farmer — Ouma Paul
5. Water User — Mrs. Adong
6. Herbalist — Ouma Mandwa
7. Sand and Clay miners — Wafula Agaetano
8. Hunter — Wafula Aggrey

MASAFU SUB-COUNTY

Bumunji Parish

1. Craft makers — Mrs. Rhoda Oliba Anyango
2. Crop farmers — Wabwire John
3. Livestock farmers — Obielo Francis
4. Fish farmer — Makokha Micah Balongo
5. Water User — Obibya Wycliffe
6. Herbalist — Mr. Okello Semu
7. Sand and Clay miners — Ojiambo Kennedy
8. Hunter — Makokha Mugabe

Masinya Parish

1. Craft makers — Ouma Bernard Mageero

2. Crop farmers Ochule Patrick
3. Livestock farmers Ocheno Alex
4. Fish farmer Ojanji Mulimo
5. Water User Pantaleo Pamba
6. Herbalist Tetelimo Barwa
7. Sand and Clay miners Magero Francis
8. Hunter Opio Haburi

DABANI SUB-COUNTY

Buyengo Parish

1. Craft makers Buruma Pascal
2. Crop farmers Lumonya Sam
3. Livestock farmers Okello Samson
4. Fish farmer Loyce Wanyama
5. Water User Mama Lumonya
6. Herbalist Namwaya
7. Sand and Clay miners Masaba Jackson
8. Hunter Mayende Francis

Nangwe Parish

1. Craft makers Wabwire Hannington
2. Crop farmers Peter Musana Okech
3. Livestock farmers Magero Alfred
4. Fish farmer Mangeni Herbert
5. Water User Margaret Ngolobe
6. Herbalist Kalim Musosi
7. Sand and Clay miners Onyango David
8. Hunter Shabana Juma Bakumba

LUMINO SUB-COUNTY

Majanji

9. Fishermen Juma Benson
10. Crop farmers Odwori Robert J.
11. Hunter Adembo Colonel
12. Herbalist Sebby Mutoha
13. Water User Christine Onyango
14. Craft makers Miss. Omaro Saidi
15. Livestock farmers Barasa George
16. Sand and Clay miners Opio Humphrey

Hashule

1. Fishermen Ojiambo Boniface
2. Crop farmers Ogara Milton
3. Hunter Okello Kennedy
4. Herbalist David Ouma
5. Water User Ouma Raymond

6. Craft makers Ojiambo Geoffrey
7. Livestock farmers Nyota Moses
8. Sand and Clay miners Goretti Awori

Dadira

1. Fishermen Okoch Stephen
2. Crop farmers Mangeni Charles
3. Hunter Ojiambo Christopher
4. Herbalist Jane Balongo
5. Water User Wandera Musungu
6. Craft makers Wandera Samuel
7. Livestock farmers Onyango Samuel
8. Sand and Clay miners Grace N. Alex

BUHEHE SUB-COUNTY

Buhehe

1. Fishermen Alex Makokha Ayoyi
2. Crop farmers Wanyama John Michael
3. Hunter Osinya Godfrey
4. Herbalist Bwire James
5. Water User Rev. Geoffrey
6. Craft makers Harriet Wandera
7. Livestock farmers Barasa Bernard
8. Sand and Clay miners Okumbe Hum Mackay

Bulwenge

1. Fishermen Oguto John
2. Crop farmers Ojiambo Gilbert
3. Hunter Nadebu Peter
4. Herbalist Barasa Harrison
5. Water User Wnyama Living Ondwongi
6. Craft makers Idah Wadundwe
7. Livestock farmers Ojiambo Moses
8. Sand and Clay miners Wanyama Nicholas

Technical Team

1. WMD Headquarters
2. WMD Regional Coordinator
3. NTEAP
4. Consultant
5. District Environment Officer
6. District Physical Planner
7. District Production Officer
8. District Fisheries Officer
9. Two Sub-county Level Extension Officer (CDA and one other)

10. One Faith Based Organisation
11. Host Sub-county Chief
12. Host Chairperson LCIII
13. Host Secretary for Production and Environment
14. One NTEAP supported NGO/ CBO

ANNEX 2: MANAGAMENT PLANNING TEAM FOR SIO-SITEKO WETLAND, KENYA SIDE

TOWNSHIP DIVISION

NAME	REPRESENTATION
Paskalia Wanjala	Handcraft (Assistant Coordinator
Roseline Khadudu	Horticulture
Florence Edede	Water and sanitation
Paul Were	Transport/communication
Bebedict Omondi	Fishermen
George Wanyama	Irrigation
Fredrick Odero Okayo	Agroforestry
Venzwa Okomu	Livestock

MATAYOS DIVISION NANGOMA LOCATION

Richard Okumu Obayi	Grazer
Josephine Taaka Makio	Water user
Silvester Oduori Mbaja	Traditional salt maker
Kenneth Banyako	Papyrus harvester
John Wandera Makokha	Horticulture (coordinator)
Carolyne Odunga	Sugarcane farmer
Vincent Osebe	Brick maker

MATAYOS DIVISION BUKHAYO WEST LOCATION

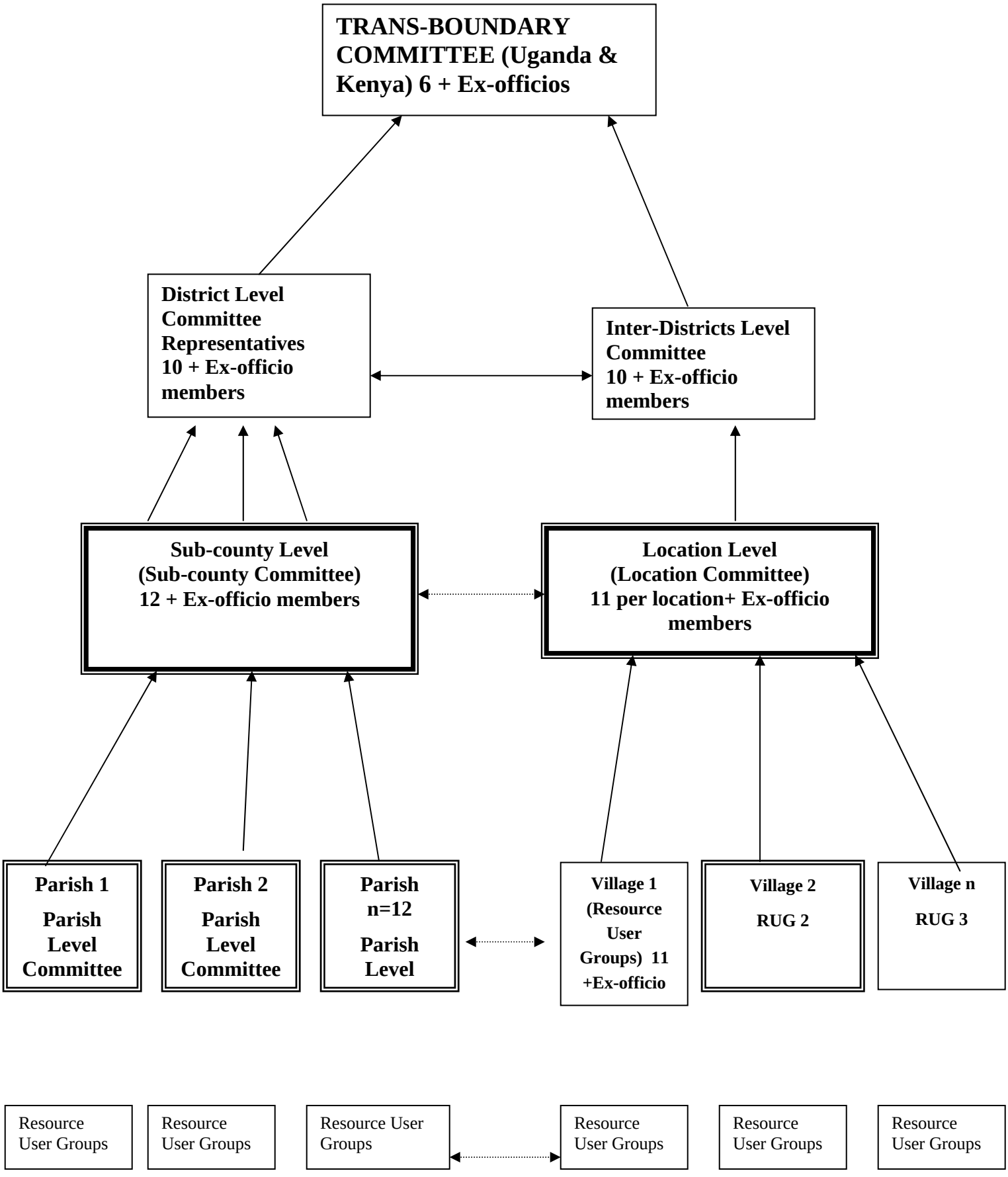
Consolata Ojiambo	Water user
Sylvester Odunga	Horticulture
Stephen Namunika	Farmer
Emmanuel Makokha	Hunter
Donald Nagolo	Sand harvester
Margret wabwire	Water user

Desma Makokha	Grazer
Alfred Sirengo	Mat maker

ROLES AND RESPONSIBILITIES OF IMPLEMENTING PARTNERS AND COLLABORATORS

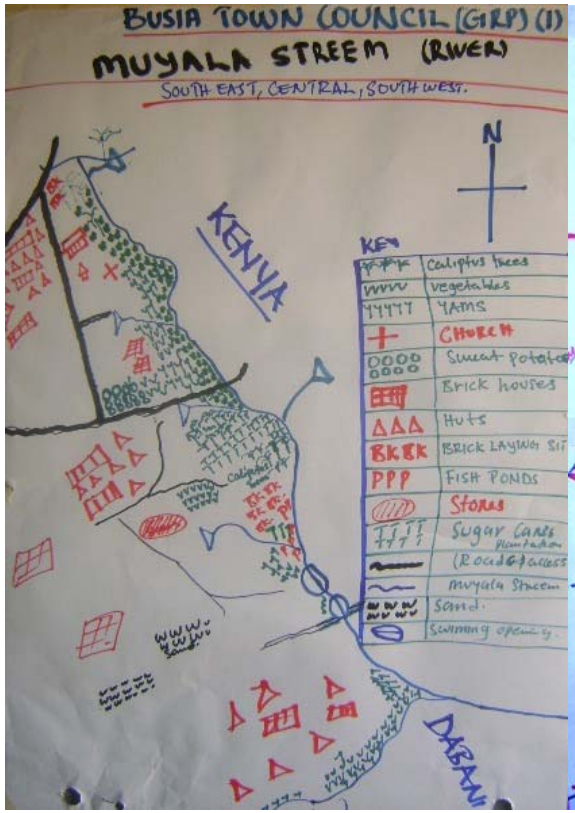
INSTITUTION	ROLE
1) Cross-border/ Transboundary/ Regional Level (KE & Ug) • Regional and International Inter-govt. bodies • Convener for the Committee	• Monitoring (M & E) • Resource mobilisation • Technical back stopping • Coordination - WMD (U), KWS (KE), NEMA (U & KE)
2) Central Government Level: • WMD (U), KWS (KE), NEMA (U & KE)	• Regular supervision and monitoring (M & E) • Resource mobilisation • Technical back stopping
3) District level • Busia (U & KE) , Samia (KE)	• Regular supervision and monitoring (M & E) • Resource mobilization • Mobilizing local communities through sub-county • Linkage to other sectors, partners and collaborators • Technical back stopping • Integration of wetland issues in DDP & other frameworks
4) Sub-county/ Location level	• Day to day supervision of implementation • Implementing some parts of the CWMP at sub-county level • Monitoring and Evaluation (M & E) – data collection and monitoring performance • Resource mobilisation and accountability • Community mobilization • Integration of wetland issues in CDF (KE) and Sub-county plans (Ug) & other frameworks
5) Parish level Parish/Ward Wetland Management Plan Implementation Committee	• Day to day supervision of CWMP implementation • Supervision of CWMP activities • Monitoring and Evaluation (M & E) – data collection and monitoring performance • Resource mobilisation and accountability

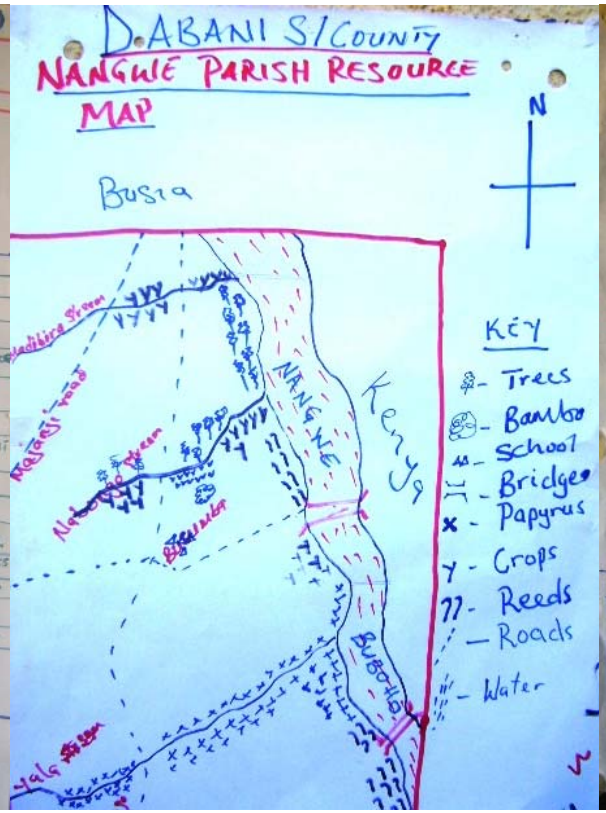
	• Community mobilisation
6) CBOs and NGOs	• Backstopping PMPIC efforts
7) Local communities	• Implementation and report to Parish/ Ward committees

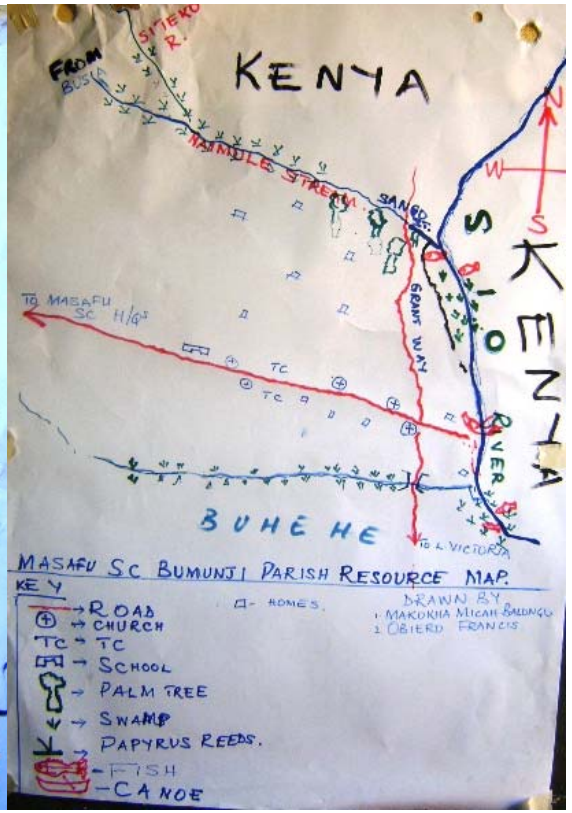

TRANS-BOUNDARY COMMITTEE (Uganda & Kenya) 6 + Ex-officios
District Level Committee Representatives 10 + Ex-officio members
Inter-Districts Level Committee 10 + Ex-officio members
Sub-county Level (Sub-county Committee) 12 + Ex-officio members
Location Level (Location Committee) 11 per location+ Ex-officio members
Parish 1 Parish Level Committee
Parish 2 Parish Level Committee
Parish n=12 Parish Level
Village 1 (Resource User Groups) 11 +Ex-officio
Village 2 RUG 2
Village n RUG 3
Resource User Groups
Resource User Groups
Resource User Groups
Resource User Groups
Resource User Groups
Resource User Groups

1. Resource user group representatives per parish
2. Women representative (1 person)
3. Youth representative (1 person)
4. PWD Representatives
5. Ex-officials – Sub-county/ Location chiefs, Community Development Officers, District Environment officer, and an Extension officer.

ANNEX 4: SAMPLE OF LOCALLY DRAWN RESOURCE MAPS







PLATES SHOWING SIO-SITEKO WETLAND SYSTEM BENEFITS AND PLANNING PROCESS

Plate 1: Some benefits from Sio-Siteko wetland system

Water for domestic Use

Water for Livestock use

Common fish from Sio-Siteko wetlands

Aesthetic Beauty at the Sangalo Beach

Use of wetlands for Transport

Income generation from wetland crafts

Plate 2: Community participation in the management planning process

Initial planning by local stakeholders

Initial Planning by Biodiversity Expert

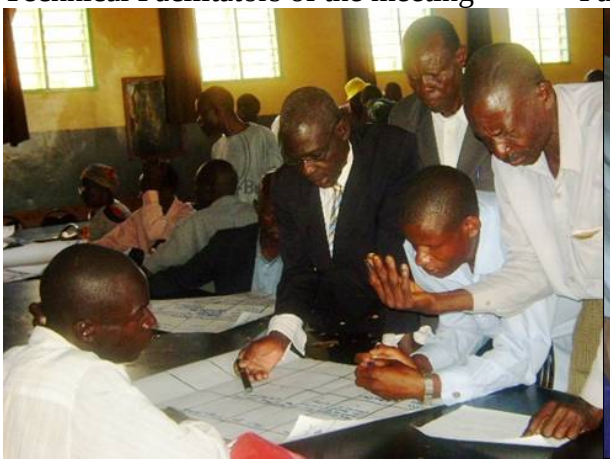
Biodiversity Experts at work

Local informant transports Specialist

Plate 2: Harmonisation of issues from Uganda and Kenya

Technical Facilitators of the meeting

Participants from Uganda and Kenya



Stakeholders harmonize ideas

Planning Team consultations

Dialogue among the stakeholders

Plate 3: Involvement of Provincial and District Leadership in the planning process

District Chairman Busia (Uganda)

Resident District Commissioner, (Uganda)

Provincial Commissioner (Kenya)

District Commissioner (Kenya)

Secretary for Environment (Uganda)

Consultations between Facilitators

Plate 4: Gender consideration and community facilitation

Dialogue among stakeholders

Emotions on wetland problems and conflicts