



SIO-SITEKO TRANSBOUNDARY WETLAND MANAGEMENT PLAN



On behalf of:



of the Federal Republic of Germany



TRANSBOUNDARY WETLAND MANAGEMENT PLAN FOR THE SIO-SITEKO WETLAND BETWEEN THE REPUBLIC OF KENYA AND THE REPUBLIC OF UGANDA

2020 - 2030



On behalf of:



Federal Ministry
for the Environment, Nature Conservation
and Nuclear Safety

of the Federal Republic of Germany



June 2020

Foreword

With a population of four million, the Sio-Malaba-Malakisi (SMM) sub-basin between Kenya and Uganda consists of a variety of ecosystems including wetlands, rivers, forests, game reserves and national parks which offer multiple opportunities for socio-economic development in the region. Agriculture is the major but poorly practiced subsistent livelihood. As demonstrated in this Transboundary Wetland Management Plan, sand harvesting, charcoal burning, wetlands encroachment and other unsustainable land use activities have resulted in relentless landscape degradation and loss of water quality.

Reflecting on the opportunities for human and economic development, and to curtail these poor practices, the Governments of Uganda and Kenya recognise that common action is needed on both sides of the border to safeguard the ecosystem services on which their livelihoods depend. The countries have through various instruments agreed to utilise the shared sub-basin waters in an equitable and reasonable manner with a view to attaining optimal and sustainable utilisation, while ensuring environmental safeguards, protection and conservation. This includes the Inter-Governmental Authority on Development (IGAD) Regional Water Policy and its provision on sustainable river basin developments in the region including the SMM Basin, to which both Kenya and Uganda signed on June 4, 2015. Further, the two countries agreed to implement joint investment programmes for socio-economic development, enhancing environmental sustainability and reducing environmental risks by integrating climate change adaptation and mitigation.

In support of the MoU, Nile Equatorial Subsidiary Action Program (NELSAP) together with the Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH (GIZ) embarked on a process to promote effective conservation of a specific but crucial component of the sub basin- the transboundary Sio-Siteko wetlands. This is because the wetlands, which form transition zones between land and water, create a unique ecosystem characterised by hydrology, soils and vegetation, providing rich habitat and breeding grounds for fish, amphibians, and migratory birds. This wetland helps to offset the human effect on rivers by cleansing the surrounding ecosystems and provide natural buffers to absorb water during rainy seasons, thus preventing flooding, while reducing impacts of drought through the steady release of water in dry seasons, to help keep river levels normal while filtering and purifying the surface water. To support implementation of conservation and management measures for the Sio-Siteko wetland, a diagnostic analysis to identify the ecological, social and economic impacts in order to develop wetland management plans for environmental conservation while creating sustainable livelihood incentives to ensure communities value, appreciate and thus protect their wetlands has been undertaken.

This process fulfils Uganda and Kenya commitments to the 2015 Paris Agreement, that states

Parties recognise that adaptation is a global challenge faced by all with local, subnational, national, regional and international dimensions, and that it is a key component of and makes a contribution to the long-term global response to climate change to protect people, livelihoods and ecosystems, taking into account the urgent and immediate needs of those that are particularly vulnerable to the adverse effects of climate change.... adaptation action should follow a country-driven, gender-responsive, participatory and fully transparent approach, taking into consideration vulnerable groups, communities and ecosystems, and should be based on and guided by the best available science and,

as appropriate, traditional knowledge, knowledge of indigenous peoples and local knowledge systems, with a view to integrating adaptation into relevant socioeconomic and environmental policies and actions, where appropriate.”

This Transboundary Wetland Management Plan is thus built on the mutual agreements and international commitments of both countries, and engages national departments, local authorities and community organs directly in preparation and execution of the planned development and conservation actions in the Sio-Siteko Wetland landscape.

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As this process was highly consultative, valuable contributions were made by key stakeholders of the Sio-Siteko wetland landscape during field campaigns and consultative stakeholder workshops. These include wetland-dependent communities, National, District and County government officials and Non-Governmental Organisations. Together with the Nile Technical Advisory Committees (Nile-TACs) and country representatives from Kenya and Uganda, these stakeholders also reviewed and validated the plan document, ensuring inputs from the participatory workshops were incorporated in the plan document.

The implementation team benefited from inputs provided by Jackson Twinomujuni, Commissioner, Transboundary Water Resources Management (Uganda), Lucy Iyango, Assistant Commissioner, Wetlands (Uganda), Wycliffe Tumwebaze, Senior Water Officer (Uganda), George Wamunga, Senior Wetlands Officer (Uganda), Director Gladys Wekesa, Director Transboundary Water Resources Department, Ministry of Water, Irrigation and Sanitation (Kenya), Andrew M. Kinyua, Deputy Director, Water Quality Monitoring Ministry of Water, Irrigation and Sanitation (Kenya), Rose Ogara Fukwo, Regional Manager, Water Resources Authority (Kenya), Stephen Manegene, Director Wildlife, Ministry of Tourism and Wildlife (Kenya) Fred Mwangi, Regional Water Expert (IGAD), Dr. Malte Grossman, Head of Projects (GIZ), Juan Carlos Sanchez, Advisor (GIZ), Andy Maro Tola, Program Officer – Water Resources (NELSAP) and Sadiki Lotha Laisser, Regional Project Officer (NELSAP).

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Executive Summary

This Transboundary Wetland Management Plan (TWMP) has been developed in line with the *Ramsar resolution VIII.14: New Guidelines for Management Planning for Ramsar Sites and Other Wetlands*. It supports the establishment of management mechanisms that build upon and strengthen those already in place at local, national and transboundary levels in the Sio-Siteko wetland landscape. The TWMP planning process was both participatory and interactive. This comprised screening and scoping, consultative reviews, field surveys, public consultations and workshops which involved key stakeholders from the local national and regional levels including local community members, civil society organisations, district and national governments and regional institutions. This TWMP will be implemented over a period of ten years (2020 – 2030).

The overall objective of the Sio-Siteko TWMP is ‘to restore the wetland and ensure retention of ecosystem services for the benefit of people.’

The Strategic Objectives are:

- To promote conservation of the Sio-Siteko wetland ecosystem and its catchment
- To promote and support sustainable sources of livelihoods for the communities’ dependent on the Sio-Siteko transboundary wetland
- To support the establishment and strengthening of governance structures for the management of the Sio-Siteko transboundary wetland

A successful implementation strategy for community-based wetland management plan requires adequate representation and involvement of grassroots resource users (primary) and other stakeholders in a co-management approach. During the consultative engagement workshops, participants from both Kenya and Uganda provided their accepted management structures that would yield sustainable results

During implementation of the TWMP, changes are expected in the context of the environment in which the stakeholders operate. Therefore, there is a need to develop an adaptive management framework that ensures the TWMP maintains relevance through a cycle of periodic reviews of monitoring and adaptation.

The monitoring and evaluation framework will be utilised to build an information base and identify critical information gaps. This necessitates meaningful dialogue and engagement with all stakeholders. An evaluation of the effectiveness and efficiency of the TWMP should take place on a five-year cycle. This evaluation should also include a review of the strategic objectives. A mid-term review will be undertaken after two and a half years.

Name

Chairperson, Nile-TAC

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Acronyms and Abbreviations

AEWA	Agreement on the Conservation of African-Eurasian Migratory Waterbirds
amsl	Above Mean Sea Level
BMUB	German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety
BUDA	Busia – Dabani Association
BUMASI	Buhehe – Masinya Association
CBD	Convention on Biological Diversity
CBO	Community Based Organisation
CBWMP	Community Based Wetland Management Plan
CEPA	Communication, Education and Participation and Awareness
CFM	Collaborative Forest Management
CFR	Central Forest Reserve
CIDP	County Integrated Development Plan
CITES	Convention on International Trade in Endangered Species of Wild Flora and Fauna
CMIP	Coupled Model Intercomparison Project
CMS	Conservation of Migratory Species
DPSIR	Drivers – Pressure – State – Impact – Response
EAC	East African Community
EIA	Environmental Impact Assessment
EMCA	Environment Management and Coordination Act
GEF	Global Environment Facility
GIZ	German Development Cooperation
GoK	Government of Kenya
GoU	Government of Uganda
Ha	Hectares
IBA	Important Bird Area
IGA	Income Generating Activity
IGAD	Inter-Governmental Authority on Development
IPP	Investment Project Plan
ITCZ	Inter-Tropical Convergence Zone
IUCN	International Union for Conservation of Nature
IWRM	Integrated Water Resource Management
KFS	Kenya Forest Service
KWS	Kenya Wildlife Service
KWTA	Kenya Water Towers Agency
LC	Least Concern
LUMA	Lumino - Majanji Association
LVEMP	Lake Victoria Environment Management Project
MAAIF	Ministry of Agriculture Animal Industry and Fisheries
MEA	Multilateral Environmental Agreement
MoU	Memorandum of Understanding

MWE	Ministry of Water and Environment
MWS&I	Ministry of Water, Sanitation and Irrigation
NBI	Nile Basin Initiative
NDCs	Nationally Determined Contributions
NELSAP	Nile Equatorial Lakes Subsidiary Action Program
NEMA	National Environment Management Authority
NEMC	National Environmental Management Council
NFA	National Forestry Authority
Nile-TAC	The Nile Technical Advisory Committee
Nile-COM	The Nile Council of Ministers
Nile-SEC	The Nile Basin Initiative Secretariat
NGO	Non-Governmental Organisation
NLC	National Land Commission
RAMCEA	Ramsar Centre for Eastern Africa
SDGs	Sustainable Development Goals
SMM	Sio-Malaba-Malakisi
SSWUA	Sio-Siteko Wetland Users Association
TEEB	The Economics of Ecosystems and Biodiversity
TWMP	Transboundary Wetland Management Plan
UNDP	United Nations Development Programme
UPDF	Uganda Peoples Defence Force
UNHCR	United Nations High Commission for Refugees
UNICEF	United Nations International Children's Fund
URA	Uganda Revenue Authority
USAID	United States Agency for International Development
UWA	Uganda Wildlife Authority
WID	Wetlands Inspection Division
WMD	Wetlands Management Department
WRA	Water Resources Authority
WRUA	Water Resource User Association
Yr	Year

SECTION ONE: INTRODUCTION

1.1 Background

The Nile Basin is one of the world's major river basins. It covers an area of 3,349,000 Km², traversing eleven (11) countries including Burundi, Democratic Republic of the Congo, Egypt, Eritrea, Ethiopia, Kenya, Rwanda, South Sudan, Sudan, Tanzania and Uganda. The Basin is endowed with rich and diverse wetlands crucial for the provision of multiple ecosystem goods and services, beneficial to its citizens, economies and associated ecosystems. Despite the numerous benefits offered by these wetlands, they continue to be heavily fragmented, degraded and reclaimed due to activities such as encroachment for settlement, conversion into agricultural lands owing to population pressure, grey infrastructural development and weak implementation of policies protecting wetlands. For wetlands that are transboundary¹ in nature, the above challenges are exacerbated, which compromises their health and integrity. Recognising the need to achieving long-term benefits, regional economic integration, peace and security from the Nile Basin, global, regional and national attention has been drawn towards the riparian countries in ensuring inter-country cooperation and sustainable and equitable utilisation of the resource.

The Nile Basin Initiative (NBI) is advancing conservation of Nile Basin transboundary wetlands of regional significance to enable state parties to meet their obligations both under the Ramsar Convention and the Convention on Biological Diversity (CBD). The objective of the wetlands programme is to develop the capacities of the NBI and its member states to sustainably manage wetlands of transboundary significance based on an ecosystem management approach. This programme is funded by the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMUB) under the International Climate Initiative and implemented by the Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH (GIZ). To maintain their biological diversity and productivity, and to permit the wise use of their resources, there is need to develop and implement focused management actions, and where they exist, conduct regular reviews to address emerging challenges and issues in line with the changing environmental context of the wider wetland landscape.

This document provides the Transboundary Wetland Management Plan (TWMP) for the Sio-Siteko wetland in the border of Kenya and Uganda. It details a consensus strategy and common framework to support stakeholders of the wetland landscape in their planning towards wise-use of wetland resources and achieving long-term sustainable development by introducing a concept for balancing growing demands with limited resources. This TWMP was developed based on the Ramsar Guidelines for management planning for Ramsar sites and other wetlands. It takes cognisance and harmonises existing conservation plans and instruments such as the *'Sio-Siteko Community Based Wetland Management Plan (NBI, 2009)*, *Busia County Integrated Development Plan (2018 – 2022)*, *The Economics of Ecosystems and Biodiversity (TEEB) for Sio Siteko (NBI 2019a)* and the *Sio-Siteko Wetland Monograph, (NBI, 2020)*. Moreover, since the wetland area is inextricably linked to the wider basin and the associated activities, the plan also mainstreams wetland management into river basin planning processes and cross-border catchment

¹ Wetlands that cross the political boundaries of two or more states (Beyene, Z. & Wadley, I., 2004)

planning process of smaller sub-basins by integrating the management plan into existing basin-wide structures for purposes of national and regional harmonisation. This includes those identified by the Sio-Malaba-Malakisi (SMM) River Basin Management joint programming.

1.2 Need for Transboundary Wetland Management Planning

Several factors define the need for a TWMP for the Sio-Siteko wetland landscape especially in light of the changing climate and its effects on these ecosystems. Firstly, the landscape consists of varied habitat sub-types with rich ecosystems inhabited by communities whose livelihoods depend on its resources. The National Report on the implementation of Ramsar Convention on wetlands in Kenya submitted at COP 12 in 2015 identified Sio-Siteko as one of the four wetlands of which a national strategy and priorities has been established for the further designation as a wetland of 'international importance' using the Strategic Framework for the Ramsar List. This is because of its ecological value and productivity, supporting many plants and animals during the seasonal climate and flooding/drying regime. As an Important Bird Area (IBA), it provides habitat and breeding ground for about five hundred and twenty (520) diverse bird populations and many other endemic plant, mammal, amphibian, reptile, fish and insect species. There exists direct inter-connection between human well-being and wetland ecosystems through both material (anthropogenic) and non-material values.

This wetland landscape is of great socio-cultural significance with strong attachment of the people through cultural heritage such as circumcision and cleansing, spiritual values such as baptisms, sense of place, quality and recreation (potential for tourism development is acknowledged by stakeholders from both Kenya and Uganda).

Thirdly, the Sio-Siteko wetland landscape is endowed with abundant natural resources including forests, fisheries and aquatic resources, grassland and shrubland, agricultural resources, water and wildlife resources. These resources present tremendous potential for social economic development. Agriculture is the major socio-economic activity in the catchment employing about 85% of the people in the basin. The wetland however faces several threats and challenges which have resulted into continued degradation of the important habitat for biodiversity. The rivers not only include a complexity of problems related to upstream (Kenya) and downstream (Uganda) conditions but also a network of river threats along the international border (World Bank, 2009).

Additionally, past and ongoing interventions in the wetland landscape point towards the need for a common approach and joint planning in this transboundary wetland. For example, the Inter-Governmental Authority on Development (IGAD) Regional Water Policy and its provision on sustainable river basin developments in the region including the SMM Basin, to which both Kenya and Uganda signed on June 4, 2015 calls for the design and implementation of sub-basin policies, plans, programs, and projects related to the use and protection of the basin's resources contributing to transboundary water governance (IGAD, 2017). To this end, a Memorandum of Understanding (MoU) under the framework of the Nile Basin Initiative is under discussion. Moreover, lessons from the Lake Victoria Environmental Management Project Phase I and II (LVEMP I & II 2010) and the Lake Victoria Basin Commission studies (LVBC, 2011) make

reference to the need for upscaling pilot project activities carried out in the wetland landscape to demonstrate wise-use. Recommendations also include the establishment and capacity strengthening of transboundary wetland institutional frameworks which will contribute to enhanced governance of shared resources in the region.

National laws such as the Environment Management and Coordination (Conservation and Management of Wetlands) Amendment Regulations, 2018 provides for the development of Integrated Wetlands Management Plans to prevent and control further degradation of wetlands in Kenya.

Given the immense importance and the challenges in the wetland landscape, management planning is important to maximise the benefits derived from ecosystem goods and services and avoid resource use conflicts. This plan recognises the existence of the outdated Sio-Siteko Community Based Wetland Management Plan 2009 – 2019 (NBI, 2009) which was the first plan for a transboundary wetland in the region. Although well-developed, the plan was not effectively put into action. Lessons from the implementation challenges have informed development of the current plan to ensure it defines strategic, realistic and achievable goals.

This plan therefore guides the utilisation of resources by specifying activities that should or should not be carried out or regulated and provides useful information on the wetlands hydrology, ecosystems and biodiversity together with their socio economic and cultural importance. It spells out management actions needed to address existing and potential threats, as well as roles of stakeholders at the regional, national and local levels. Successful Implementation of the plan will not only lead to the effective management of the ecosystem and improved livelihoods of the Sio-Siteko communities, but also contribute to the two country's national, regional and international obligations on protection and conservation of fragile ecosystems.

1.3 Plan development approach

The development of the Sio-Siteko Transboundary Wetland Management Plan is built on three other processes i.e.

1. **Wetland Monograph:** Established the physical context, biodiversity and ecosystems, policies and institutions, socio-economics and livelihoods, and social dimensions where key development aspects that inform wetland management planning will be addressed (NBI, 2020).
2. **Investment Project Plan (IPP):** Many environmental management plans often have excellent situation analysis including causes and threats to ecosystems from human, environmental or climate issues, but fail to clarify the economic value or propose sources of funding. IPPs expound on the economic benefits and detail the financial outlays and economic benefits that can be derived from the implementation of management actions. These are presented as investment packages to attract public and private financing.
3. **Early Investment Projects:** In the last three decades, many environmental studies have been undertaken within the Nile Basin, mobilising stakeholders and communities. To ensure there is sustained interest and demonstrate the potential of the IPP portfolios, the project with local

stakeholders and communities is preparing readily implementable priority actions that promote ecosystem conservation through sustainable livelihoods.

The methodology used in the development of the Sio-Siteko Transboundary Wetland Management Plan is derived from the *Ramsar resolution VIII.14: New Guidelines for Management Planning for Ramsar Sites and Other Wetlands*. The planning process began with an inception phase which laid the basis for the subsequent assessments on stakeholders, resources and socio-economic, policies and institutional frameworks and the environmental context. The assessment phase was followed by an analysis and design phase in which the different interventions were identified and designed. The final step included the development of the TWMP

Plan development adopted an inclusive process that engaged key stakeholders as far as possible, including national and local government, local communities, and civil society organisations in the two countries. Resource users, including farmers, papyrus harvesters, transporters and livestock keepers, were also involved.

Several stakeholder workshops held in April, July and November 2019 aimed at presenting an overview of the wetland landscape, major issues, problems, trends and opportunities identified during the assessment phase, prioritising the issues which need to be addressed by the TWMP and development of a joint vision, planning objectives, management actions and a monitoring framework.

A summary of this approach is provided in Figure 1 and the methodology of each step of the process is described in detail in section 5 of this plan.

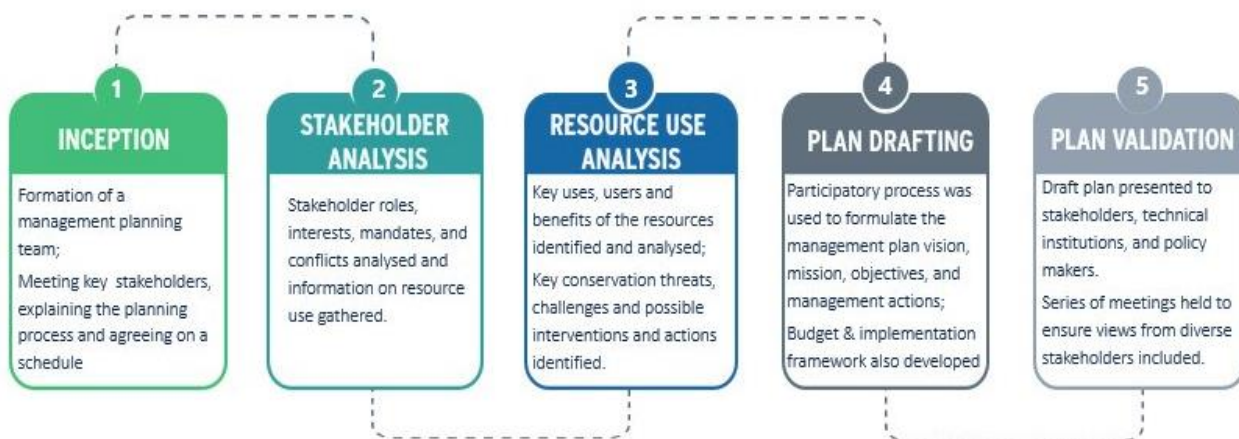


Figure 1: Summary of plan development approach (Wetlands International 2019b)

1.4 Outline of the Transboundary Wetland Management Plan

This Transboundary Wetland Management Plan is divided into eight sections. **Section 1** gives the introduction, background and outline of the plan. It also summarises a justification for the TWMP.

Section 2 describes the main wetland landscape characteristics including its location, biophysical features, climate conditions and socio-economic context. It also details the ecosystem values and services of the wetland. The findings of this section provide the biophysical information required to understand the functioning and values of the wetland landscape.

Section 3 provides an overview of the policy, legal and institutional framework on wetland conservation and management in the transboundary wetland landscape. It specifies the relevant policies, laws and strategies in Kenya, Uganda and the region, and how different actors are involved in wetland conservation and management.

Section 4 highlights the key issues, threats and challenges facing the wetland landscape.

Section 5 goes further to link the trends and key issues identified in broad management actions. These are detailed in a management planning framework. The joint vision of the TWMP is defined providing the basis for the development of management objectives for the wetland landscape.

Section 6 draws the priority interventions for implementation providing an action plan agreed by the stakeholders. These interventions are organised under three (3) thematic areas: 1) ecosystem protection and restoration, 2) livelihood improvement and 3) institutional strengthening. Actions to enhance partnerships and communication are integrated into the three thematic areas as relevant. The financial costs of implementing the plan are also provided in this section.

Section 7 guides the roles and responsibilities for the successful implementation of the strategy. It details the management structures agreed upon by stakeholders from Kenya and Uganda to facilitate a co-management approach for dialogue, conflict resolution and implementation.

Section 8 details the arrangements to monitor and evaluate the efficiency with which the different components of the plan can be assessed and improvements initiated.



SECTION TWO: STATUS OF THE SIO-SITEKO WETLAND LANDSCAPE

2.1 Geographical Location

The Sio-Siteko wetland landscape is a transboundary wetland system located northeast of Lake Victoria and encompasses the lower catchment of River Sio, crossing the boundary of Kenya and Uganda and consists of several interconnected secondary and tertiary wetland systems (Figure 2). The total catchment of Sio River, including a 200 metres buffer at the shoreline of Lake Victoria are defined as the boundary of the Sio - Siteko wetland system plan area. It lies between latitude 0.47 - 0.21 °N and longitude 33.98 - 34.20 °E and has an area of approximately 415 square kilometres. In the dry season, flooding is limited to the stream channels, but during and after the long rains between March and May, the wide floodplains of the River Sio and its tributaries are submerged.

Administratively, the wetland is located in six sub-counties (Buhehe, Busia TC, Dabani, Lumino, Majanji and Masinya) covering an area of 182 square kilometres in Busia District of Uganda, and four sub-counties (Butula, Funyula, Matayos and Nambale) covering an area of 233 square kilometres in Busia County, Kenya (NBI, 2020). This wetland is a complex ecosystem with different unique habitats supporting a wide range of biodiversity. It also supports communities and their livelihoods in and around the wetland area.

A full description of the wetland landscape can be found in the Sio-Siteko Wetland Monograph (NBI, 2020), which should be read in conjunction with this plan.

2.2 Biophysical Context

2.2.1 Landscape

The boundaries of the Sio-Siteko wetland landscape are consistent with the boundaries of the study area of the previous community wetland management plan (NBI, 2009) and are based on a combination of topography and the road network. The north-eastern boundary follows the paved road between Busia and Bumala. The other boundaries are determined by the topography, following the water divide. In the southeast, the boundary extends one kilometre into the Lake Victoria to account for seasonal changes in the shoreline and more long-term effects of erosion and sedimentation.

SIO - SITEKO WETLANDS

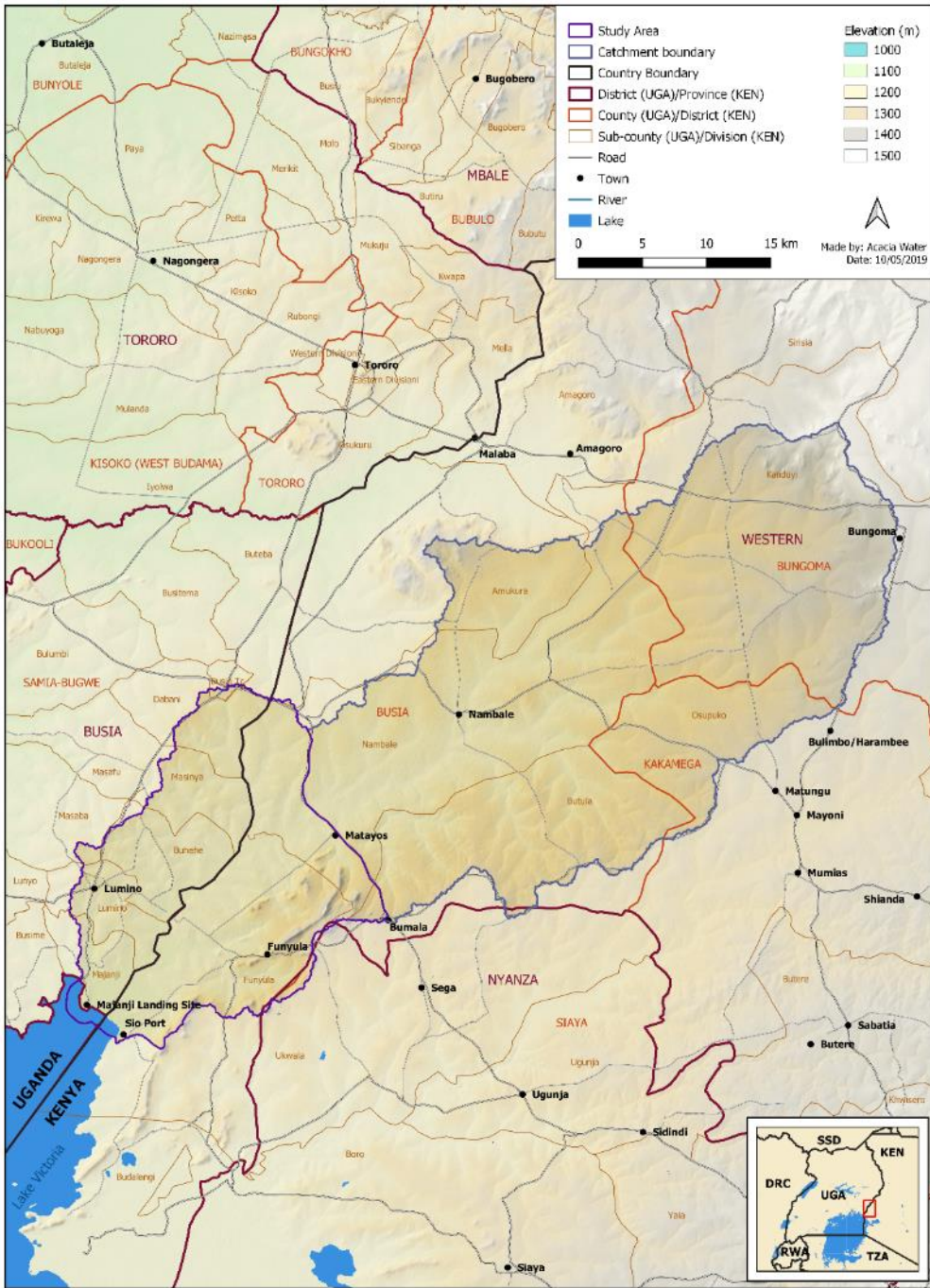


Figure 2: Location and administrative boundaries of the Sio-Siteko Wetland landscape (NBI, 2020)

2.2.2 Topography

The basin of the River Sio is located between 1,135 to 1,500 metres above mean sea level (amsl), ranging from the Lake Victoria shores (1,135 m amsl) up to the hills (1,500 m amsl) located on the foot of Mt Elgon slope. The altitude of the Sio-Siteko plan area is located mainly between 1,135 and 1,200 m amsl, with the only exception being several elongated North West – South East orientated rocky outcrops ranging up to 1,450 m amsl in the most southern part of the plan area.

In its upper reaches, the River Sio flows in narrow V-shaped valleys bordered by steep slopes. In its middle reaches the River Sio meanders in a narrow river bed within a much wider river valley that widens from tens to several hundreds of metres wide. The wide river valley indicates that conditions were much wetter in the past (Figure 3). There are many contributing streams, which are then joined together into the tributaries of the River Sio. This dendritic drainage pattern indicates that the underlying rocks are rather impervious. In its lower reaches, the river widens considerably in a wide floodplain, up to several kilometres wide, flooding an extensive area of flat land during the rainy season (NBI 2020).



Figure 3: Morphological pattern of the River Sio in its middle reaches, heavily meandering on the edges of the wide river valley, as seen downstream of the bridge of Busia – Bumala road (Source: Google Earth)

2.2.3 Geology and Soils

The geology of any particular land surface determines the drainage patterns of the area in addition to influencing land-use systems. Geologically, the Sio-Siteko wetland system is underlain by Precambrian crystalline basement rocks and Cenozoic volcanic rocks. Downstream is characterised by a variety of granites (Masaba biotite), while the mid-stream consists of gneisses (Tororo Suite and Mica) both part of the Kibale-Arua Supergroup (Precambrium Mobile/Orogenic Belt) (National Atlas of Kenya Geological Map). Higher upstream of the wetland landscape, pyroclastic and lahar-type alkaline/sodic volcanic rocks and associated carbonatite plugs and fenites are deposited by volcanic activity in the linear Elgon depression, which is part of the Elgon Complex (Geological Map of Uganda, 2014).

The soils on the higher parts of the wetland landscape are predominantly Ferralsols, while the lower parts closer to the river are characterised by Planosols and Leptosols. Ferralsols are defined by a fine-textured sub-surface layer of low silt to clay ration (FAO, 2015). They develop in highly weathered material and are associated with old geomorphic surfaces and high rainfall. They have a high content of iron oxides thus highly leached and low in nutrients limiting agricultural productivity. Regular application of fertilisers and lime are essential for sustainable agriculture (NBI, 2020). Ferralsols in Matayos and Nambale sub-counties (Kenya) and west of the sub-counties in Busia District, Uganda are thus largely used for shifting cultivation.

Planosols have a light-coloured silty or sandy surface horizon that overlies a more clayey subsoil with low permeability. These soils are typically found in seasonally waterlogged flatlands and develop in clayey alluvial and colluvial deposits (FAO, 2015). Planosols in their natural state support sparse grass vegetation, often with scattered shrubs and trees that have shallow root systems and can cope with temporary waterlogging. They are not very suitable for agriculture or wood production but can be used for extensive grazing as seen in Siteko, Majanji, Buduluku, Buyende and Bujwang'a areas (Wetlands International 2019a).

Leptosols are very shallow soils over hard rock and are unattractive soils for rainfed agriculture because of their inability to hold water (FAO, 2015). In Sio-Siteko, leptosols can be found along the southern edge of the River Sio basin in Butula and Funyula sub-counties on the Kenyan side. The wetland soils found near the River Sio and its tributaries are characterised by high soil fertility and moisture and thus widely used for agriculture. This has been observed as one of the main drivers of wetland encroachment in Sio-Siteko (Wetlands International 2019b). Due to unsustainable land use management, farmers leave their plots on the hills/slopes and go down in the wetland valley for new land, further enhancing the encroachment. This destruction of wetlands is especially severe during dry season and periods of drought. It is prevalent in Hadoda, Buyende, Bulolo (Kenya) and in Bwaya and Bwalira areas (Uganda) (Wetlands International 2019b).



Figure 4: L-R Wetland area converted into farmland (L) and typical red coloured ferrasols (R)

2.2.4 Hydrology

The Sio Siteko wetland landscape plays an important role in the hydrology of the catchment and in the ecosystem. The River Sio originates south of Mount Elgon near Bungoma, drains into the north eastern corner of Lake Victoria, and ultimately joins the Nile. The river is approximately 85km long and the catchment covers about 1400 square kilometres. In the upper part of the catchment, the river flows through steep v-shaped valleys. In the middle reaches, the topography is flatter and the river meanders through narrow floodplains and has a width of about eight metres. The river banks are still steep and three to four metres high. At the mouth of the river, the floodplains are wider and the river banks lower (Figure 5). The river is 10-12 metres wide where it enters the lake. While River Sio itself is perennial, some of its tributaries no longer run year-round.

Increased flow in the wet season frequently results in flooding of the areas near the river and its tributaries. Due to the wide floodplains surrounding the river channel, the flooding can extend hundreds of metres up to even a couple of kilometres wide. These floods can last two to three months, usually in the period March to May. However, according to The Economics of Ecosystems and Biodiversity (TEEB) study of Sio-Siteko (NBI, 2019) there are no records of past damages cost by flooding, except for the self-reported damage to crops by farmers.

Besides the River Sio, the main source of surface water is Lake Victoria. Lake Victoria is the largest tropical lake, with an area of nearly 70,000 km², with an average depth of about 40 metres (NEMA, 2009). However, water levels have varied considerably in the past due to sedimentation and changes in climate, with a sharp increase in the 60s, followed by steadily decreasing water level elevations. Up to date measurements of lake water levels show height variations of up more than two metres over the period 1992 - 2019 (USDA 2019). The water levels follow a seasonal pattern superimposed with interannual variability following a generally decreasing trend from 1992 - 2007 and an increasing trend between 2007 - 2019. This means that the water level in the wetlands of the lower reaches of the River Sio have similarly increased by about 2.5 metres since 2006. The changes in lake levels are primarily caused by changes in rainfall rather than changes in river flows (NBI 2020).



Figure 5: The River Sio near Bulwenge has steep banks several metres high and vegetation is limited to the edges of the river even in the dry season (L). Where the river enters Lake Victoria, the topography is flatter, and vegetation covers the river mouth

2.2.5 Climatic Conditions

The basin of the River Sio is located within a relatively humid equatorial climate zone, where the topography, prevailing winds and water bodies cause large differences in rainfall patterns. Average annual rainfall ranges from 1400 mm in the lower reaches to 1800 mm in the upper reaches of the basin. The rainfall pattern is typically bimodal, with the first rainy season extending from March to May and the second one from October to November. The high rainfall variability, both seasonal and spatial, makes the area vulnerable to both droughts and floods. Average daily temperature is around 28 °C, but varies with altitude, with lower temperatures in the upstream part of the catchment on the slopes of Mt Elgon, compared to low-lying Sio-Siteko study area (Climate Change Profile Uganda 2018).

In comparison of records over two 30-year periods, from 1951 to 1980 and from 1981 to 2010 the data overall indicate no clear changes in annual rainfall in Uganda and direct surroundings (Figure 6). Analyses identified a statistically significant increase in temperature at a rate of 0.5 °C per decade over the past 30 years, with an increase in the average number of both hot days and hot nights per year (Climate Service Centre Germany 2015).

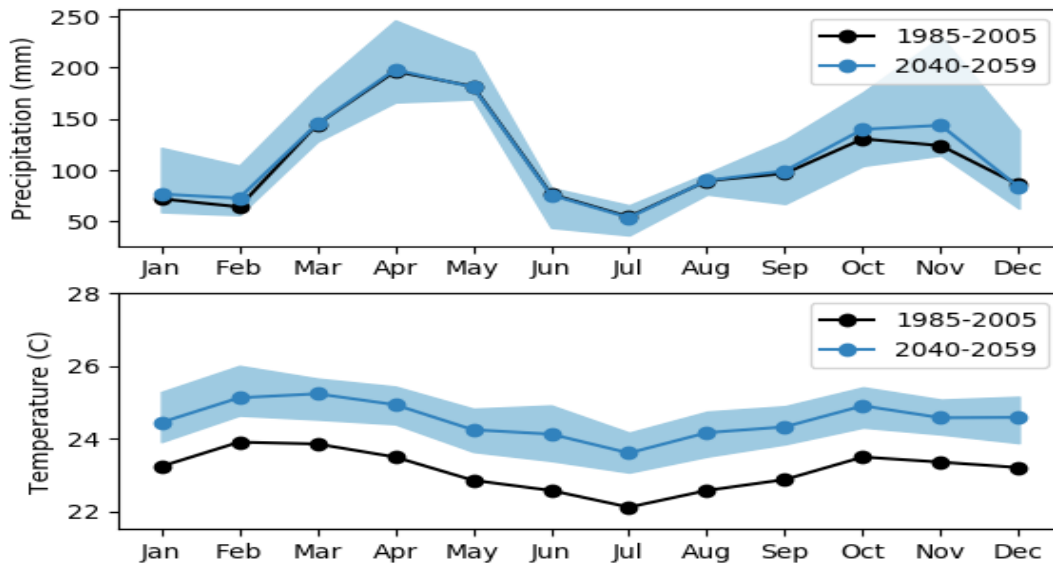


Figure 6: Historical monthly precipitation and average temperature for the period 1985 - 2005 and 2040 -2059. The blue line shows the model ensemble median, the shaded area shows the 10th – 90th percentiles of the model ensemble (n=35)

Future models project an increase in temperature by about 1.2°C to 2°C by 2050 (Taylor et al. 2012). These projections are in line with the observed warming trend. Due to this warming, there is a potential for an increase in the frequency and intensity of extreme events (e.g. heavy rainstorms, flooding, droughts). The percentage of rainfall coming in the form of heavy precipitation events is anticipated to further increase, due to continued warming, which would escalate the risk of disasters such as floods and landslides (NBI 2020).

2.2.6 Flora and Fauna

a Flora

The Sio-Siteko ecosystem is characterised by a continuous wetland habitat, with intertwined areas of open water, permanent swamps and seasonally flooded plains. An overview of plant species in the Sio Siteko is developed through a desk literature review and consultation of researchers, who have worked in the respective wetland areas (Namaganda, 2019).

The Sio-Siteko ecosystem has a rich flora of which *Cyperus papyrus*, *C. latifolius* and *Phragmites mauritianum* form the dominant species. In total 208 species were recorded in the Sio – Siteko wetland system out of which are 149 herb species (72%), 36 shrubs (17%) and 23 tree species (11%). A few of the identified species (e.g. *Ageratum conyzoides*, *Digitaria ciliaris*, and *Tagetes minuta*) are not typical wetland plants as they are escapes from the cultivations that extend to the edges of the wetland ecosystem. Others are simply weeds of disturbance from human activities like papyrus harvesting and bush burning. 59 out of

208 species, most of which are herbs (44%) are of use to the communities adjacent to the wetland in the form of medicine, firewood, food, construction and other uses (Namaganda, 2019).

The introduction of invasive species in this ecosystem has over time posed a serious threat to both plants and animals existing in these places. These invasive species compete with the native species for food and space, they also introduce disease which has led to the extinction of some species (NBI 2019a). The edge of the wetland is mainly covered by *Mimosa pudica* and *Lantana camara*. Although they reduce the overall species diversity due to their invasive ability although they serve as a source of feed to birds, especially the Nectariniidae family (Nalwanga, 2019).

Mimosa pudica (also called sensitive plant or touch-me-not) is a creeping annual or perennial flowering plant of the pea/legume family Fabaceae and Magnoliopsida taxon. It is mostly known for its curiosity value: the compound leaves fold inward and droop when touched or shaken, defending themselves from harm, and re-open moments later. It is not shade tolerant, and is primarily found on soils with low nutrient concentrations. The species can be weedy, particularly when fields are hand cultivated. Dry thickets may become a fire hazard. In addition, *Mimosa pudica* (Figure 7).

The invasive plant species *Lantana camara* has also been identified in agricultural areas. It spreads by becoming the dominant understorey shrub, crowding out other native species and reducing biodiversity. There are also secondary impacts, as mosquitoes which transmit malaria and tsetse flies shelter within its bushes. *Lantana camara* is known to be toxic to livestock. The active substances causing toxicity in grazing animals are pentacyclic triterpenoids, which result in liver damage and photosensitivity.

The common water hyacinth (*Pontederia crassipes*) has become an invasive plant species on Lake Victoria after it was introduced into the area in the 1980s. Water hyacinth was observed as mobile mats near the mouth of River Sio (Wetlands International 2019b). When not controlled, water hyacinth clog waterways and can cover lakes and ponds entirely; this dramatically affects water flow and blocks sunlight from reaching native aquatic plants which often die. The decay processes deplete dissolved oxygen in the water, often killing fish. The plants also create a prime habitat for mosquitoes, the classic vectors of diseases such as malaria, and a species of snail known to host a parasitic flatworm which causes schistosomiasis (snail fever). Excessive nutrients from overfeeding and waste cause eutrophication and enhances growth of algae and water hyacinth (NBI 2020). There is also appearance of congress grass (*Parthenium hysterophorus*) and Dodder weed (*Cuscuta japonica*) in the wetland landscape, which if not managed in a timely manner, can spread and cause havoc very quickly (Wetlands International 2019b).



Figure 7: L-R Flowering Mimosa Pudica and Water Hyacinth blocking water flow at the river mouth (Wetlands International)

***b* Fauna**

The wider Sio-Malaba-Malakisi catchment area is an Important Bird Area where over 520 species have been documented, including the endangered Grey Crowned crane (Figure 8), the globally threatened Papyrus Gonolek (*Laniarius mufumbiri*; IUCN Vulnerable), the Papyrus Yellow Warbler (*Chrolopetta gracillostris*) and Pallid Harrier (IUCN Near Threatened). According to the Avian Worlds Database 2018 at least 16 globally threatened species are present in Sio Siteko. Furthermore, four Lake Victoria biome-restricted species (Papyrus Canary, Carruthers’s Cisticola, Papyrus Gonolek and Red-Chested Sunbird) and three Papyrus endemic species (Papyrus Gonolek, Carruthers’s Cisticola and Papyrus Canary) were recorded. The most common species including the White-crowed Coucal (*Centropus superciliosus*), Common Bulbul (*Pycnonotus barbatus*), Blue-spotted Wood-Dove (*Turtur afer*), Red-chested Sunbird (*Cinnyris erythrocerca*) and Speckled Mousebird (*Colius striatus*) among others (Nalwanga 2019).

The Sio River is listed among proposed Key Biodiversity areas of Uganda (Plumptre et al. 2019) on account of its being an IUCN Freshwater Site and containing a critically endangered species. As a site, it has not received much scientific attention, therefore, the mammal species diversity for the wetland is not very well documented. Nonetheless, the Sio-Siteko area has 26 known species of mammals representing five (5) orders (Martin 2019). Sources lists some of the mammals that commonly occur in the area to include the Vervet monkey, Otter, Sitatunga, Hippopotamus and water mongoose. Species of conservation concern are also Bohor Reedbuck, Red river Hog, Leopard, African Spot-necked Otter and the spotted Hyena.

River Sio habitat has one of the highest amphibian diversity (13 spp) in the area. This is because the micro and macro habitats around the river were lesser disturbed and more diverse than those in surrounding areas. Examples of amphibian species reported are: the frogs *Afrixalus quadrivittatus*, *Hyperolius kivuensis* and *Ptychadena nilotica*, the *Common reed frog*, *Lake Victoria clawed frog* and *Lake Victoria toad*.

A total of seven reptile species belonging to three orders (Sauria, Crocodylia and Serpentes), seven families and seven genera are reported in the Sio-Siteko transboundary wetland system, with the records documented for Uganda side and some referred to in the Kenyan side. All reptile species in the area are

listed as of Least Concern (LC) globally and nationally. Examples of reptiles found in the area are the forest cobra (black cobra), Smooth chameleon, *Varanus niloticus* and the African rock python (Behangana 2019).

The Sio-Siteko wetland landscape is also an important habitat for fish, which are found mainly in Lake Victoria, rivers, and ponds. Before the 1980s, water quality in Lake Victoria was good and the diversity of species was high. Over 500 endemic haplochromine cichlid species and 36 other species, many of which were also endemic, were present in the lake (NBI, 2009). Their numbers were dramatically reduced after the introduction of the Nile perch, a predator species, although some species have started to recover. A total of thirty-seven (37) species representing eleven families (*Cichlidae*, *Mochokidae*, *Schilbeidae*, *Clariidae*, *Protopteridae*, *Cyprinidae*, *Characidae*, *Centropomidae*, *Mormyridae*, *Bagridae*, and *Mastercembalidae*) occur in the wetland system. Generally, tilapia and widely distributed cichlids species are the most common species (Masai et al 2001). *Oreochromis leucostictus*, *Tilapia zilli* Gervais and *Tilapia rendalli*, *Astatotilapia sp* *Ptychromis sp*, *Paralabidochromis sp* are rare and occur during the rainy season mainly in rivers and ponds. *Synodontis victoriae* Boulenger and *Synodontis afrofisheri* Hilgendorf belonging to the family Mochokidae are also available in this ecosystem, mainly in river mouths. *Schilbe intermedius* (Linnaeus), *Clarias gariepinus* Burchell, *Protopterus aethiopicus* Heckel occur in most of the fish landing station around the Sio-Siteko wetland ecosystems while *Bagrus docmac*, and the fresh water eel are rarely found particularly during dry season (Mwalo 1991). Where river Sio flows into Lake Victoria, Tilapia (*Oreochromis niloticus*), Nile Perch and Sardines are dominant (NBI, 2020).



Figure 8: Grey Crowned Crane observed in the wetland landscape (Wetlands International)

2.3 Social and Environmental Context

2.3.1 Human Demography

The Sio-Siteko wetland landscape lies predominantly in Busia district and Busia county in Uganda and Kenya respectively. Therefore, for purposes of identifying the demographic patterns in the wetland landscape, reference will be made to these two geographic locations which are the enumeration areas used to collect census data in Uganda and Kenya.

The total population of Sio Siteko wetland landscape in 2019 was calculated from census data (UN 2019; KNBS 2010; UBS 2014). Kenya, on the eastern side of the plan area, has a population of 53 million, and Uganda has a population of 44 million. Busia county in Kenya and Busia district in Uganda have 1.0 million and 0.38 million respectively. Within the project area, about 180,000 people live on the Kenya side and 93,000 on the Ugandan side, for a total of 273,000 people (NBI, 2020).

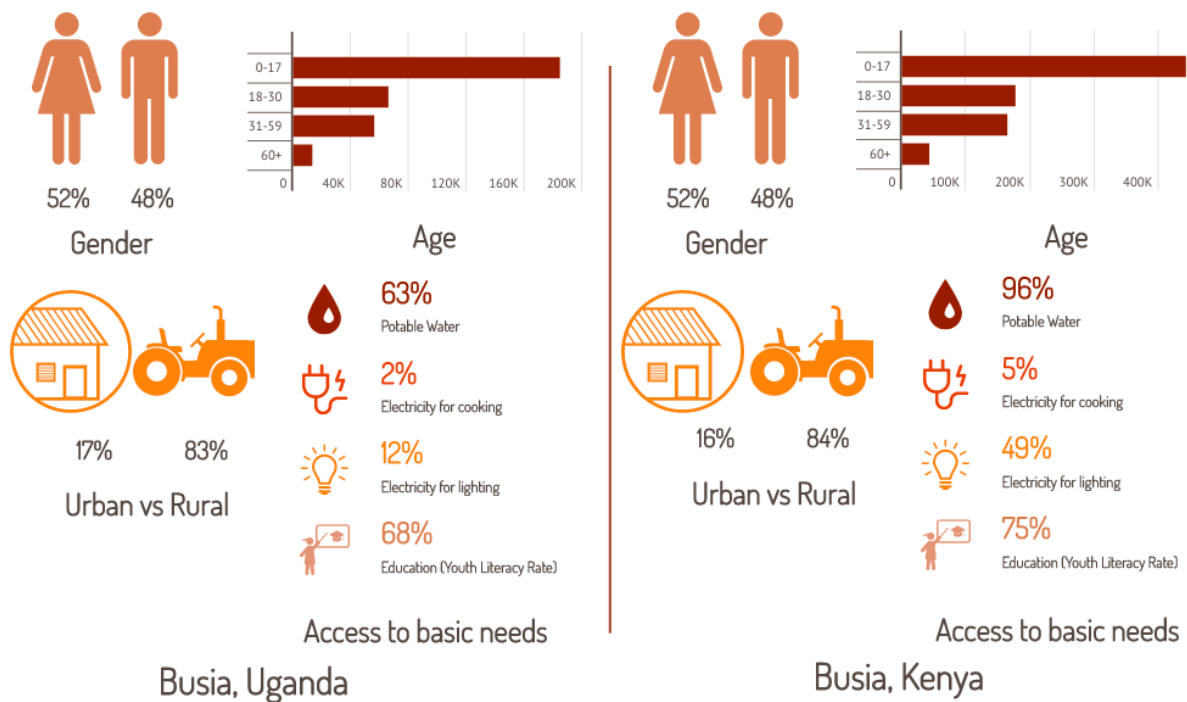


Figure 9: Summary demographics – Busia district (Uganda) and Busia County (Kenya) (Wetlands International 2019b)

Figure 10 shows the population forecast of the project area, from 2009 (year of latest census in Kenya) to 2030. It shows that population is expected to increase from the current estimated 273,000 (2019) to 340,000 in 2025 and over 370,000 people in 2030.

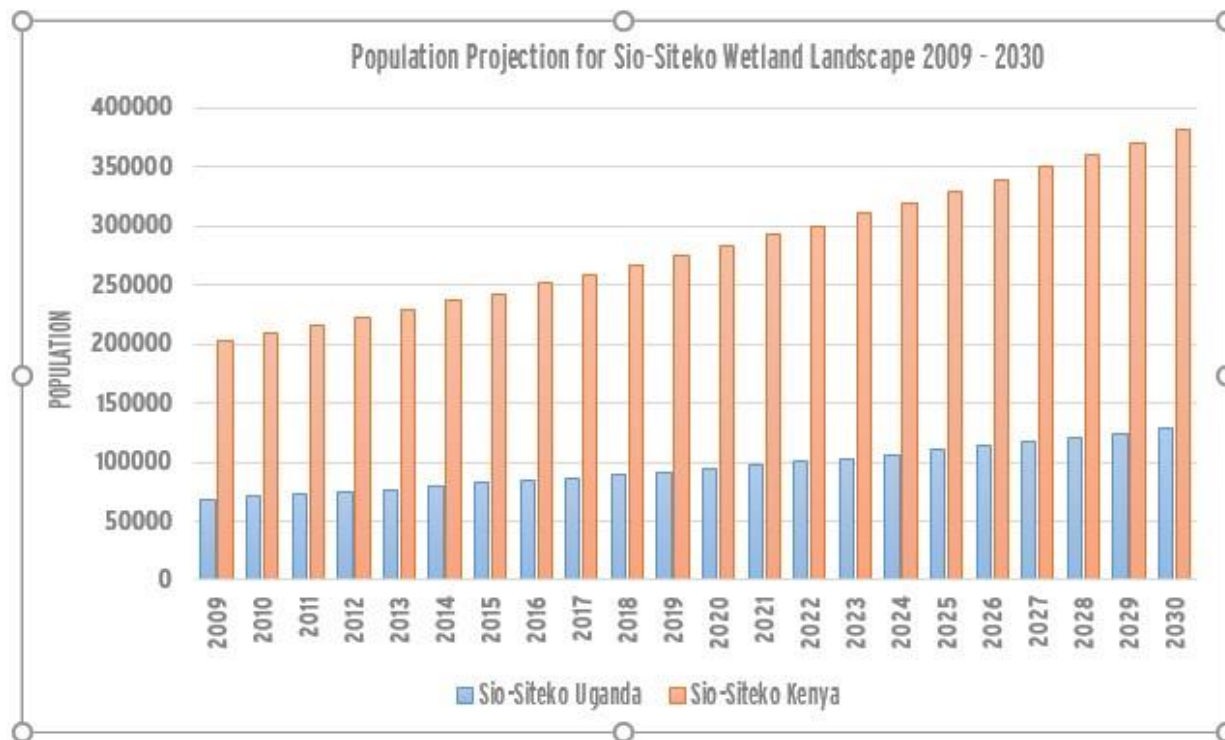


Figure 10: Population Projection Sio-Siteko Wetland Landscape (UBS, 2017 & KNBS, 2010)

2.3.2 Livelihoods

Majority of the population in both Kenya and Uganda rely on subsistence farming as their main source of livelihoods. The main crops grown are sorghum, millet, cotton, cassava, sweet potatoes, maize and beans. 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 low and has decreased over time, probably due to declining soil fertility and soil erosion. Livestock farming contributes significantly to the livelihoods of communities around the wetland. Cattle, goats, sheep are the major domestic animals kept for sale and are mainly indigenous and reared 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.

Fishing, both in Lake Victoria and River Sio is one of the major economic activities in the wetland landscape. The fishing industry is quite underdeveloped and is characterised by low mechanisation and is practiced on a limited scale. Nonetheless, it has a potential for boosting the fisheries resource sector.

Tourism industry in and around the wetland locations in the two countries is not well developed, though there are attractive tourist sites and some significant potential. Some of the nature based activities such as bird watching, sport fishing, canoeing and water sports identified in the Community Based Wetland Management Plan developed in 2009 have since disappeared due to degradation.

2.3.3 Land Use and Land Cover

The Sio-Siteko wetland landscape largely consists of cropland, with wetland areas immediately surrounding the River Sio and its tributaries. Scattered within the catchment are patches of tree cover and built-up area. Funyula and Lumino are the most notable villages within the project area. The larger towns of Busia and Bungoma are located along the edge of the Sio catchment. The coverage of different land use types is summarised in Table 2.

Table 2: Overview of relative coverage of different land cover types in the Sio-Siteko plan area

Land cover	Coverage (%)
Trees*	11.1
Shrubs	1.1
Grassland	4.2
Cropland	80.9
Built up	1.2
Water	1.5

The wetlands are restricted to a relatively narrow band around the main drainage network in the lower half of the Sio catchment. Covering an area of just under 60 km², the wetlands are a combination of papyrus swamp and other herbaceous cover such as reeds. The wetlands are permanent, though the extent of the flooded area varies considerably during the year.



Figure 11: Typical land cover in the valleys of the Sio catchment is agricultural land interspersed with trees and natural vegetation including papyrus and reeds

The most important land use in the plan area is farming interspersed with livestock grazing (Figure 11). Rainfed subsistence farming is the dominant agricultural practice, with crops including sorghum, millet, cassava, beans, vegetables and rice. However, larger-scale commercial farming is on the rise. One of the most important commercial crops is sugarcane, of which the cultivated area is expected to increase dramatically in the near future.

Other land uses within the Sio-Siteko plan area include tree plantations, transportation, and industry. The tree plots mainly consist of eucalypt and pine species and are located close to the villages. The main transportation routes in the project area are the road between Busia and Bumala along the northeastern boundary of the project area, by foot and boat at the River Sio crossing between Lumino and Funyula, and by boat in Lake Victoria (Figure 12). Industry is limited to the outskirts of Busia in the north.



Figure 12: Transportation of people and goods for trade is common along the River Sio (left) and Sio Port (right)

The land cover and land use have changed in recent years. Encroachment of agricultural land into the wetlands has increased, especially for rice and sugarcane. Cultivation of crops on the river banks and the encroachment into the wetlands, on the Uganda side for example, in Bwalira, Bwaya, and in the eastern parts of Majanji (0.26 °N, 34.01°E), Lumino (0.16 °N, 34.01 °E), and Buhehe (0.21 °N, 34.05 °E), and on the Kenya side at Nangoma (Buyende and Bulolo), Khadoda, and North of Sio Town (around Sigalame 0.15 °N, 34.01 °E) (NBI, 2020).

Increasing encroachment in and around the wetland areas, coupled with poor agricultural practices have caused soil fertility to decline on the higher ground near the settlements. Tree cover has decreased as trees are cleared for agricultural fields and to provide firewood. The deforestation and increasing agricultural area on the slopes also increase erosion and the risk of landslides. At the same time, eucalyptus and pine tree species have been planted in and around the wetland on a massive scale; predominantly in Busumba and Buyengo areas, and Mundulusia along Mavale River which is a tributary of River Sio.

The TEEB study for Sio-Siteko has determined the annual wetland degradation rate at 4%, which is majorly for reclamation of the wetland for conversion into crop farming. However, other carrier services such as aquaculture, and brick making have been seen to lead to reclamation of the wetland, probably at even more increased rates (NBI 2019).

2.4 Ecosystem Services and their Values

2.4.1 Ecosystem Services

The Sio-Siteko wetland landscape is endowed with abundant natural resources which present tremendous potential for social economic development. The majority of the around 273,000 people living in the transboundary ecosystem depend heavily and benefit from the wetland to support their economic well-being and survival. The benefits obtained from this wetland landscape are referred to as ecosystem services. These are grouped into provisioning services, regulating services, supporting services and cultural services (Ramsar, 2018) as illustrated below (Figure 13).



Figure 13: Categories and examples of ecosystem services of Sio-Siteko wetland (Source: Wetlands International 2019b)

These examples are gleaned from field surveys and assessments undertaken during plan development. The assessments involved participatory discussions by wetland stakeholders including government agencies, Non-Governmental Organisations, community-based groups and resource users whose perceptions, interests and concerns were collected.

The wetland supports subsistence and commercial agriculture, capture fisheries, grazing land and pasture, timber and non-timber products and traditional medicine. During the dry seasons, the wetland serves as a watering area for livestock herds from drier districts such as Lyantonde and Lwengo in Uganda. The local communities also use palm leaves, sedges and grasses from the wetland and forests for making mats and other handicrafts (Wetlands International 2019b). Fish is not only used for food, but also for medicine and leather tanning. The government of Uganda has recognised the wetland as one of the four most important fish breeding sites in Lake Victoria and is calling for the protection of the delta against human activities that might degrade fish breeding and the breeding sites (NBI 2019).

While sand harvesting is one of the major economic benefits derived from the wetland by the local population, it is hardly sustainable since the rate of harvesting rarely corresponds to the rate of sand disposition. Furthermore, the sites in which some harvests take place or the method of harvesting often lead to degradation of wetlands including destruction of fish breeding sites (NBI 2019, Wetlands International 2019b). The need for infrastructural development creates an increased market for sand which escalates the mining activities Sio-Siteko wetland. This has contributed to indiscriminate sand mining and severe environmental impacts such as habitat destruction, degradation of the aesthetic beauty of the surroundings, river bank erosion and modified stream structure and functionality.

Regulating and supporting services are less tangible, but this does not mean they are less important. Specific examples include trapping the sediments and effluents from surrounding catchments; and hence reducing the level of sediments carried to Lake Victoria, thereby helping to maintain the natural clean water conditions important for the survival of fish and many other aquatic living organisms in the lake. The wetland vegetation also helps to control the speed of the water flowing along the streams and rivers that flow into Lake Victoria, therefore helping to manage flooding.

The Sio-Siteko wetland has over time been used for educational purposes. This sites have greatly been visited by tourists from all over the world in view of the rich flora and fauna species found in the wetland as well as the activities which take place there such as bird watching, photography, hiking and fishing. (Businge, 2012). The Sangalo and Sio-Port beaches are good examples of a recreational areas along the wetland landscape.

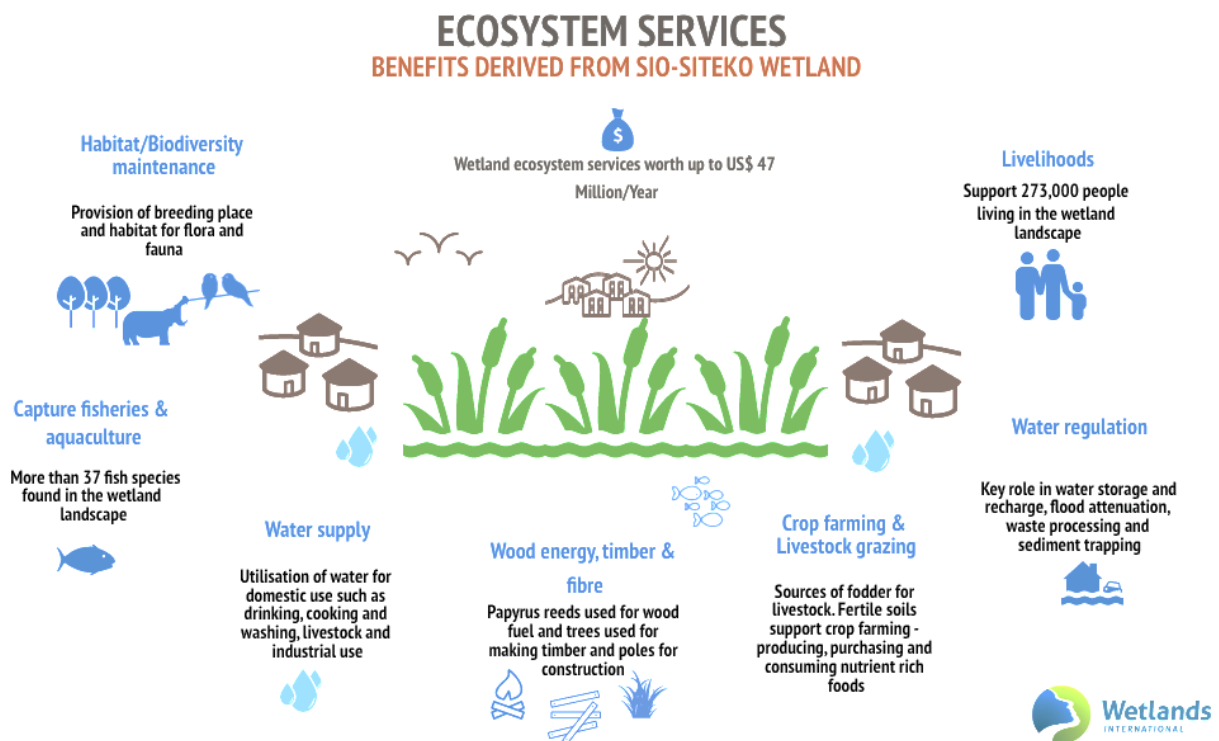


Figure 14: Summary of Ecosystem Services provided by Sio-Siteko wetland landscape (Source Wetlands International 2019b)

2.4.2 Economic Values

In 2019, economic valuation of ecosystem services within the wetland landscape conducted by the Nile Basin Initiative estimated the value of ecosystem services at USD 74,536,135 per year (Table 3).

Table 1: Economic Valuation of Sio-Siteko Wetland Ecosystem Services (NBI, 2019)

Ecosystem Service	Value Sio-Siteko (US\$/yr)
Provisioning Services	45,911,714
Capture fisheries	24,945,744
Water for domestic use	3,374,640
Livestock grazing	6,530,093
Crop farming and irrigation	2,302,360
Sand harvesting	3,765,178
Grass harvesting	2,688,109
Aquaculture	370,576
Wood energy	221,426
Mat making	459,103
Other wetland products (non-wood)	1,254,485
Regulating and Supporting Services	26,150,146
Soil fertility and moisture	14,929,100
Pollination, seed dispersal and pest control	3,904,759
Water quality regulation	5,807,365
Flood control	36,787
Carbon storage and sequestration	179,917
Habitat/Biodiversity maintenance	965,878
Pharmaceutical value	326,340
Cultural Services	2,474,275
Nature based tourism and cultural values	2,474,275
Total	74,536,135

These benefits serve as incentives to motivate the participation of the different actors in sustainable use and conservation. Given the ecosystem services and values of this wetland landscape, it has been under consideration for listing as a wetland of ‘international importance’ under the Ramsar Convention of Wetlands. Articulation of the economic value for Sio-Siteko wetland landscape should be used as a clear justification for financing the management and conservation of the wetland landscape through interventions identified in this plan and the Sio-Siteko Investment Project Plan.

2.5 Stakeholder Analysis

Effective participatory planning requires the involvement of key stakeholders. It includes identifying their interests, concerns and values and developing a broad consensus that incorporates their views. For the Sio-Siteko TWMP, it also included utilising the vast amount of information and experience held by the stakeholders to find joint workable solutions.

2.5.1 Stakeholder Inventory

Stakeholders within the wetland landscape have been classified as either primary, secondary or tertiary based on their defined varying interests, influence, impact and capacities on the wetland dependence (Table 4). This provides useful insights on the level, extent and type of stakeholder involvement and participation in the implementation of the TWMP. A detailed list is provided in Annex B.

Table 2: Stakeholder Classification (Wetlands International 2019b)

Primary Stakeholders	Secondary Stakeholders	Tertiary Stakeholders
<input type="checkbox"/> Crop farmers <input type="checkbox"/> Livestock herders <input type="checkbox"/> Fisher folk <input type="checkbox"/> Transporters <input type="checkbox"/> Craft makers <input type="checkbox"/> Reed cutters <input type="checkbox"/> Water Resource User Associations <input type="checkbox"/> Community Forest Associations <input type="checkbox"/> Herbalists <input type="checkbox"/> Brick makers	<input type="checkbox"/> National government departments and agencies <input type="checkbox"/> Local government departments <input type="checkbox"/> Local administration <input type="checkbox"/> Political leaders <input type="checkbox"/> Community Based Organisations <input type="checkbox"/> National NGOs <input type="checkbox"/> Development partners <input type="checkbox"/> Regional institutions <input type="checkbox"/> Private sector	<input type="checkbox"/> Research institutes <input type="checkbox"/> Cultural leaders <input type="checkbox"/> Religious leaders <input type="checkbox"/> Immigration departments <input type="checkbox"/> Media <input type="checkbox"/> International NGOs

The primary stakeholders are those that are ultimately directly or indirectly affected by actions or interventions in the wetland landscape. As such they have the highest interest in wetland conservation and management. However, their influence is rather low and their focus is localised. They have a good knowledge of the area, providing insights into historical resource use and wetland conservation mechanisms. Involving this group of stakeholder in the wetland management planning process promotes the uptake of their prioritised issues and options and contributes to the acceptance of the TWMP across borders and in their communities. When their voices are not heard or they do not have the chance to participate in the planning process, the sustainability of the project outcomes is at risk.

The local government technical officers are representatives of the primary stakeholders. They are mandated to implement government plans and policies and in equal measure, have both high interest and influence in the TWMP process. They have the knowledge and skills, as well as information networks to perform their functions and make key decisions on wetland conservation and management. Despite this, they have limited funding and inadequate staffing to adequately execute their mandates.

2.5.2 Stakeholder Interests and Impacts

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. This classification is summarised below.

Table 3: Classification of Stakeholder Interests and (Likely) Impacts in Sio-Siteko (Wetlands International 2019b)

INTERESTS		(LIKELY) IMPACTS
Primary Stakeholders		
<i>Local community members</i>	Enhanced quality of life	(+)
	Improved water and resource supply	(+)
	Social status	(+/-)
<i>Cattle keepers</i>	Sustained production and income	(+/-)
	Social status	(+/-)
<i>Crop farmers</i>	Sustained yields and income	(+/-)
	Improved water supplies	(+)
<i>Fisherfolk</i>	Sustained production and income	(+/-)
	Improved markets and fishing inputs	(+)
<i>Transporters</i>	Increased cross-border activity	(+/-)
	Sustained income	(+)
<i>Reed cutters</i>	Sustained production	(+/-)
	Better value for reed products	(+)
Secondary stakeholders		
Government agencies		
<i>Busia District and County (Environment, Fisheries, Forest and Community Development Office) and NEMA</i>	Better utilisation of wetland and natural resources	(+)
	Achievement of mandates	(+)
	Controlled encroachment	(+/-)
	Enhanced stakeholder awareness	(+)
	Enhanced capacity (technical and financial)	(+)
	Enhanced compliance of laws and regulations	(+)
<i>Ministry of Water and Environment (MWE), Ministry of Water, Sanitation and Irrigation (MOWS&I) and Ministry of Environment and Forestry</i>	Achievement of mandates	(+)
	Improved ecosystem integrity	(+)
	Improved water serviced	(+)
	Increased human (technical) capacity	(+)
	Enhanced compliance of laws and regulations	(+)
	Increased sector funding	(+)
Private companies		
<i>Tanneries, Sugar and Fish factories</i>	Sustained/Increased productivity and income	(+/-)
	Availability of water supplies	(+/-)

	Good enabling environment for business (permits, waste disposal etc)	(+/-)
Civil Society Organisations		
<i>Nature Uganda, Wetlands International, Youth Environment Service (YES), Environmental Women in Action for Development (EWAD), BUDA, BUMASI, LUMA, SSWUA, Eco-green</i>	Achievement of complementary objectives Development of operating capacity Constituent/beneficiary capacity strengthening Development of partnerships and collaboration Stakeholder mobilisation	(+) (+) (+) (+) (+)
Tertiary Stakeholders		
<i>NBI, Inter-governmental Authority on Development (IGAD) and United Nations Development Programme (UNDP)</i>	Achievement of complementary objectives Fulfilment of sector policy objectives Cost-effective disbursement Sustained resource use and conflict prevention	(+) (+) (+) (+)
<i>Members of Parliament, Resident District Commissioner (RDC), Chief Administrative Officer (CAO)</i>	Policy formulation Border security	(+) (+/-)
<i>Religious leaders</i>	Enhance public awareness	(+)
<i>Academia/Research Institutes</i>	Wetland research Knowledge generation	(+) (+)



Figure 15: Participatory stakeholder identification exercises (Source: Wetlands International 2019b)

2.5.3 Power dynamics

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. The interests and influence of the classified stakeholder groups are visualised in Figure 16. Although generalised, their position in the chart (Box A – D) is reflective of their level of influence and interest, and is key to their involvement and participation in the management planning and assigning them roles in the management of the resource as described below.

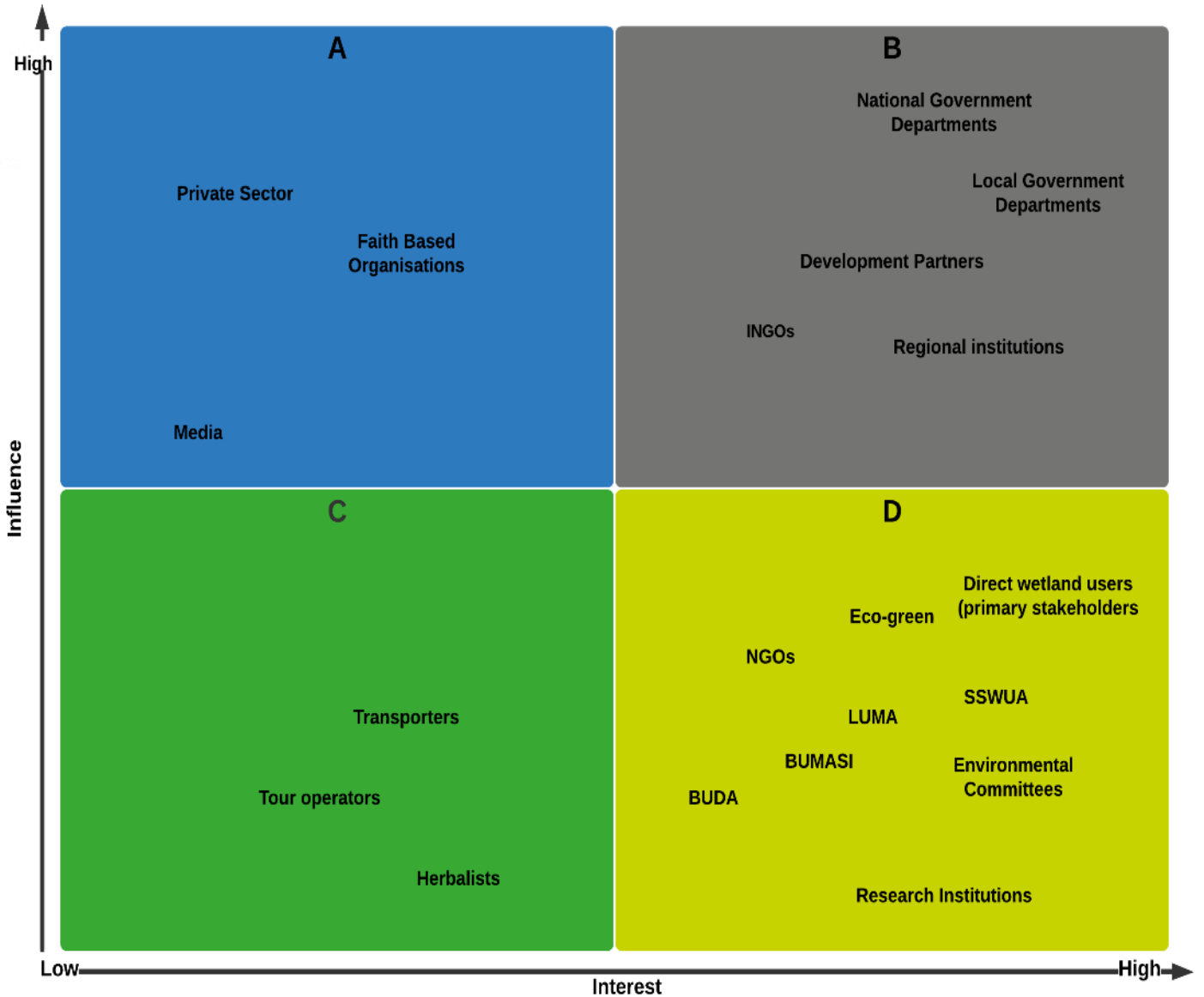


Figure 16: Sio-Siteko Power Dynamics Map (Wetlands International, 2019b)

Box A: Stakeholders of high interest but with low influence could become strong participants of wetland conservation and management. They require special mechanisms if their interests have to be protected but their actions if not monitored may cause degradation to the wetland.

Box B: Stakeholders with a high degree of influence, and high interest in the conservation of the wetland could be strong allies in the implementation of identified interventions. Need to develop good working relations among these stakeholders to ensure an effective coalition of support.

Box C: Stakeholders with low influence and low interest. For the plan processes, they require limited monitoring and management.

Box D: Stakeholders in this box can affect the outcome of plan development and implementation processes. They may be a source of significant risk and will need careful monitoring and management. It is therefore important to keep them well-informed and lobby towards their support for improved wetland conservation and management in collaboration with other stakeholders.



SECTION THREE: POLICY, LEGAL AND INSTITUTIONAL CONTEXT

The sustainable management of the wetland resources is not limited to the physical management, but also incorporates the institutional framework of legislation, policies, economic tools and the institutions and stakeholders involved in wetland management, regulation and utilisation. There are a number of Multilateral Environmental Agreements (MEAs) and national policies and legal frameworks both in Uganda and Kenya relevant to the management and conservation of Sio-Siteko transboundary wetland. The development of this management plan seeks to implement such frameworks at local level.

3.1 Global and Regional Multilateral Environmental Agreements (MEAs)

MEA	Remarks
<p>Ramsar Convention on Wetlands of International Importance, 1971</p>	<p>Its mission is the conservation and wise use of all wetlands through local and national actions and international cooperation. It calls for Parties to formulate national policies on wetlands and provides for establishment of national wetlands committees to assist in its implementation at the national and grass root levels. This Plan proposes to establish and strengthen the Sio-Siteko Wetlands Management Committee for the management of the wetland.</p> <p>Sio-Siteko Wetland is under consideration for listing as a wetland of ‘international importance’ under this convention.</p> <p>The main gap in the Convention is lack of clarity on how to support the Transboundary Wetlands Management Committees. Uganda (ratified in 1998) and Kenya (ratified in 1990) are Parties to the Convention.</p>
<p>2030 Sustainable Development Goals (SDGs)</p>	<p>SDG 15 is the most relevant to this Plan as it specifically calls for conservation and sustainable use of the Sio-Siteko wetland. SDG 6 focuses on water and sanitation with a target relating to trends in water-related ecosystems. The major weakness of the SDGs is on how to integrate wetland conservation, wise use and restoration into national SDG planning, implementation and reporting.</p> <p>There is a challenge in including wetlands in national SDGs and ensuring that progress reports reflect the contributions of wetlands so that their conservation, wise use and restoration can directly link to the sustainable development agenda.</p>
<p>Paris Agreement of 2015</p>	<p>Obligates State Parties to develop Nationally Determined Contributions (NDCs) to address climate change through nature-based solutions, including from wetlands. Wetlands ecosystems such as Sio-Siteko are crucial in climate change adaptation and mitigation through carbon storage and sequestration. This Plan therefore provides Sio-Siteko wetlands management priority actions for Uganda and Kenya to include in their NDCs.</p>

	The challenge is that very few climate initiatives are yet to identify the need to protect, restore and sustainably manage transboundary wetlands ecosystems such as Sio-Siteko.
Convention on Biological Diversity (CBD), 1992	Aims to protect ecosystems such as wetlands, which are species-rich. It obligates States to develop national strategies, plans or programmes for conservation and sustainable use of biological diversity and to integrate them into sectoral or cross-sectoral plans, programs and policies. This makes the CBD relevant to the management of Sio-Siteko wetland. Uganda and Kenya ratified the CBD in 1993 and 1992 respectively.
Convention on the Conservation of Migratory Species of Wild Animals (CMS)	Ratified by Uganda in 2000 and adopted by Kenya 1999, CMS provides a global platform for the conservation and sustainable use of migratory animals and their habitats. It focuses on conservation of terrestrial, aquatic and avian migratory species, their habitats and migration routes.
Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA)	Provides guidance for the conservation of migratory water birds and their habitats across Africa. Its African Plan of Action identifies priority actions for implementation. The wider Sio-Siteko catchment area represents an Important Bird Area (IBA) with over 300 bird species including the Papyrus Yellow Warbler (<i>Chrolopetta gracillostris</i>) and the Papyrus Gonolek (<i>Laniarius mufumbiri</i>). Both Uganda (2000) and Kenya (2001) are signatories to the Agreement.
Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES), 1973	Ratified in 1978 and 1991 by Kenya and Uganda respectively, this convention regulates international trade in endangered species of wild animals and plants to ensure that this does not threaten their survival. Sio-Siteko is a habitat of several endangered and threatened species.
Agreement on the Nile River Basin Cooperative Framework, 2010	Governs the relations of the Nile Basin States with regard to the Nile River Basin. The treaty intends to establish a framework to promote integrated management, sustainable development, and harmonious utilisation of the water resources of the Basin including Sio-Siteko as well as their conservation and protection for the benefit of present and future generations. The Agreement has however not formally entered into force because only four (4) countries - Ethiopia, Tanzania, Uganda and Rwanda have ratified. This falls short of the six (6) countries that are required to ratify or accede to the treaty for it to enter into force.
East African Community (EAC) Treaty, 2000	Obligates parties to cooperate in matters of environment and natural resource management in their countries as well as those that are transboundary. It's Protocol on Environment and Natural Resources Management, 2006, obligates parties to harmonise, adopt and domesticate common policies, laws and frameworks to ensure that there is sustainable management and use of the wetlands resources within their borders and also ensure the same for the

	<p>transboundary resources such as Sio-Siteko. However, the Protocol faces the challenge of having a joint framework on environment and natural resources matters.</p> <p>The expired Sio-Siteko Community Based Wetland Management Plan (2009 – 2019) had as part of its management instruments formed transboundary wetland management committees. These committees were largely ineffective due to limited funding to support adequate participation.</p>
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3.2 Policy, Legal and Regulatory Framework for Wetland Management in Uganda

Uganda’s National Policy for the Conservation and Management of Wetlands Resources of 1995 is currently under review. At the same time the country is in the process of formulating the Wetlands law. Despite having a specific Policy on wetlands management and conservation, the country has experienced challenges in implementation of the Policy ranging from inadequate institutional funding, policy conflicts such as the Wetlands Policy and the Agricultural policies, overlapping institutional mandates leading to conflicts. It is critical therefore that other Policies such as Agriculture policies and the role of institutions such as Uganda Wildlife Authority, the National Environment Management Authority and the Wetlands Management Department are harmonised. These policy, legal and regulatory framework for relevant for Sio-Siteko wetland management are described below.

Policy and legal framework	Remarks
<p>Draft National Environment Management Policy, 2017</p>	<p>This draft policy acknowledges that wetlands are critical ecosystems that provide ecological values and functions contributing to health and socio-economic development of the country. The policy presents six guiding principles and nine strategies for wetland management and conservation. Most relevant to this Plan are inter alia: strengthening the mapping, demarcation and gazettement of wetlands; preparing and implementing wetland management plans; and promoting transboundary cooperation for the sustainable management of cross-border wetlands such as Sio-Siteko.</p>
<p>National policy for the conservation and management of wetland resources, 1995</p>	<p>This is the main policy for the conservation of Uganda’s wetlands. It promotes conservation of Uganda’s wetlands in order to sustain their ecological and socio-economic functions. It is implemented through the Wetlands Sector Strategic Plan (2011 – 2020) that define projects and programmes and provides the basis for informed investment discussions by the central and local governments and development partners by outlining the needs and aspirations of Uganda for wetland utilisation and sustainable management. Its key objectives are: improving</p>

	the planning, management and conservation of wetlands and the institutional and technical capacity for sustainable wetland management.
Draft Wetlands Policy and Bill	The above National Policy for the Conservation and Management of Wetland Resources, 1995 is under review. The Bill is also being developed to operationalise the Policy. These will provide a comprehensive framework for wetlands management including the implementation of this Plan
National Water Policy, 1999	Provides an overall policy framework that defines the Government's policy objective as managing and developing water resources of Uganda in an integrated and sustainable manner, to secure and provide water of adequate quantity and quality for all social and economic needs sustainably, with the full participation of all stakeholders. Calls for wetlands to be recognised as an integral part of water resources ecosystems and for the need to set up and empower local community groups and committees to monitor water resources including wetlands and forests.
The Uganda Vision 2040	Provides development paths and strategies for the country to transform from a low income to a competitive upper middle income country. Articles 295 and 296 of the Vision 2040 outline the efforts necessary to restore ecosystems such as wetlands and other fragile ecosystems through implementation of catchment-based systems, gazetting of vital wetlands for increased protection and use and, monitoring and inspecting restored ecosystems.
National Development Plan II (2016 – 2020) and the Draft National Development Plan III	One of the objectives of these Plans is to increase wetland coverage and reduce degradation. The proposed measures to achieve this include development of wetland management plans for equitable utilisation of wetland resources.
Constitution of Uganda, 1995	Obligates the state to protect and conserve wetlands on behalf of the people of Uganda and provides for parliament to introduce measures necessary to protect and preserve the environment (including wetlands) from degradation.
Wetland Sector Strategic Plan 2011/2020	The Wetlands Sector Strategic Plan (2011 – 2020) highlights as key objectives enhancing the knowledge base on wetlands for informed decision making; reinforcing public and stakeholder awareness; improving the planning, management and conservation of wetlands; strengthening compliance mechanisms and governance systems; and improving institutional and technical capacity for sustainable wetland management at all levels.
National Environment Act, 2019	Sections 54 and 55 provides for management of wetlands to comply with <i>inter alia</i> special measures essential for the protection of wetlands of international, national and local importance as ecological systems and habitats for fauna and flora species, and for cultural and aesthetic purposes, as well as for their hydrological functions. The Act provides restrictions on activities that destroy, damage or disturb wetlands.

	<p>The Act further provides for mandatory Environmental Impact Assessment (EIA) on all projects to be implemented in wetlands, and gives NEMA the authority, in conjunction with District Environment Committees, to declare any wetland as a protected wetland thereby excluding or limiting human activities in the wetland. This Plan is a reinforcement of the National Environment Act.</p>
Water Act, 1995	<p>Defines water to include swamps and marshes. The Act provides for the issuance of a Water Permit for extraction of water from a natural source and issuance of a Waste Water Permit for discharge of waste water or trade waste into any water body, including wetlands. Under the Act, the government can declare any part of Uganda to be a controlled area, and establish a comprehensive and integrated plan for managing land, water and wetlands within such area.</p>
Local Government Act, 1997	<p>Provides for decentralisation at all levels of local governments to ensure good governance and democratic participation in, and control of, decision making by the people. It devolves the management of wetlands to local governments to ensure country-wide demarcation, restoration and management planning of wetlands.</p>
Land Act, 1998	<p>Provides for the tenure, ownership and management of land. It prohibits Government from leasing out or alienating wetlands except as provided for under the law.</p>
National Forest and Tree Planting Act, 2003	<p>Addresses the problem of the rapidly decreasing cover, depletion of green belts and the indiscriminate tree felling in Uganda. It makes provision for the conservation, management and development of forest resources in Uganda and establishes the National Forestry Authority (NFA) and a fund for tree planting. The NFA is mandated to oversee the management of Management of Central Forest Reserves (CFRs) in partnership with private sector and local communities including Sitambogo and West Bugwe CFRs which are found within and around the wetland landscape.</p>
The Fish (Amendment) Act, 2011	<p>An Act to make provision for <i>interalia</i> the control of fishing and the conservation of fish. Section 4 restricts basket fishing while section 5 provides for licensing before fishes from any vessel in any waters including wetlands of Uganda unless a valid fishing vessel licence to fish either with long lines or with nets is in force in respect of the vessel. These are important provisions for the conservation of fish within the wetlands. The Act further prohibits the use of poison or explosive or electrical device for fishing. Under section 8, the Act mandates the Minister to control particular methods of fishing. It states"In any case where it appears to the Minister that an otherwise lawful method of fishing is likely to prove unduly destructive, he or she may by statutory order, which order may be made to apply to the whole or to any part or parts of Uganda—prohibit the use of the method".</p>

National Wildlife Act, 2019	Provides for the conservation and sustainable management of wildlife and strengthening of the roles of Uganda Wildlife Authority (UWA). Under the act, the roles and responsibilities of institutions involved in wildlife conservation and management are streamlined, addressing the issue of conflicting mandates on wildlife conservation in the country.
National Fisheries and Aquaculture Policy, 2017	The Policy notes that almost 20% of Uganda’s surface area is covered by open fresh water resources comprising of major and minor lakes, rivers, wetlands and water reservoirs among others, which raise its potential for fisheries and aquaculture development. The Government commits to secure the long-term future of the fisheries and aquaculture sub-sector that contributes to a sustainable development through liaising with other relevant agencies in regulating sand mining, other mineral exploration and pollution inducing activities in water bodies, wetlands and catchment.
National Climate Change Policy, 2015	This Policy promotes long-term wetland conservation and restoration of degraded wetlands so that they can continue to provide global services including mitigating climate change while supporting the sustainable development needs of communities and the country.
Climate Change Bill	The Climate Change Bill is being formulated to operationalise the above Policy. It a relevant legislation for promotion of wetlands conservation and restoration of degraded wetlands for climate change mitigation as envisaged in the Policy.
National Environment Wetlands, River Banks and Lakeshores Management Regulations, 2000	These Regulations promote the conservation and wise use of wetlands and its resources. They provide for establishment of a National Technical Committee on Biodiversity Conservation responsible for advising NEMA on wetlands management matters. It also outlines functions of District and Local Environment Committees with respect to wetlands resources management. The Regulations mandate the Minister to declare any wetland to be a protected wetland. It lists activities in wetlands that may be carried out without a permit while prohibiting all other activities except under a permit issued by NEMA in consultation with the Lead Agency and District and Local Environment Committees.

3.3 Policy, Legal and Regulatory Framework for Wetland Management in Kenya

Policy and legal framework	Remarks
Kenya Vision 2030	Although missing on the environment pillar, Vision 2030 makes a strong case for sustainable management of natural resources (including wetlands). It identifies key projects to ensure achievement of the sector's goals such as improved water resource information and management.
National Environment Policy, 2014	Aims to ensuring sustainable management of the environment and natural resources, such as unique terrestrial and aquatic ecosystems, for national economic growth and improved livelihoods. It provides mechanisms for ensuring the protection of wetlands and riverbanks from unsustainable practices and recommends the development of a wetlands policy and management plans and the rehabilitation of degraded wetlands.
National Wetlands Conservation and Management Policy, 2015	Its goal is to ensure wise use and sustainable management of wetlands in order to enhance sustenance of their ecological and socio-economic functions for the present and future generations of Kenya. Recommends development and implementation of appropriate management plans through a participatory process for establishment of wetland conservation areas such as parks and reserves to ensure that they are adequately protected. Most importantly, the Policy notes challenges facing trans-boundary wetlands such as Sio-Siteko and the need for collaborative measures on their management.
National Land Policy, 2009	Offers a framework of policies and laws to ensure maintenance of a system of land administration and management to provide efficient and effective utilisation of land and land-based resources including wetlands. One of the policy principles is that of conservation and management of land based natural resources, the principle of protection and management of fragile and critical ecosystems including wetlands.
National Land Use Policy, 2017	Recommends that protected areas and areas of high intrinsic value such as habitat for endangered biodiversity and wetlands shall not be allocated for private use or degazetted. To address the problem of cultivation on marginal lands and fragile ecosystems, the government shall among other interventions, increase public awareness on the dangers of farming in marginal lands like wetlands as a routine activity by extension service providers.
National Water Master Plan 2030	Seeks to have improved water and sanitation services available and accessible to all by 2030. The plan notes that the water deficits would require promotion of water

	resources (including wetlands) development to the maximum in order to meet future water demand.
Constitution of Kenya, 2010	Constitution of Kenya, 2010 reaffirms the government commitment on sustainable exploitation, utilisation, management and conservation of the environment and natural resources, and ensures the equitable sharing of the accruing benefits. This includes enactment of legislation related to conservation and management of wetlands in the country.
Environmental Management and Coordination (Amendment) Act, 2015	Section 42 provides for protection of wetlands including prohibition in carrying out of various activities on a wetland without prior approval of NEMA. The Act mandates the Cabinet Secretary to declare a wetland to be a protected area and impose such conditions necessary to protect the wetland from degradation.
Water Act, 2016	Provides for the management, conservation, use and control of water resources including wetlands and for acquisition and regulation of rights to use water. Further, provides for the regulation and management of water supply and sewerage services.
Agriculture, Fisheries and Food Authority (Amendment) Act, 2013	Critical to management of Sio-Siteko wetlands, this Act under Section 22 mandates the Cabinet Secretary to formulate land development guidelines in respect of any category of agricultural land to be implemented by the respective county governments taking into account the circumstances of the respective areas under their jurisdiction which may include wetlands.
County Governments Act, 2012	Requires county governments to deal with planning and development where they manage and regulate the activities that occur within their counties such as wetlands cultivation and restoration of degraded wetlands.
The Wildlife Conservation and Management Act, 2013	Defines Wetlands under Section 2 which is borrowed from the Ramsar Convention. It mandates the Cabinet Secretary to declare a wetland that is important for habitat or ecosystem for wildlife conservation a protected wetland. Further in consultation with the community and relevant stakeholders they shall prepare an Integrated Wetland Management Plan for the protected wetland.
National Lands Commission Act, 2012	National Lands Commission (NLC) is mandated to carry out the implementation of Articles 60 and 67 of the Constitution as well as ensure the national land policy is implemented. Wetlands is public land that should be administered on behalf of the communities therein by the NLC.
The Community Land Act, 2016	Provides for the recognition, protection and registration of community land rights; management and administration of community land and the role of county governments in relation to unregistered community land. Although not very explicit,

	the Community Land Act is relevant to wetlands management because various wetlands are located on community land.
Irrigation Act, 2019	Not very explicit on wetlands. Provides for mainstreaming irrigation related statutory obligations such as those that relate to the environment, water and health.
Environmental Management and Coordination (Wetlands, River Banks, Lake Shores and Sea Shore Management) Regulations, 2009	Provide for the conservation and sustainable use of wetlands to ensure they provide social, economic and ecological benefits to the society. Regulation 10 notes that an inventory of the wetlands should be carried out and that wetland management plans should be developed. Regulation 5 (1) (d) provides that sustainable use of wetlands shall be integrated into the national and local land use plans to ensure sustainable use and management of the resources. The Regulations are in the process of being reviewed to comply with the Amended EMCA (Amendment), 2015 and the provisions of the Constitution of Kenya, 2010.
National Spatial Plan, 2015 - 2045	Recognises the functions and importance of wetlands, noting that wetlands cover about 3% to 4% of the land. It further acknowledges that wetlands provide important ecosystem services such as filtering and storing water and as wildlife habitats. The Plan proposes policy statements to address wetlands management challenges including preparing integrated wetlands management plans to promote their sustainable use and empower communities in the management of wetland ecosystems.
Busia County Integrated Development Plan (CIDP)	Busia CIDP contains plans to manage and protect wetlands and water catchment zones within the county. It has allocated KES 70 million to protect 1,500 acres of wetlands and develop and implement 3 wetlands management plans for a budget of KES 30 million. Through the Sio-Siteko Wetland Management Plan, the County Government could be influenced to allocate additional funds for implementation of activities herein.

3.4 Institutional Framework Relevant to the Management of Sio-Siteko Wetland

3.4.1 Regional Institutional Framework

The Ramsar Centre for Eastern Africa (RAMCEA)

RAMCEA is a regional initiative based in Uganda consisting of Burundi, Djibouti, Kenya, Rwanda, Tanzania and Uganda as Member States. It supports members, other stakeholders and institutions to improve and implement the Ramsar Convention in their countries. RAMCEA further supports the mission of the Convention by building capacity of the administrative authorities and other stakeholders to put in place appropriate instruments to promote the wise use of wetlands. RAMCEA recognises the need for regional initiatives but calls for mobilisation of technical support to the regional interventions on wise use of wetlands by all interested stakeholders. Through such a forum, countries are able to report back to a veto body to make a unified decision rather than individual decisions.

Nile Council of Ministers

The Nile Council of Ministers (Nile-COM) is the highest political and decision-making body of the Nile basin Initiative. Nile-COM comprises of Ministers in charge of Water Affairs in the Member States. Among the Nile-COM's roles and responsibilities are: approving annual work plans and budgets; ensuring smooth implementation of NBI's activities; and ensuring contribution of member states as well as external support agencies and Non-Governmental Organisations (NGOs).

Nile Technical Advisory Committee

The Nile Technical Advisory Committee (Nile-TAC), comprises twenty (20) senior government officials, two from each of the Member States. Nile-TAC provides technical support and advice to the Nile-COM on matters related to the management and development of the Nile waters. It also acts as an interface between the Nile-COM and development partners, and between Nile-COM and the Secretariat, programmes and projects of the NBI. Nile-TAC also provides oversight for NBI programmatic activities.

Nile Basin Initiative Secretariat

The Nile Basin Initiative Secretariat (Nile-SEC) is the executive arm of the NBI. The Nile-SEC was established in November 2002 by the Nile-COM and is based in Entebbe, Uganda. The Secretariat's work is organised around basin cooperation and water resources management. The basin cooperation programme aims to facilitate open discussions and understanding of the interests, positions and expectations of the Basin States in matters concerning the management and utilisation of the shared Nile Basin water and related resources. The platform is also vital for sharing information and responding to shared challenges in the basin. The water resources management programme seeks to strengthen Member States' institutional and technical capacities and sharing knowledge bases to support decision making and action at local levels.

East African Community (EAC)

The objective of the Environment and Natural Resources Management sector is to promote conservation of the environment and sustainable exploitation of natural resources including wetlands in the Community. The EAC Partner States have agreed to take measures to foster co-operation in the joint and efficient management and sustainable utilisation of natural resources.

Lake Victoria Basin Commission (LVBC)

Lake Victoria Basin Commission (LVBC) is a specialised institution of the East African Community (EAC) mandated to coordinate sustainable development and management of the Lake Victoria Basin in the 5 EAC Partner States. Its mission is to promote, facilitate and coordinate activities of different actors towards sustainable development and poverty eradication of the Lake Victoria Basin.

The Intergovernmental Authority on Development (IGAD)

The Intergovernmental Authority on Development (IGAD) promotes regional cooperation and integration to add value to Member States' efforts in achieving peace, security and prosperity. One of its objectives is to harmonise policies with regard to trade, customs, transport, communications, agriculture, and natural resources and environment, and promote free movement of goods, services, and people within the region. IGAD division of Agriculture and Environment and the Water Technical Advisors play an important role in wetlands management.

3.4.2 Institutional Framework in Uganda

Ministry of Water and Environment

The Ministry of Water and Environment is responsible for management of water and environment resources including coordination of cross border and trans-boundary ecosystems. This is implemented through;

- i. **Department of Transboundary Water Affairs** in the Directorate of Water Resources Management, which plays a key role in coordinating the preparation and review of Integrated Water Resources Management (IWRM) activities on transboundary river and lake systems including wetlands with transboundary water significance and coordinate implementation of integrated plans such as this Transboundary Wetlands Management Plan (TWMP). It also plays the coordinating role of all Nile Basin (NBI) activities at national level.
- ii. **Department of Wetlands Management** in the Directorate of Environment Affairs doubles as the National Ramsar Committee that provides strategic level Institutional support. It comprises of representation from Line Ministries, Departments, Agencies, Civil Society, Private Sector and Academia; and
- iii. **Victoria Water Management Zone**, established under Water Sector Reform in 2006, the Ministry of Water to implement Integrated Water Resources Management (IWRM) that is aimed at de-

concentration of water resources management at the Water Management Zone and catchment levels. There are four Water Management Zones (WMZ), which are defined by the drainage patterns. The Sio-Siteko Wetland is part of the Victoria Water Management Zone.

National Environment Management Authority (NEMA)

NEMA is the principal environment enforcement agency with the principal role of enforcing the Environment Act across all sectors including wetlands. In fulfilling its mandate, NEMA works with Lead Agencies, Government departments and Local Governments as specified in the National Environment Act Cap. 153 and the Local Governments Act Cap. 243.

National Forestry Authority (NFA)

Established under section 52 of The National Forestry and Tree Planting Act, the NFA is mandated to manage all Central Forest Reserves including swamps in forests.

District Environment Committees

The management of wetlands is further decentralised to the Local Governments level. The District Environment Committee is the sub-committee of the District Council that provides policy guidance on the management of wetlands. Local Governments are supported by the WMD and NEMA. At local Government level, there is Natural Resource Department under which the Environment Unit is placed, and at sub-county level there is a Focal Point handling wetland related issues.

National NGOs and Community Based Organisations (CBOs)

These non-state actors are crucial for ensuring sound wetlands management in Uganda. Communal Wetlands Associations have worked with Wetlands Inspection Division (WID) to establish Community Based Wetlands Management Plans that provide guidelines for utilising local wetlands. The Associations are also useful in settling disputes over wetlands use and tenure. Members of Communal Wetlands Associations can monitor wetland activities and community members can report illegal encroachment to the Associations examples are BUDA (Busia – Dabani Association), BUMASI (Buhehe – Masinya Association) and LUMA (Lumino – Majanji Association).

In addition, there is an Environment Sector Consortium coordinated by Environment Alert (an NGO). Within this Consortium wetlands, issues are also handled, spearheaded by the International Union for the Conservation of Nature as Wetland Thematic Area leader.

3.4.3 Institutional Framework in Kenya

Lack of a holistic institutional framework has affected wetland management in Kenya as noted in the Environment Policy and the Wetlands Policy. Different aspects of wetland conservation and management are handled by different agencies. This has therefore meant that no single agency is in charge of overall coordination. This has contributed to massive wetland loss and degradation. The Kenyan Government has undertaken reforms aimed at conservation of environmental resources including wetlands. Two key institutions charged with mandates to manage wetlands are the National Environment Management Authority (NEMA) and the Kenya Wildlife Service (KWS).

National Environment Management Authority (NEMA)

Established under Section 7 of EMCA, NEMA is the agency charged with co-coordinating all environmental activities being undertaken by various government departments and bodies in Kenya including wetlands management. Institutionally NEMA establishes the framework of the County Environment Committees under Sections 29 (2) and (3). Section 42 of the Act provides that all activities on wetlands shall be carried out only after prior approval has been issued by NEMA.

Kenya Wildlife Service (KWS)

KWS' mandate is to conserve and manage wildlife in Kenya, and to enforce related laws and regulations. KWS is the designated institutional focal point for the implementation of the Ramsar Convention. Among its duties, is advising the government on the establishment of national parks, game reserves and protected wildlife sanctuaries including wetlands.

Water Resources Authority (WRA)

WRA is mandated to sustainably and equitably allocate water resources among the various competing needs. The institution also controls pollution and improves water quality in the country's water bodies by integrating land use activities into its water quality control programmes.

Kenya Forest Service (KFS)

Provides for the development and sustainable management, including conservation and rational utilisation of all forest resources for the socio-economic development of the country and for connected purposes. The KFS Busia Ecosystem Conservator has implemented elaborate bamboo growing initiatives along the river beds to protect wetlands, address flooding and water quality issues.

Kenya Water Towers Agency (KWTA)

Mandated to coordinate and provide oversight over Kenya's water towers which are the sources of most rivers in Kenya. This includes Mount Elgon, which is the source of River Sio. The agency focuses on analysing changes in water flows from rivers, springs and wetlands as a result of the changes in land cover, and

providing prescriptive measures to address them. The agency has proposed harmonisation of the gazettelement of Mount Elgon water tower, which has double gazettelement between KWTA and KFS to avoid institutional overlaps and conflicts.

Sio-Siteko Wetland Users Association (SSWUA)

Sio-Siteko Wetland Users Association covers Bwiri, Nanguba, Ageng'a, Nambuku, Namboboto, Nang'oma, Bukhayo West and Busia Township locations of Matayos and Samia sub-counties of Busia County.

The objectives are:

- To sustainably manage the fisheries of Sio-Siteko wetlands
- To mitigate adverse effects of water pollution and reduce water borne diseases
- To conserve wetland habitats to reduce wetlands biodiversity loss
- To reduce human-wildlife conflict through introduction of sustainable conservation measures and alternative source of income
- To resolve conflict and create harmonious environment that promote cross-border trade
- To set up, facilitate and monitor management plan implementation structure mechanisms
- To improve food productivity, alleviate food security and enhance livelihoods



SECTION 4: ISSUES AND THREATS FACING THE SIO-SITEKO WETLAND LANDSCAPE

The Drivers – Pressures – State – Impact – Response (DPSIR) framework was used to understand, synthesise and visualise the cause – effect interactions of the wetland landscape and develop potential actions for improving the implementation of sustainable wetland conservation and management interventions in the Sio-Siteko wetland landscape. This conceptual framework is described in sub-sections below.

4.1 Drivers of change

Drivers of change are the socio-economic and socio-cultural factors driving human activities, which increase or mitigate pressures on the environment (Ramsar, 2018). Section 2.3 of this plan identified the socio-economic factors driving human activities within the Sio-Siteko wetland landscape. For this TWMP, the focus is on drivers with a negative effect on the ecological character of the wetland landscape.

These drivers are attributed to natural or human induced causes of biophysical changes at a local or regional scale (Van Asselen et al, 2013). They include demographic, socio-political (governance, institutional and legal frameworks), cultural and religious changes. In this wetland landscape, the population is increasing at a rate of 2.8% per year (NBI 2020). With a **rapidly growing population** comes increasing demand for livelihood resources including food, water, raw materials and land. If these resources are not sustainably managed, there will be irreversible changes to the functioning and productivity of the wetland landscape.

Widespread poverty (39% of the population in Kenya and 55% in Uganda is in multidimensional poverty; UNDP 2019a) as a consequence of low income, high incidence of diseases, loss of crop productivity and limited livelihood options is a key driver of change in the wetland landscape. The demand therefore to improve livelihoods continues to put pressure on natural resources in the Sio-Siteko wetland.

Thirdly, **Weak governance systems and structures** including inadequate allocation of financial and human resources to strengthen enforcement of existing policies and legislation, and poor coordination among institutions mandated to oversee the conservation and management of the wetland in Kenya and Uganda is increasing the occurrence and impacts of illegal overexploitation of natural resources and destruction of the ecosystem.

Moreover, **inadequate awareness of the value of wetland ecosystems by riparian communities** as well as their hydrological and ecological functioning continues to hinder more sustainable use of the resources. The drastic changes in weather and climatic patterns across the globe, the declining condition of the rivers, lakes, groundwater, forest and wetland cover as a result of unregulated conflicting human action represent an important aspect of environmental issues that require urgent attention. The population is fully dependent on the wetland natural resources for their livelihoods, but there is little awareness on the need for wise-use. Weak participation, involvement and inclusion in natural resource use decision making also contributes to non-compliance by the public.



4.2 Pressures

Pressures are the stresses that human activities exert on the environment. The above drivers on wetland degradation compromise the functionality of the wetland landscape. Notable wetland changes have been identified as a consequence of among others, overexploitation of natural resources, unsustainable resource use practices, poor land use planning, pollution and unsustainable resource use practices.

Sio-Siteko wetland resources such as papyrus, wood, fish, sand and grassland are being **overexploited**. Indiscriminate sand harvesting at local scale is contributing to the degradation. **Overfishing** and **use of illegal fishing gear common** in Munongo and Buyisa areas is reducing fish stock and breeding sites are disappearing. With 19,000 heads of cattle and 16,000 goats in the project area (numbers as per 2009 and approximately doubling every five to ten years) **overgrazing** is a major threat to the wetland. This has not only led to reduced wetland vegetation, but has also been a major source of conflict in the area. Often, the cattle wander through farmlands and destroys crops, leading to disharmony amongst farmers and livestock keepers. The **overexploitation of timber**, mainly for firewood and charcoal production, is a reflection of the overreliance of the population on these resources for energy production. This is exacerbated by the lack of alternative options, rendering these resources are prone to depletion. Local communities harvest papyrus en masse and without control on quantity, period for regeneration or harvesting methods and load it on trailers for sale to traders in the United Arab Emirates. Hotspot areas for these activities are Siteko, Buyende and Buduluku. Finally, **over abstraction of water** resources is an important contributor to lower groundwater levels, decreasing the yield of springs and boreholes or even causing them to run dry.

Unsustainable land use practices are also widespread within the wetland landscape. This includes **riverbank cultivation** and **encroachment into the wetlands** which is common in Hadoda area in Bumunji, Buyende and Bulolo in Nangoma sub-location and Bwaya and Bwalira areas in Uganda. The land cover dataset does indicate that built up areas have increased more than tenfold between 1995 and 2015. Expansion and encroachment occur as a result of a shortage of land with population increase, which is further increasing due to soil degradation associated with poor agricultural practices that forces farmers to leave the land fallow to recover. Besides local farmers' big investors purchase or lease large tracts of land adjacent to the wetland areas to subsequently expand their operations into the wetlands. **Deforestation** not only affects the local ecology, but also contributes to lower groundwater levels in downstream areas since by lowering the natural groundwater recharge rate. There is a widespread planting of **water intensive trees** such as eucalyptus tree species which abstracts huge volumes of water particularly during the dry seasons resulting in the drying up of the wetlands. This is predominant in Busumba and Buyengo areas, and Mundulusia along Mavale river which is a tributary of River Sio.

Several **invasive species** impact the Sio Siteko wetland system, by competing with native species for food and space and introducing disease. The **touch-me-not (*Mimosa pudica*)** is a creeping flowering plant that

changes soil physical and chemical properties, affecting crops and slowing down grass growth. **Common lantana (*Lantana camara*)** is becoming a dominant understorey shrub that is reducing the productivity of pastures through the formation of dense thickets, which reduce growth of crops as well as make harvesting more difficult. The emergence of the faster spreading parasitic **Dodder weed (*Cuscuta spp*)** along the Sio-Siteko wetland boundaries is greatly killing the green vegetation of the wetland landscape. **Water hyacinth (*Pontederia crassipes*)** spreads prolifically in Lake Victoria and affects communities and biodiversity at the Sio river mouth by obstructing (fishing/transport) boats, forming perfect breeding ground for malaria mosquitoes and other vector-spread diseases, and locally it deoxygenises water having a huge negative on young fish. The clogging of waterways with such invasive species, along with predation by the introduced Nile perch, the use of destructive fishing gears especially at the river mouths (including mosquito nets), and the destruction of spawning and nursery grounds due to encroachment into the wetlands are the main causes for **fish stock reduction** (Ogotu-Ohwayo et al. 1990, Ochumba et al. 1990).



4.3 State

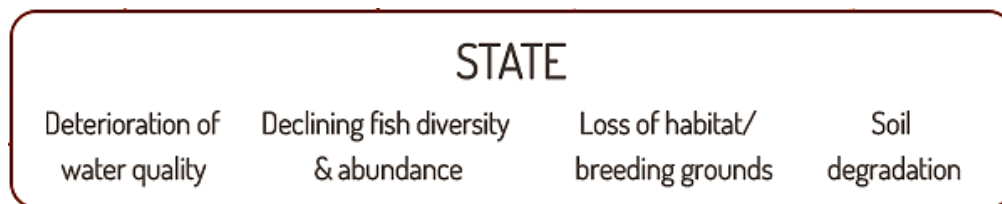
The pressures discussed above have contributed to changes in the ecology (state) of the wetland. It is a combination of these pressures impacting the health and the integrity of the wetland that increase the likelihood of abrupt changes in its ecosystem with significant consequences for human well-being (MEA 2005).

Changes in erosion and sedimentation patterns are another visible result of wetland destruction and also contribute to further degradation. In the upstream reaches of River Sio planting of Eucalyptus and other water-intensive trees has accelerated **soil erosion and reduced flow in streams and rivers** in the wetlands, particularly around Busumba, Buyengo, Mundulusia and Busimba in Uganda, and northeast of the road Busia-Bumala in Kenya. Due to **sedimentation**, higher surface runoff rates due to environmental degradation and clogging of the main river channel flooding is increasingly a problem. At the mouth of River Sio the inundation after heavy rainfall may span a width of up to three kilometres. Waterlogged conditions are affecting those crops and natural vegetation that are intolerant to the prolonged low oxygen wet conditions.

The **supply of safe and clean water is low and** in some areas water availability is **decreasing**, as springs, shallow wells, boreholes dry up due to falling groundwater levels and diversion of water courses (anecdotal evidence). The water shortages were reported in Busia Township and in the surrounding villages of Mayenje, Bwalira, and Busumba. Access to safe water, however, is an equally big problem in the rural areas, albeit for different reason, such as shortage of infrastructure and broken infrastructure. This challenge is complicated by **poor water quality** in the wetland area. **Point source pollution** including open defecation and improper waste disposal are poisoning fish in Buyende, Buyisa, Hadoda, Sidonge, Lugala, Buradi,

Mayenje, Buradi, Rukada, Bukhwamba, Buyingi, Mramba and Sigalame. Altogether the poor water quality is a major threat not only to communities, but also to the ecological functioning – including survival of fish – in the wetland.

The fragmentation of the natural vegetation, intensification of natural resources uses and increasing invasive species entering the ecosystem, which tend to suppress native species, have resulted in **declining species populations**. The burning is a traditional method for destroying ticks and other vectors as well as stimulating fresh pastures, creating sweet young shoots for livestock, and to clear areas in advance of tilling farms (NBI, 2020). The illegal hunters also burn wetlands to scare animals so they can easily hunt them. Bush burning degrades the wetlands, and contributes to **biodiversity loss** and migration of wild animals.



4.4 Impact

Changes in the quality and functioning of the ecosystem have an impact on the welfare of humans, including the production of ecosystem goods and services and ultimately, human well-being.

Section 3.4 and 3.5 of this TWMP detail the value of ecosystems and the services they provide. Provisioning services directly contribute to the livelihoods of communities as food and income sources. However, the ecosystems in the Sio-Siteko wetlands are vulnerable to external pressures which are detrimental to their attributes.

Overfishing, increased competition and the use of illegal fishing methods is reducing fish stock indiscriminately and breeding sites are disappearing. Fish species such as *Echachu*, *Labue*, *Schilbe*, *Mumairus*, *mud fish/ lung fish*, *P. Eels*, *Vidonge* and *fish-Syodonta* and other populations are under great pressure and have continued to disappear. The decline in fish diversity and abundance has a direct impact on **loss of incomes and species**. Wild animal populations, including hippos and the *Sitatunga* are reducing due to illegal hunting both for domestic consumption as well as wildlife trade across borders, poaching and encroachment into the forest-wetland area.

An increasing number of **resource use conflicts** has been reported between various wetland users. Local communities and other wetland users do not always adhere to set rules and regulations in their operations in the wetland, posing a threat to the ecological functioning of the wetlands, and leading to an ever-increasing number of conflicts between different users and between users and the responsible authorities. The latter type of conflict is enhanced when clear demarcation of different landscape zones and the policies and laws that must be adhered to are lacking. Conflicts between crop farmers, herdsman, plant harvesters, grass harvesters, clay miners, sand miners and more are intensified by decreasing land and resource

availability. In addition, the encroachment and disappearance of natural vegetation has increased the frequency of human-wildlife conflicts.

Poor access to safe and clean water resources resulting from poor water quality in the wetland landscape, cause **health risks** and **reduction in human well-being**. **Inadequate waste disposal** and **poor access to sanitation and water treatment services** throughout the catchment of River Sio are the main drivers of point source pollution. In Busia Town the sewerage company is a big polluter as it discharges untreated waste water into the river, and so are the hospitals that dispose biomedical waste into the river. The deteriorating water quality is therefore detrimental to many people who are directly fetching water from the wetlands for domestic use.



4.5 Responses

Responses are actions taken by groups or individuals in society and government to prevent, compensate, ameliorate or adapt to changes in the state of the environment; and to modify human behaviours that or to compensate for social or economic impacts of human condition on human well-being.

For a transboundary wetland such as Sio-Siteko, the problem of shared ownership is reflected when it comes to managing the wetland resources. Institutional cooperation and collaboration within and across the borders is a challenge. Implementation of national and regional policies and frameworks is also not cascaded to the local level. Thus, the inadequacies in policy implementation, participation of the local communities and institutional collaboration are leading to ineffective conservation and management of wetland resources. Setting up and strengthening transboundary wetland institutions bringing together diverse stakeholder groups is therefore crucial for conservation of the wetland.

To this end, section 4 and 5 of this plan details the multilevel responses including development and implementation of decision support tools, strengthening governance systems and structures, outreach and education, resource management, development and implementation of by-laws, sustainable livelihood improvement, restoration – including green borders along the wetland landscape as feedback to driving forces, pressures, changes of state and impacts. A summary of the responses is presented in the DPSIR framework (Figure 17).

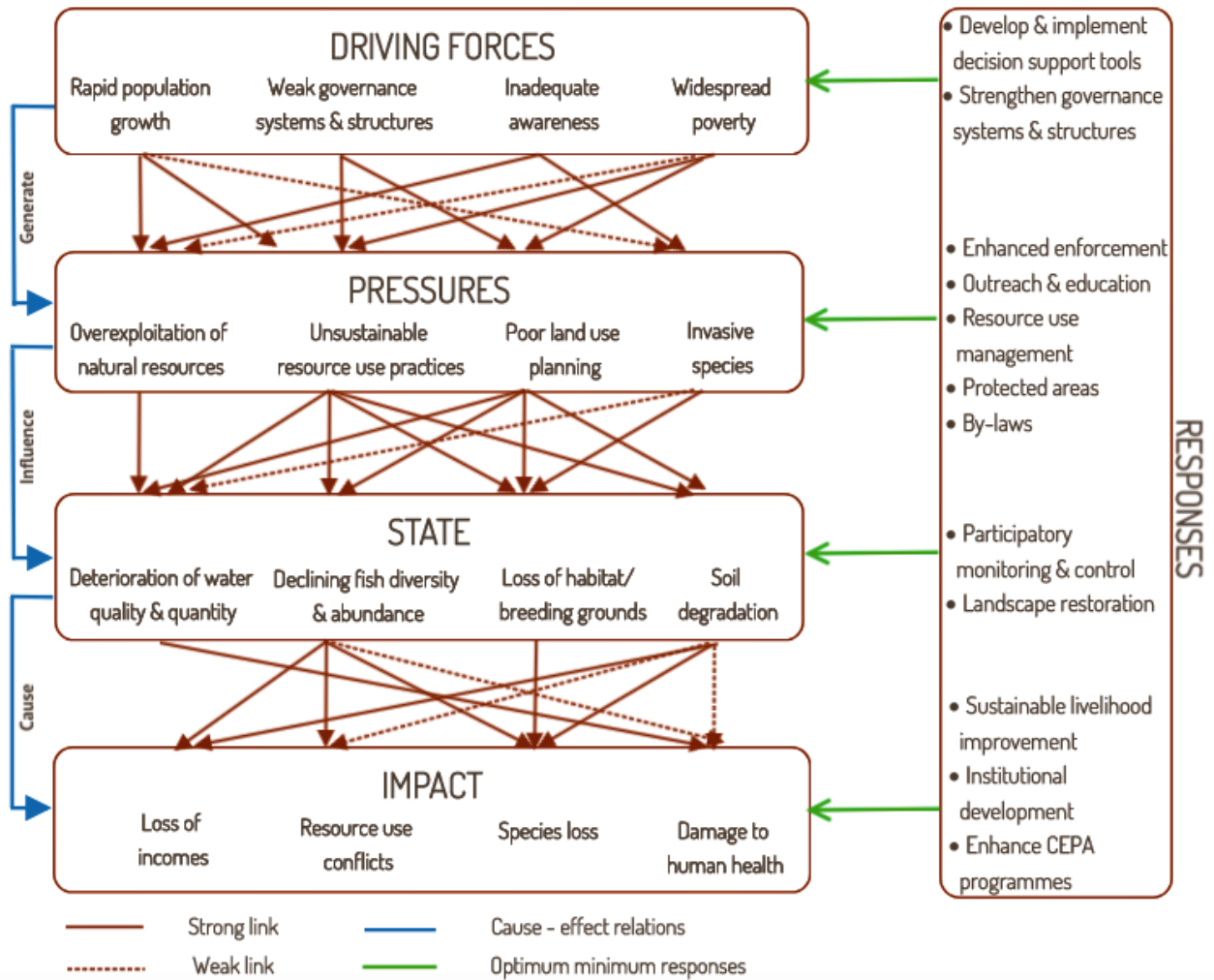


Figure 17: DPSIR response model of intervention Sio-Siteko Transboundary Wetland (Wetlands International, 2019b)



SECTION FIVE: MANAGEMENT PLANNING FRAMEWORK

5.1 The Transboundary Wetland Management Planning Process

This Transboundary Wetland Management Plan (TWMP) has been developed in line with the *Ramsar resolution VIII.14: New Guidelines for Management Planning for Ramsar Sites and Other Wetlands (Figure 18)*. It supports the establishment of management mechanisms that build upon and strengthen those already in place at local, national and transboundary levels in the Sio-Siteko wetland landscape.

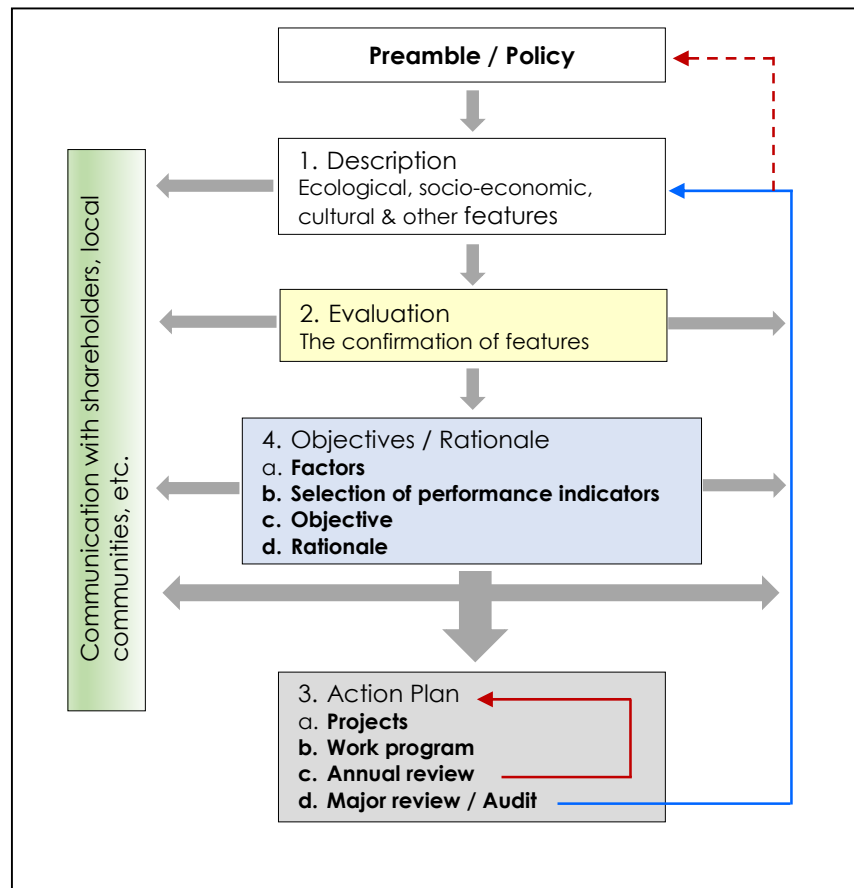


Figure 18: Management Planning Framework for Wetlands (Ramsar, 2007)

The TWMP planning process was both participatory and interactive with step-by-step reviews and incorporation of suggestions and inputs by key stakeholders and experts. This comprised screening and scoping, consultative reviews, field surveys, public consultations and workshops which involved key stakeholders from the local national and regional levels including local community members, civil society organisations, district, county and national governments and regional institutions. Engaging stakeholders in the planning process helped to: Raise awareness and create greater understanding for the TWMP; Facilitate the commitment of stakeholders to the plan under development and institutionalisation of identified mechanisms for conflict resolution, enforcement and wetland management measures. It also

encouraged sharing of good practices and strengthened relationships among participants across the border. The steps and activities undertaken are summarised in Table 5 below:

Table 4: Steps and activities undertaken during the development of the TWMP

Planning step	Activities
<p>Inception phase</p>	<p>Kick-off meeting held with senior technical officers from NELSAP, Nile Basin Initiative, GIZ and Directorate of Wetlands, Uganda on December 10, 2018 in Entebbe, Uganda.</p> <p>Scoping mission with National and District/County government officials, and NELSAP officers to develop a common understanding of the key issues conducted between 14 and 16 January 2019 in Busia, Kenya and Busia, Uganda. Mobilisation of local authorities, technical officers and stakeholders including site visits were also conducted.</p> <p>Key outputs: Development of tools to facilitate the planning process, awareness creation among the government officials and stakeholders on purpose and scope of wetland management planning and agreements on schedules for the management planning process.</p>
<p>National level consultations</p>	<p>Consultations undertaken in advance of field missions with both NELSAP, Nile-TAC members, GIZ and officials at national level responsible for wetlands, environment, natural resources and water.</p> <p>This step included explaining the management planning process and agreeing on a schedule for the management plan process. Socio-economic and ecological information on the area from national and local institutions was also gathered.</p> <p>This workshop was held in Kampala, Uganda from 9 to 10 April, 2019 and brought together 50 participants (34 men and 16 women) drawn from five (5) member states representing government agencies, civil society and research institutes.</p>
<p>District/County level consultations at the wetland sites</p>	<p>Consultations undertaken with local government officials, CSOs and community representatives at the wetland site. This was combined with capacity building sessions to establish the importance of wetlands management planning. Particular emphasis laid on stakeholder mapping and resource analysis. These meetings were held from 11 – 14 April 2019 in Busia, Kenya and Busia, Uganda with participation of 42 and 31 participants respectively.</p> <p>Collection of biophysical, social, economic and biodiversity data (plants, mammals, fish) was also carried out through joint field visits with community members and workshops with informed stakeholders.</p>
<p>Joint District/County level</p>	<p>Joint cross-border workshops organised bringing together 42 different local government officials, technical departments, CSOs and community representatives from Kenya and Uganda. This was combined with capacity building sessions on</p>

<p>consultations at the wetland site</p>	<p>wetlands ecosystem services. This meeting was held from July 16 – 19, 2019 in Busia, Kenya.</p> <p>Joint identification of resources, resource analysis, stakeholder mapping, visioning, objectives, interventions and a monitoring and evaluation plan were developed. The purpose was to strengthen joint planning for the entire wetland by stakeholders from both sides of the border</p>
<p>Literature review and synthesis of all information from the consultations</p>	<p>All information was collated and synthesised to form the inception and first draft TWMP.</p> <p>Baseline information on the status of the wetland landscape collected and compiled into a Wetland Monograph for the transboundary wetland.</p>
<p>Presentation of the zero draft to the technical management team</p>	<p>The first draft TWMP was presented to the NELSAP-GIZ Technical Management Team for appraisal</p>
<p>Participatory drafting and validation workshops</p>	<p>After incorporation of comments and input, the first draft of the TWMP was presented to the first regional workshop with feedback from Nile-TAC members obtained.</p> <p>Incorporation of comments and further information to produce the second draft of wetlands management plan which was presented at the second regional workshop held in Nairobi, Kenya on 22 and 23 November 2019.</p>

5.2 Vision

The following Vision was formulated and adopted through a participatory process involving key stakeholders in the wetland landscape:

‘A well conserved Sio-Siteko Wetland system, sustainably utilised for economic benefits in a harmonised trans-boundary relationship’

It is important to note that there was no change to the vision from the earlier aspirations captured in the Community Based Wetland Management Plan of 2009 for the wetland landscape.

5.3 Strategic Objectives of the Management Plan

The overall objective of the Sio-Siteko TWMP is ***‘to restore the wetland and ensure retention of ecosystem services for the benefit of people.’***

The Strategic Objectives are:

- To promote conservation of the Sio-Siteko wetland ecosystem and its catchment
- To promote and support adoption of sustainable sources of livelihoods for the communities' dependent on the Sio-Siteko transboundary wetland
- To support the establishment and strengthening of governance structures for the management of the Sio-Siteko transboundary wetland

5.4 Key Result Areas

Based on the biophysical and socio-economic conditions in the wetland landscape, the process of the assessment of issues, needs and opportunities, the developed vision and strategic objectives, and the prioritisation of management actions, this Transboundary Wetland Management Plan has identified key result areas under each strategic objective which will be implemented over a period of **ten years**.

Strategic Objective 1: To promote conservation of the Sio-Siteko ecosystem and its catchment

Ecological restoration involves maintaining and improving the ecological character of wetland ecosystem through sustainable management practices. It is an established fact that the integrity of the wetland ecosystems has been interfered with due to the several anthropogenic activities taking place within and around the transboundary wetland landscape. This can be attested from the problems and conflicts associated with the wetland goods and services identified in the earlier sections of this plan. The following targets will address conservation of the wetland landscape.

Target 1.1: Enhance the protection of wetland water resources for improved water quality and quantity

Target 1.2: Integrate wetland wise-use into river basin development planning

Target 1.3: Promote conservation of woody and non-woody vegetation in the wetlands for enhanced socio-economic and ecological benefits

Target 1.4: Promote adoption of sustainable fishing practices and responsible aquaculture for improved fish diversity and abundance

Target 1.5: Rehabilitate and restore 5% of degraded wetland biodiversity annually

Table 5: Summary of Management Action for wetland conservation and restoration

Strategic Objective 1: To promote conservation of the Sio-Siteko ecosystem and its catchment		
Key Result Area	Management Actions	Expected Outputs/Outcomes
1.1 Enhance the protection of wetland water resources for improved water quality and quantity	Identify and protect springs with high yield within the catchment area	Survey completed and prioritisation of springs protected to recharge wetlands
	Construct water retention ponds	Improved water quality, storm water management and flood control
	Rehabilitate or construct wastewater treatment facilities	Improved water quality and availability of potable water; and reduced incidences of water borne diseases
	Strengthen capacity of Water User Associations on catchment protection	Improved understanding of measures for catchment protection and monitoring of water resource use
1.2 Integrate wetland wise-use into river basin development planning	Develop and implement water allocation plans as a decision support tool	Equitable allocation of available resources to broader social, economic, environmental and development needs
	Conduct regular water quality and hydrological monitoring	Improved understanding of trends in water quality in the wetlands landscape
	Enforce water quality regulations within the riparian zones	Improved compliance with water quality regulations on both sides of the landscape
	Conduct environmental flow assessments and impacts of river course diversions in the wetland	Guaranteed freshwater ecosystem services and continued access to water for people
1.3 Promote conservation of woody and non-woody vegetation for enhanced socio-economic and ecological benefits	Sensitise and conduct outreach programmes on benefits and values of wetland woody and non-woody products	Better use and management of wetland vegetation and improved wetland habitats
	Integrate high value crop-friendly fruit trees and bamboo into farmland	Sustainable agricultural practices adopted leading to improved soil and water conservation
	Establish woodlot demonstration sites of mixed species in degraded sites	Sustainable source of fuelwood, poles and building materials and improved soil and water conservation.
	Establish herbaria in the wetland landscape	Valuable and useful information regarding plant species for evidence-based conservation decisions
1.4 Promote adoption of sustainable fishing practices	Strengthen capacity of Beach Management Units and fisher folk on sustainable fishing practices and systems	Improved understanding and adoption of sustainable fishing practices

and responsible aquaculture for improved fish diversity and abundance	Identify and protect fish breeding grounds (no-take zones)	Increased fish diversity and abundance in degraded/overexploited sites
	Promote sustainable aquaculture	Adoption of aquaculture to reduce pressure on capture fishery and improve food security
	Formulate and implement by-laws on fisheries and enforcement of fisheries regulations	Strengthened community and formal enforcement systems on fisheries
1.5 Rehabilitate and restore 5% of degraded wetland biodiversity annually	Establish green borders and rehabilitate demarcated and degraded sites	Recovered ecosystem functioning and improvements in water quality
	Restore land cover by planting indigenous value plants	Restored habitats contributing to reduced greenhouse emissions
	Formulate and implement by-laws on sand harvesting and enforcement of NEMA regulations	Strengthened community and formal enforcement systems on natural resource use and extraction
	Strengthen capacities of local transboundary organisations on integrated wetland restoration practices and ecosystem values	Community of practice actively engaged in local wetland conservation and restoration measures

Strategic Objective 2: To promote and support adoption of sustainable sources of livelihoods for the communities’ dependent on the Sio-Siteko transboundary wetland

The livelihoods of communities adjacent to wetland ecosystems is closely linked to the exploitation of natural resources. If unchecked, this normally leads to degradation of the quality of these resources to levels where they can no longer support their ecosystem and social resilience. Building resilience is therefore important if communities are to continue benefiting from the fragile wetland resources. Sustainable livelihoods through value addition, coupled with outreach and awareness plays a significant role in diverting attention of the local communities from overexploitation of stressed wetland resources. Livelihoods at the local level will be improved by enhancing income from existing enterprises and diversification of income from other sustainable alternative livelihood sources. The following targets will address sustainable economic development and local livelihoods.

Target 2.1: Promote paludiculture pilots in 60 acres of land for improved ecological integrity and socio-economic benefits

Target 2.2: Promote conservation of wetland resources with natural beauty and cultural heritage within the wetland landscape for ecotourism development

Target 2.3: Promote adoption of sustainable agricultural practices for improved livelihoods and food security

Target 2.4: Promote value-addition of capture fisheries and aquaculture to improve the value chain

Table 6: Summary of Management Action for livelihood enhancement

Strategic Objective 2: To promote and support adoption of sustainable sources of livelihoods for the communities' dependent on the Sio-Siteko transboundary wetland		
Key Result Area	Management Actions	Expected Outputs/Outcomes
2.1 Promote paludiculture pilots in 60 acres of land for improved ecological integrity and socio-economic benefits	Identify potential areas for paludiculture	Paludiculture pilots set up contributing to recovery of the landscape water regime
	Establish demonstration sites showcasing good land use practices for knowledge exchange	Reduced net greenhouse gas emissions from agriculture, forests and other forms of land use
	Strengthen capacity of crop farmers on sustainable farming practices (soil and water conservation measures)	Reduced runoff and siltation of the Lake and wetlands leading to improved water quality and soil productivity
2.2 Promote conservation of wetland resources with natural beauty and cultural heritage for ecotourism development	Identify and develop ecotourism sites and packages with consideration of cultural and religious values	Increased incomes and awareness towards conservation of natural resources
	Build capacity of local communities to serve as tour guides	Employment opportunities and improved community well-being
2.3 Promote adoption of sustainable agricultural practices for improved livelihoods and food security	Promote the adoption of locally suited practices and technologies for climate smart agriculture e.g. drought tolerant crops, improved livestock breeds etc.	Improved understanding and adoption of climate smart agriculture practices for increased community and ecosystem resilience
	Establish demonstration sites showcasing good agricultural practices for knowledge exchange e.g. mulching	Improved awareness and adoption of sustainable agricultural practices
	Promote establishment of agro-based micro and small enterprises for small holders	Increase in net return per unit of product sold
	Formulate and implement grazing by-laws and zoning plans where appropriate	Strengthened community and formal enforcement systems on land use
2.4 Promote value-addition of capture fisheries and aquaculture to	Identify and promote uptake of sustainable aquaculture and small-scale fisheries	Diverse livelihood activities undertaken by local communities and supplementing income streams
	Improve fish post-harvest handling and value addition	Improved access and use of resources in a sustainable manner

improve the value chain	Promote business and enterprise models for small scale fisher folk and value chain actors	Improved climate resilience in aquaculture production systems and fisheries livelihoods
	Promote localised fisheries management and broader-scale governance improvements	Improved enabling environment for efficient value chains and equitable livelihoods

Strategic Objective 3: To support the establishment and strengthening of governance structures for the management of the Sio-Siteko transboundary wetland

Both Kenya and Uganda have well established legal structures for managing their wetland ecosystems and resources thereof. In a transboundary set up, harmonious governance structures must be sought, guided either by regional or international legal frameworks or mutual agreements through by – laws. Section 3 of this TWMP has given a broad outline of national, regional and international institutional and legal frameworks for managing wetland ecosystems. Successful management relies heavily on building adequate institutional capacity across relevant sectors with a view of promoting sustainable management. In this TWMP, several governance issues have been incorporated in different components of the implementation framework. The implementation of the plan will be conducted by elected community members and government officials from the grassroots to transboundary level in line with national regulations. This is clearly exemplified in Section 6 on implementation strategy. The following targets will address governance issues:

Target 3.1: Enhance transboundary coordination and cooperation of transboundary wetland institutions

Target 3.2: Enhance communication, education and public participation and awareness

Table 7: Summary of Management Action for governance strengthening

Strategic Objective 3: To support the establishment and strengthening of governance structures for the management of the Sio-Siteko transboundary wetland		
Key Result Area	Management Actions	Expected Outputs/Outcomes
3.1 Enhance transboundary coordination and cooperation of transboundary wetland institutions	Establish Transboundary Wetland Management Committees	Functional structure enhancing coordination and conservation efforts in the wetland landscape
	Strengthen capacity of relevant institutions to effectively manage the wetland landscape	Improved cooperation and understanding of transboundary wetland functions and systems
	Facilitate transboundary exchange visits for cross-learning and experience sharing	Enhanced skills and knowledge on wetland conservation and management
	Facilitate joint launch of the management plan	Ownership of the management plan and its interventions providing for collaborative implementation

3.2 Enhance communication, education and public participation and awareness	Conduct education and awareness campaigns at transboundary level on the importance of the wetland	Improved awareness on the values of wetlands through outreach campaigns and public awareness
	Strengthen community groups to champion conservation activities	Actively engaged community groups supporting local authorities with resource monitoring and implementation of prioritised actions
	Develop and disseminate knowledge products on the Sio-Siteko wetland	Readily available material and information providing for Improved awareness on the values and wise-use of wetlands
	Develop and implement resource use conflict resolution mechanisms	Conflict resolution mechanisms and structures adopted and implemented

SECTION SIX: MANAGEMENT PROGRAMMES

VISION: A WELL CONSERVED SIO-SITEKO WETLAND SYSTEM, SUSTAINABLY UTILISED FOR ECONOMIC BENEFITS IN A HARMONISED TRANSBOUNDARY RELATIONSHIP												
STRATEGIC OBJECTIVE 1: To promote conservation of the Sio-Siteko ecosystem and its catchment												
RESULT 1.1: Enhance the protection of wetland water resources for improved water quality and quantity												
MANAGEMENT ACTION	UNIT	TARGET	INDICATORS	ANNUAL TARGETS (YEARS)					RESPONSIBLE INSTITUTIONS IN UGANDA	RESPONSIBLE INSTITUTIONS IN KENYA	ESTIMATED BUDGET	
				1	2	3	4	5			UGX	KES
1.1.1. Identify and protect springs with high yield within the catchment area	No.	100	Springs identified and protected	20	20	20	20	20	MWE; Kyoga Water Management Zone; LVEMP; Busia District; BUDA; LUMA; BUMASI	Water Resources Authority; Kenya Water Towers Agency; Kenya Forest Service; County Government of Busia; WRUAs; SSWUA	550M	15M
1.1.2 Construct water retention ponds	No.	4	Retention ponds constructed	-	1	1	1	1	MWE; Kyoga Water Management Zone; DWRM; LVEMP; NEMA; Busia District; BUDA; LUMA; BUMASI	MoWS&I; Water Resources Authority; County Government of Busia; NEMA; WRUAs; SSWUA	250M	7M
1.1.3 Rehabilitate or construct wastewater treatment facilities	No.	2	Wastewater treatment facilities operational	-	1	-	1	-	MWE; Busia Municipal Council; National Water and Sewerage Corporation	MOWS&I; Busia Water and Sewerage Services Company; Lake Victoria North Water Works Development Agency; County Government of Busia;	1.8B	50M

1.1.4 Strengthen Capacity of Water User Associations on catchment protection	No.	8	Water User Associations trained	-	4	4	-	-	MWE; NFA, LUMA, BUDA; BUMASI; Kyoga Water Management Zone; Nature Uganda	TFS; WRA; NEMA; WRUAs, SSWUA; Wetlands International; Eco-green	280M	8M
RESULT 1.2: Integrate wetland wise-use into river basin development planning for improved water quantity and quality												
1.2.1 Develop and implement water allocation plans as a decision support tool	No.	2	Plans developed and implemented	-	1	-	1		MWE; Kyoga Water Management Zone; LVEMP; Busia District; Busia Municipal Council; BUDA; LUMA; BUMASI	MoWS&I; WRA; Busia County Government; WRUAs; SSWUA	800M	2M
1.2.2 Conduct regular water quality and hydrological monitoring	No.	120	Monthly monitoring tests	24	24	24	24	24	NEMA; Busia District; DWRM; Kyoga WMZ; UWA; MWE	NEMA; MoWS&I; WRA; Busia County Government; WRUAs; SSWUA	100M	2.8M
1.2.3 Enforce water quality regulations within the riparian zones	No.	40	Quarterly compliance assessment reports	8	8	8	8	8	NEMA; Busia District; DWRM; Kyoga WMZ; UWA; MWE	NEMA; MoWS&I; WRA; Busia County Government; WRUAs; SSWUA	100M	2.8M
1.2.4 Conduct environmental flow assessments and impacts of river course diversions on the wetland	No.	1	Assessment report and data on river flow	-	1	-	-	-	NEMA; Busia District; DWRM; Kyoga WMZ; UWA; MWE; NFA	NEMA; MoWS&I; WRA; Busia County Government; WRUAs; SSWUA; Kenya Water Towers Agency; TFS	600M	16M
RESULT 1.3: Promote conservation of woody and non-woody vegetation for enhanced socio-economic and ecological benefits												
1.3.1 Sensitise and conduct outreach programmes on benefits and values	No.	40	Outreach sessions conducted	8	8	8	8	8	NFA; Busia District Production Office; UWA; LUMA; BUDA; BUMASI; Farmers groups	KFS; KWS; WRA; County Government of Busia; WRUAs; SSWUA	1B	28M

of wetland woody and non-woody products												
1.3.2 Integrate high-value crop friendly fruit trees and bamboo into farmland	Trees	600,000	Number of trees planted	250000	120000	120000	60000	50000	MAAIF; MoF, MWE; NFA; UWA; NEMA, District Authorities, MWE; CBOs, NGOs, Sub County officials; LC II; LC I; LUMA; BUMASI; BUDA	MoE&F, KEFRI MoWS&I, SSWUA, County Government of Busia; GSCSS; WRUAs	7B	22M
1.3.3 Establish woodlot demonstration sites of mixed species in degraded sites	No.	8	Woodlots established per sub-county	-	2	2	2	2	MAAIF; MoF, MWE; NFA; UWA; NEMA, District Authorities, MWE; CBOs, NGOs, Sub County officials; LC II; LC I; LUMA; BUMASI; BUDA	MoE&F, KEFRI MoWS&I, SSWUA, County Government of Busia; GSCSS; WRUAs; Sub-Counties	280M	8M
1.3.4 Establish herbaria in the wetland landscape	No.	2	Number of herbariums established	-	1	1	-	-	MAAIF; MoF; MWE; NFA; UWA; LVBC; NEMA; District Authorities; NGOs, Sub-County officials; LC II; LC I; LUMA; BUMASI; BUDA	MoE&F; KEFRI; County Government of Busia; MoWS&I, TFS; SSWUA; WRUAs	2M	68M
RESULT 1.4: Promote adoption of sustainable fishing practices and responsible aquaculture for improved fish diversity and abundance												
1.4.1 Strengthen capacity of fisher folk (BMUs) on sustainable fishing practices and systems	No.	500	BMUs and community members trained	100	100	100	100	100	MAAIF; Local Government; NaFIRRI; LVFO LUMA; BMUs; BUMASI; BUDA; Local community	Dept. of Fisheries; SSWUA; WRUAs; Community; BMUs	1B	28M
1.4.2 Identify and protect fish breeding grounds (no-take zones)	No.	10	No. of fish breeding grounds demarcated and protected	3	2	1	2	2	MAAIF; Local Government; NaFIRRI; LVFO LUMA; BMUs; BUMASI; BUDA; Local community	Dept. of Fisheries; SSWUA; WRUAs; Community; BMUs	180M	5M

1.4.3 Promote sustainable aquaculture	No.	200	Aquaculture infrastructure e.g. ponds, cages set, fingerlings	50	50	50	50	-	MAAIF; Local Government; NaFIRRI; LVFO LUMA; BMUs; BUMASI; BUDA; Local community	Dept. of Fisheries; SSWUA; WRUAs; Community; County Government of Busia; BMUs	6B	17M
1.4.4 Formulate and implement by-laws on fisheries and enforcement of fisheries regulations	No.	4	By laws developed through a participatory process	-	2	2	-	-	MAAIF; Local Government; NaFIRRI; LVFO LUMA; BMUs; BUMASI; BUDA; Local community	Dept. of Fisheries; SSWUA; WRUAs; Community; BMUs; County Government of Busia	150M	4.2M
RESULT 1.5: Rehabilitate and restore 5% of degraded wetland biodiversity annually												
1.5.1 Establish green borders and rehabilitate degraded sites	-	-	Degraded areas identified	-	-	-	-	-	BUDA; BUMASI, LUMA, MAAIF; District; LVFO, NEMA; LCI; LCII; NFA; MWE	SSWUA; KFS; DWIENR; Ecogreen; LVFO; Dept. of Agriculture, NEMA; MOE&F; Kenya Water Towers Agency; KEFRI; MOWS&I	70M	2M
	No.	150	Tree nurseries established (including bamboo)	30	30	30	30	30			520M	14M
	Area	5 ha	Rehabilitated area with tree planting	-	2	2	1	-			87.5M	2.5M
1.5.2 Restore land cover by planting indigenous value crops e.g. Napier grass and fodder	Area	50 acres	Degraded area restored	-	10	20	20	-	BUDA; BUMASI; LUMA, MAAIF; District; LVFO, NEMA; LCI; LCII; NFA; MWE	SSWUA; KFS; DWIENR; Ecogreen; LVFO; Dept. of Agriculture, NEMA; MOE&F; Kenya Water Towers Agency; KEFRI; MOWS&I	70M	2M
1.5.3 Formulate and implement by-laws on sand harvesting	No.	4	By laws developed through a	-	2	2	-	-	BUDA; BUMASI; LUMA, MAAIF; District; LVFO, NEMA; LCI; LCII; NFA	SSWUA; KFS; DWIENR; Ecogreen; LVFO; Dept. of Agriculture, NEMA; MOE&F; Kenya Water	42M	1.2M

and enforcement of NEMA regulations			participatory process							Towers Agency; KEFRI; MOWS&I		
1.5.4 Strengthen capacities of local transboundary organisations on integrated wetland restoration practices and ecosystem values	No.	500	People reached	100	100	100	100	100	MAAIF; Local Government; NaFIRRI; LVFO LUMA; BMUs; BUMASI; BUDA; Local community; LVFO; UWA; NEMA; LCI; LCII; NFA	Dept. of Fisheries; SSWUA; WRUAs; Community; BMUs; Department of Agriculture; TFS; NEMA	1B	28M

STRATEGIC OBJECTIVE 2: To promote and support adoption of sustainable sources of livelihoods for the communities' dependent on the Sio-Siteko transboundary wetland

RESULT 2.1: Promote paludiculture pilots in 60 acres of land for improved ecological integrity and socio-economic benefits

2.1.1 Identify potential areas for paludiculture	Area	60 acres	Paludiculture sites identified	-	20	20	20	-	MAAIF; MoT; MoF; NARO, District and Sub County officers; LC II; LC I; NGOs; LUMA; BUMASI; BUDA; NFA	Department of Agriculture; NEMA; TFS; Sub-counties; SSWUA; WRUAs	35M	1M
2.1.2 Establish demonstration sites showcasing good land use practices for knowledge exchange	No.	6	Demonstration sites established	2	2	2	0	0	MAAIF; MoT; MoF; NARO, District and Sub County officers; LC II; LC I; NGOs; LUMA; BUMASI; BUDA; NFA	Department of Agriculture; NEMA; TFS; Sub-counties; SSWUA; WRUAs	100M	3M
2.1.3 Strengthen capacity of crop farmers on sustainable land use practices	No.	500	Farmers trained	100	100	100	100	100	MAAIF; MoT; MoF; NARO, District and Sub County officers; LC II; LC I; NGOs; LUMA; BUMASI; BUDA; NFA	Department of Agriculture; NEMA; TFS; Sub-counties; SSWUA; WRUAs	1B	28M

RESULT 2.2: Promote conservation of wetland resources with natural beauty and cultural heritage for ecotourism development

2.2.1 Identify and develop ecotourism sites and packages with consideration of cultural and religious values	No.	4	Eco-tourism sites operational	-	2	-	2	-	National and District government officials; community representatives; NGOs and Private Sector	National and County government officials; community representatives; NGOs and Private Sector	1.5B	42M
2.2.2 Build capacity of local communities to serve as tour guides	No.	40	Tour guides employed and trained	-	20	-	20	-	National and District government officials; community representatives; NGOs and Private Sector	National and County government officials; community representatives; NGOs and Private Sector	300M	8.4M
RESULT 2.3: Promote the adoption of sustainable agricultural practices for improved livelihoods and food security												
2.3.1 Promote the adoption of locally suited practices and technologies for climate smart agriculture e.g. drought tolerant crops, improved livestock breeds	Acres	10	High yielding crops planted	100	50	50	50	50	MAAIF; MoT; MoF; NARO, District and Sub County officers; LC II; LC I; NGOs; LUMA; BUMASI; BUDA; NFA	Department of Agriculture; NEMA; TFS; Sub-counties; SSWUA; WRUAs	2B	60M
	No.	100	Livestock breeds distributed	20	20	20	20	20			105M	3M
2.3.2 Establish demonstration sites showcasing good agricultural practices for knowledge exchange	No.	16	Demonstration sites established and operational	4	4	4	4	-	MAAIF; MoT; MoF; NARO, District and Sub County officers; LC II; LC I; NGOs; LUMA; BUMASI; BUDA; NFA	Department of Agriculture; NEMA; TFS; Sub-counties; SSWUA; WRUAs; WRA	300M	8.4M
2.3.3 Promote establishment of agro-based micro and small enterprises for small	No.	10	Cottage industries established and operational	2	6	2	0	0	MAAIF; Busia District; crop farmers; District Production Departments; Agricultural Extension Officers; NFA; CFMs	Ministry of Agriculture, Livestock and Fisheries; County Government of Busia; TFS; Sub-Counties; WRUAs	1.2B	850M

holders e.g. pasture preservation etc.	No.	200	Farmers trained on value addition	50	50	25	25	0				
2.3.4 Formulate and implement grazing by-laws and zoning plans where appropriate	No.	4	By laws developed through a participatory process	-	2	2	-	-	MAAIF; Busia District; crop farmers; District Production Departments; Agricultural Extension Officers; NFA; CFMs	Ministry of Agriculture, Livestock and Fisheries; County Government of Busia; TFS; Sub-Counties; WRUAs	150M	4.2M
RESULT 2.4: Promote value-addition of capture fisheries and aquaculture to improve value-chain												
2.4.1 Identify and promote uptake of sustainable aquaculture and small scale fisheries	No.	4	Sustainable alternatives identified, disseminated, operational and reported	2	1	1	-	-	MAAIF; Local Government; NaFIRRI; LVFO; LUMA; BMUs; BUMASI; BUDA; Local community	Department of Fisheries; SSWUA; WRUAs; Community; County Government of Busia; BMUs	300M	8.4M
2.4.2 Improve fish post-harvest handling and value addition	No.	50	Storage facilities established and functioning	10	10	10	10	10	MAAIF; Local Government; NaFIRRI; LVFO; LUMA; BMUs; BUMASI; BUDA; Local community	Department of Fisheries; SSWUA; WRUAs; Community; County Government of Busia; BMUs	2B	60M
2.4.3 Promote business and enterprise models for small scale fisher folk and value chain actors	No.	200	Pond, cage farming and aquaculture models prioritised	50	100	50	-	-	MAAIF; Local Government; NaFIRRI; LVFO; LUMA; BMUs; BUMASI; BUDA; Local community	Department of Fisheries; SSWUA; WRUAs; Community; County Government of Busia; BMUs	4B	120M
2.4.4 Promote localised fisheries management and broader-scale governance improvements	No.	40	Monitoring reports from fisheries patrols by BMUs and monitoring groups	8	8	8	8	8	MAAIF; Local Government; NaFIRRI; LVFO; LUMA; BMUs; BUMASI; BUDA; Local community	Department of Fisheries; SSWUA; WRUAs; Community; County Government of Busia; BMUs	150M	4.2M

STRATEGIC OBJECTIVE 3: To support the establishment and strengthening of governance structures for the management of the Sio-Siteko transboundary wetland

RESULT 3.1: Enhance transboundary coordination and cooperation of transboundary wetland institutions

3.1.1 Establish Transboundary Wetland Management Committees	No.	1	Transboundary Wetland Management Committee in place and active	1	-	-	-	-	MWE; National and District government officials; community representatives; NGOs and Private Sector; GIZ; NBI/NELSAP; IGAD	MoWS&I; National and County government officials; community representatives; NGOs and Private Sector; GIZ; NBI/NELSAP; IGAD	100M	2.85M
3.1.2 Strengthen capacity of relevant institutions to effectively manage the wetland landscape	No.	60	Number of awareness meetings held and reports produced	12	12	12	12	12	MWE; National and District government officials; community representatives; NGOs and Private Sector; GIZ; NBI/NELSAP; IGAD	MoWS&I; National and County government officials; community representatives; NGOs and Private Sector; GIZ; NBI/NELSAP; IGAD	500M	14M
3.1.3 Facilitate transboundary exchange visits for cross-learning and experience sharing	No.	10	Exchange visits organised	2	2	2	2	2	MWE; National and District government officials; community representatives; NGOs and Private Sector; GIZ; NBI/NELSAP; IGAD	MoWS&I; National and County government officials; community representatives; NGOs and Private Sector; GIZ; NBI/NELSAP; IGAD	500M	14M
3.1.4 Facilitate joint launch of the Transboundary Wetland Management Plan	No.	6	Stakeholder consultation meetings	6	-	-	-	-	MWE; National and District government officials; community representatives; NGOs and Private Sector; GIZ; NBI/NELSAP; IGAD	MoWS&I; National and County government officials; community representatives; NGOs and Private Sector; GIZ; NBI/NELSAP; IGAD	35M	1M

RESULT 3.2: Enhance communication, education and public participation and awareness

3.2.1 Conduct education and awareness campaigns at transboundary level on the importance of the wetland	No.	30	Training sessions	6	6	6	6	6	MWE; Kyoga Water Management Zone; DWRM; LVEMP; NEMA; Busia District; BUDA; LUMA; BUMASI	MoWS&I; Water Resources Authority; County Government of Busia; NEMA; WRUAs; SSWUA	120M	3.4M
3.2.2 Strengthen community groups to champion conservation activities	No.	30	No. of community groups trained	10	10	10	-	-	MWE; Kyoga Water Management Zone; DWRM; LVEMP; NEMA; Busia District; BUDA; LUMA; BUMASI	MoWS&I; Water Resources Authority; County Government of Busia; NEMA; WRUAs; SSWUA	500M M	900M
3.2.3 Develop and implement resource use conflict resolution mechanisms	No.	-	Functional mechanisms established	-	-	-	-	-	MWE; National and District government officials; community representatives; NGOs and Private Sector; GIZ; NBI/NELSAP; IGAD	MoWS&I; National and County government officials; community representatives; NGOs and Private Sector; GIZ; NBI/NELSAP; IGAD	500M	320M

SECTION SEVEN: IMPLEMENTATION STRATEGY

Successful implementation strategy for community-based wetland management plan requires adequate representation and involvement of grassroots resource users (primary) and other stakeholders in a co-management approach. During the consultative engagement workshops, participants from the both Kenya and Uganda provided their accepted management structures that would yield sustainable results (Figure 19). The different levels of engagement identified for complementarity with respective suitable representatives as presented below.

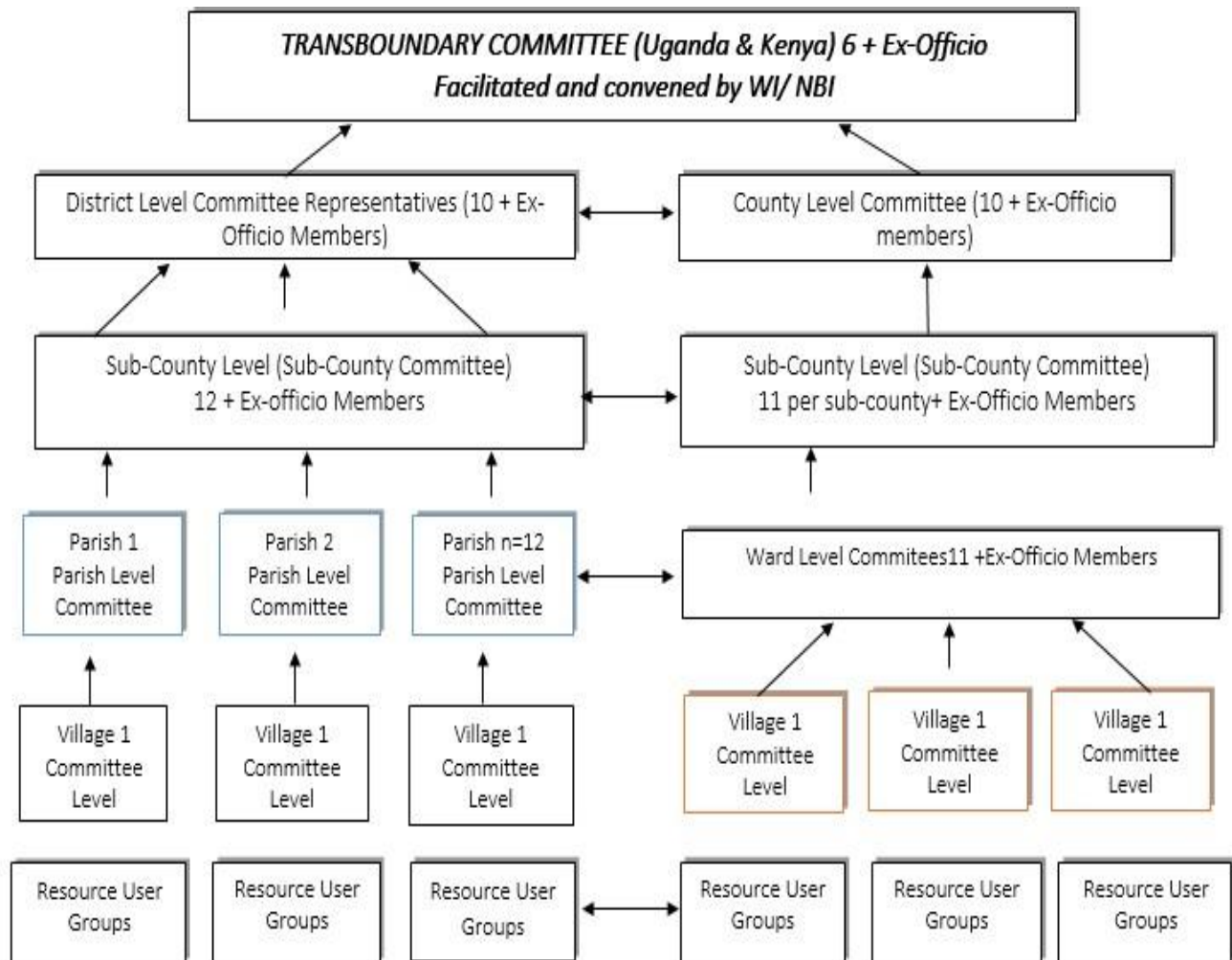


Figure 19: Sio-Siteko TWMP Implementation Structure (Wetlands International 2019b)



SECTION EIGHT: MONITORING AND EVALUATION ARRANGEMENTS

This TWMP will be implemented over a period of ten years. During this time, changes are expected in the context of the environment in which the stakeholders operate and in the wetland landscape. Therefore, there is need to develop an adaptive management framework that ensures the TWMP maintains relevance through a cycle of periodic reviews of monitoring and adaptation.

The monitoring and evaluation framework will be utilised to build an information base and identify critical information gaps. This necessitates meaningful dialogue and engagement with all stakeholders. An evaluation of effectiveness and efficiency of the TWMP should take place on a 5-year cycle. This evaluation should also include the review of the strategic objectives. A mid-term review will be undertaken after 2.5 years.

The effectiveness and sustainability of this monitoring plan is dependent on the following:

- Participatory implementation of the TWMP;
- Timely reporting of feedback to all stakeholders that aid decision making and adaptive management; and
- Active coordination and cooperation amongst the transboundary wetland communities/stakeholders.

The Monitoring and evaluation matrix is provided under Table 9.

Table 8: Monitoring and Evaluation Matrix

Strategic Objective 1: To promote conservation of the Sio-Siteko and its catchment area				
Management action	Units	Target	Performance Indicators	Means of verification
RESULT 1.1: Enhance the protection of wetland water resources for improved water quality and quantity				
1.1.1. Identify and protect springs with high yield within the catchment area	No.	100	Number of springs identified and protected	<ul style="list-style-type: none"> • Mission reports • Spring protection plan • Monitoring plan developed
1.1.2 Construct water retention ponds	No.	4	Number of retention ponds constructed and operational	<ul style="list-style-type: none"> • Water quality reports • Storm water retention level readings
1.1.3 Rehabilitate or construct wastewater treatment facilities	No.	2	<ul style="list-style-type: none"> • Wastewater treatment facilities in place and operational • Reduction in COD concentration of sewage inflow and volume of inflow 	<ul style="list-style-type: none"> • Detailed water quality verification testing reports • Maps and area statistics of wastewater treatment facilities
1.1.4 Strengthen Capacity of Water User Associations on catchment protection	No.	8	<ul style="list-style-type: none"> • Improved participation in catchment protection measures • Improved water resources management 	<ul style="list-style-type: none"> • Training modules • List of participants trained • Training reports
RESULT 1.2: Integrate wetland wise-use into river basin development planning for improved water quantity and quality				
1.2.1 Develop and implement water allocation plans as a decision support tool	No.	2	<ul style="list-style-type: none"> • Water allocation plans that meets various ecological and socio-economic needs operationalised • Management committee set up to oversee management plan • Conserved catchment areas 	<ul style="list-style-type: none"> • Water allocation plans • Management committee reports • Water quantity and quality reports
1.2.2 Conduct regular water quality and hydrological monitoring	No.	120	<ul style="list-style-type: none"> • No. of households accessing clean and safe water for domestic use 	<ul style="list-style-type: none"> • Water quality test reports • Compliance monitoring reports

			<ul style="list-style-type: none"> • Reduced volume of sediment and siltation into water sources within the wetland 	
1.2.3 Enforce water quality regulations within the riparian zones	No.	40	<ul style="list-style-type: none"> • No. of households accessing clean and safe water for domestic use • Reduced volume of sediment and siltation into water sources within the wetland 	Quality monitoring and compliance reports
1.2.4 Conduct environmental flow assessments and impacts of river course diversions on the wetland	No.	1	<ul style="list-style-type: none"> • Equitable and fair allocation of the e-flow plan • Flooding regimes throughout the plan period monitored and reported 	E-flow allocation assessment reports
RESULT 1.3: Promote conservation of woody and non-woody vegetation for enhanced socio-economic and ecological benefits				
1.3.1 Sensitise and conduct outreach programmes on benefits and values of wetland woody and non-woody products	No.	40	<ul style="list-style-type: none"> • Improved participation in sustainable natural resource use and management • Improved water resources management and biomass productivity 	<ul style="list-style-type: none"> • Training reports • Changes in trends photos
1.3.2 Integrate high-value crop friendly fruit trees and bamboo into farmland	Trees	600,000	<ul style="list-style-type: none"> • Increased and diversified sources of income • Improved soil and water conservation 	<ul style="list-style-type: none"> • Progress reports • Number of visits recorded motivating replication
1.3.3 Establish woodlot demonstration sites of mixed species in degraded sites	No.	8	<ul style="list-style-type: none"> • Improved soil and water conservation • Sustainable sources of fuelwood, poles and building materials 	<ul style="list-style-type: none"> • Report verifying density and species of vegetation in the woodlot • Number of visits recorded motivating replication
1.3.4 Establish herbaria in the wetland landscape	No.	2	Easy to access information on plant species, their distribution and traits informing conservation decisions	Herbariums available with diverse herbs and shrubs
RESULT 1.4: Promote adoption of sustainable fishing practices and responsible aquaculture for improved fish diversity and abundance				
1.4.1 Strengthen capacity of fisher folk (BMUs) on sustainable fishing practices and systems	No.	500	Improved understanding and adoption of sustainable fishing practices	<ul style="list-style-type: none"> • Number of BMUs and community members trained • Training reports and modules

1.4.2 Identify and protect fish breeding grounds (no-take zones)	No.	10	Increased fish diversity and abundance in degraded/overexploited sites	<ul style="list-style-type: none"> • Frame survey reports • Monitoring, control and surveillance reports
1.4.3 Promote sustainable aquaculture	No.	150	Increased adoption of aquaculture to reduce pressure on capture fishery	Number of ponds and hatcheries set up and handed over to communities
1.4.4 Formulate and implement by-laws on fisheries and enforcement of fisheries regulations	No.	8	Strengthened community and formal enforcement systems on fisheries	<ul style="list-style-type: none"> • BMU reports • Operational regulations on local fisheries governance and management in place
RESULT 1.5: Rehabilitate and restore 5% of degraded wetland biodiversity annually				
1.5.1 Establish green borders and rehabilitate degraded sites	No. Area	150 5 ha	<ul style="list-style-type: none"> • Number of nursery beds established and trees planted • Acreage and type of diversity of restored/rehabilitated sites • Improvements in water quality (reduced sedimentation) 	<ul style="list-style-type: none"> • Field monitoring reports on restoration • Satellite maps on land use land cover trends
1.5.2 Restore land cover by planting indigenous value crops e.g. Napier grass and fodder	Area	50 acres	<ul style="list-style-type: none"> • Improved participation in sustainable land use practices • Improved water resources management and crop productivity 	<ul style="list-style-type: none"> • Training reports • Changes in trends photos
1.5.3 Formulate and implement by-laws on sand harvesting and enforcement of NEMA regulations	No.	4	Strengthened community and formal enforcement systems on fisheries	Operational regulations on sand harvesting governance and management in place
1.5.4 Strengthen capacities of local transboundary organisations on integrated wetland restoration practices and ecosystem values	No.	500	Improved understanding, adoption and participation in wetland restoration measures	<ul style="list-style-type: none"> • Training modules • List of participants trained • Training reports
STRATEGIC OBJECTIVE 2: To promote and support adoption of sustainable sources of livelihoods for the communities' dependent on the Sio-Siteko transboundary wetland				
RESULT 2.1: Promote paludiculture pilots in 60 acres of land for improved ecological integrity and socio-economic benefits				

2.1.1 Identify potential areas for paludiculture	Area	60 acres	Paludiculture pilots set up contributing to recovery of the landscape water regime	Frame survey reports
2.1.2 Establish demonstration sites showcasing good land use practices for knowledge exchange	No.	6	<ul style="list-style-type: none"> • Increased and diversified sources of income • Improved participation in sustainable land use practices 	<ul style="list-style-type: none"> • Demonstration sites established • Number of visits recorded motivating replication
2.1.3 Strengthen capacity of crop farmers on sustainable land use practices	No.	500	<ul style="list-style-type: none"> • Improved participation in sustainable land use practices • Improved water resources management and crop productivity 	<ul style="list-style-type: none"> • Training reports • Changes in trends photos
RESULT 2.2: Promote wise use and value addition to wetland plants for improved livelihoods of 20% of households in the wetland landscape annually				
2.2.1 Identify and develop ecotourism sites with consideration of cultural and religious values	No.	4	Increased incomes and awareness towards conservation of natural resources	<ul style="list-style-type: none"> • Training modules • List of participants trained • Training reports
2.2.2 Build capacity of local communities to serve as tour guides	No.	40	Employment opportunities and improved community well-being	Monitoring reports
RESULT 2.3: Promote adoption of sustainable agricultural practices for improved livelihoods and food security				
2.3.1 Promote the adoption of locally suited practices and technologies for climate smart agriculture e.g. drought tolerant crops, improved livestock breeds	Acres	10	Improved understanding and adoption of climate smart agriculture practices such as paludiculture for increased community and ecosystem resilience	Diversity of high yielding crops planted and livestock breed distributed
	No.	100		
2.3.2 Establish demonstration sites showcasing good agricultural practices for knowledge exchange e.g. mulching	No.	16	<ul style="list-style-type: none"> • Increased and diversified sources of income • Improved participation in sustainable agricultural practices 	<ul style="list-style-type: none"> • Demonstration sites established • Number of visits recorded inspiring replication and upscaling
2.3.3 Promote establishment of agro-based micro and small enterprises for small holders e.g. pasture preservation	No.	10	<ul style="list-style-type: none"> • Cottage industries established • Farmers trained on value addition • Increase in net return per unit of product sold 	<ul style="list-style-type: none"> • Field visit reports • Training reports • Attendance lists
	No.	200		

2.3.4 Formulate and implement grazing by-laws and zoning plants where appropriate	No.	4	<ul style="list-style-type: none"> Improved capacity of local communities to address land use challenges Decreased cases of overgrazing and conflicts reported 	<ul style="list-style-type: none"> Operational regulations on local land use governance and management in place
RESULT 2.4: Promote value-addition of capture fisheries and aquaculture practices to improve the value chain				
2.4.1 Identify and promote uptake of sustainable aquaculture and small scale fisheries	No.	4	<ul style="list-style-type: none"> Type and diversity of sustainable alternatives identified, disseminated and operationalised Increased and diversified sources of income 	<ul style="list-style-type: none"> Field monitoring reports Training reports Books of accounts on IGAs
2.4.2 Improve fish post-harvest handling and value addition	No.	50	<ul style="list-style-type: none"> Type and scale of aquaculture infrastructure i.e. ponds, cages and storage facilities established Improved access and use of resources in a sustainable manner 	<ul style="list-style-type: none"> Field monitoring reports on aquaculture infrastructure in place Reports on maintenance activities in place
2.4.3 Promote business and enterprise models for small scale fisher folk and value chain actors	No.	200	Increased production and value addition of fisheries resources	<ul style="list-style-type: none"> Training reports No. of community groups trained on site selection, pond construction and management reported
2.4.4 Promote localised fisheries management and broader-scale governance improvements	No.	20	Improved enabling environment for efficient value chains and equitable livelihoods	BMU financial reports
STRATEGIC OBJECTIVE 3: To support the establishment and strengthening of governance structures for the management of the Sio-Siteko transboundary wetland				
RESULT 3.1: Enhance transboundary coordination and cooperation of transboundary wetland institutions				
3.1.1 Establish Transboundary Wetland Management Committees (TWMCs)	No.	1	Functional TWMCs enhancing coordination and conservation efforts in the wetland landscape	<ul style="list-style-type: none"> TWMCs list of members TWMC Terms of Reference
3.1.2 Strengthen capacity of relevant institutions to effectively manage the wetland landscape	No.	60	Improved understanding of transboundary wetland functions and systems	<ul style="list-style-type: none"> Reports Attendance lists Copies of training manuals

			<ul style="list-style-type: none"> Improved participation and decision making on transboundary wetland conservation initiatives 	
3.1.3 Facilitate transboundary exchange visits for cross-learning and experience sharing	No.	10	<ul style="list-style-type: none"> Exchange visits held with experiences shared upscaled or replicated Enhanced skills and knowledge on wetland conservation and management 	<ul style="list-style-type: none"> List of participants Follow up and monitoring reports
3.1.4 Facilitate joint launch of the management plan	No.	1	Launch event held providing for wide ownership and implementation of the plan	<ul style="list-style-type: none"> List of participants Launch media coverage Signed TWMP
RESULT 3.2: Enhance communication, education and public participation and awareness				
3.2.1 Conduct education and awareness campaigns at transboundary level on the importance of the wetland	No.	30	<ul style="list-style-type: none"> Improved awareness on the values of wetlands through outreach campaigns and public awareness Enhanced uptake of conservation measures 	<ul style="list-style-type: none"> Outreach materials developed Training modules Number and list of participants Training reports
3.2.2 Strengthen community groups to champion conservation activities	No.	30	Actively engaged community groups supporting local authorities with resource monitoring	<ul style="list-style-type: none"> Training modules Number and list of trained participants Training reports
3.2.3 Develop and implement resource use conflict resolution mechanisms	No.	-	Reduced instances of natural resource use conflicts reports	<ul style="list-style-type: none"> Number of conflict resolution mechanisms adopted and implemented Monitoring reports

REFERENCES

1. Behangana, M. (2019). *Status of biodiversity of herpetofauna in three selected wetlands in Uganda: Sio Siteko, Sango Bay – Minziro and Semliki Delta*. Dept. of Environmental Management, Makerere University, Uganda
2. Beyene, Z and Wadley G. (2004) Common goods and the common good: Transboundary natural resources, principled cooperation, and the Nile Basin Initiative
3. BirdLife International (2020) Important Bird Areas factsheet: Sio Port swamp. Downloaded from <http://www.birdlife.org> on 31/05/2020
4. Climate Change Profile Uganda, Ministry of Foreign Affairs of the Netherlands, April 2018
5. Climate Service Center Germany (2015). Climate-fact-sheet. Uganda. Updated version 2015 <https://www.climate-service-center.de/products_and_publications/fact_sheets/climate_fact_sheets/index.php.en>
6. Ramsar Convention on Wetlands (2002) *New Guidelines for management planning for Ramsar sites and other wetlands*, viewed 31 May 2019
7. Government of Kenya (2013). Busia County Integrated Development Plan.
8. IGAD (2017). *IGAD Regional Water Resources Policy and Protocol – Principles and Lessons*. Presented at the 1st Sio-Malaba-Malakisi basin stakeholders’ consultative workshop for the initiation of a Benefit Opportunities Assessment Dialogue, May 15th – 19th 2017, at Kisumu Imperial Hotel, Kenya
9. IUCN (2019). IUCN Red List of Threatened Species. Version 2019.3. <www.iucnredlist.org>. Downloaded on 15 July 2019.
10. Nile Basin Initiative (2009) *Sio - Siteko Transboundary Management Plan*. Production of the Wetlands and Biodiversity Conservation component of the Nile Transboundary Environmental Action Project. Nilebasin Initiative Secretariat.
11. Kenya National Bureau of Statistics (2018). Economic Survey 2018. Downloaded from: <www.knbs.or.ke/download/economic-survey-2018/>
12. KNBS (2010). The 2009 Kenya population and housing census (Vol. 1). Kenya National Bureau of Statistics.
13. LVEMP I (2005) Regional Lessons Learnt Final Report. Lake Victoria Environmental Management Project
14. Masai D.M, J.E Ojuok and W. Ojwang (2001). Fish species composition, distribution and abundance in Lake Victoria basin, Kenya. 13pp
15. Maithya, J. and Jembe B.T. (1998). A survey of the Ichthyofauna of Lake Kanyaboli and small water bodies: Alternative Refugia for endangered Fish species. *Afr. J. Trop. Hydrobiol. Fish.* Vol. 8. NOS 1&2. Pg 9-12.
16. Masai D.M, J.E Ojuok and W. Ojwang (2001). *Fish species composition, distribution and abundance in Lake Victoria basin, Kenya*. 13pp
17. MEA (2005). *Millennium Ecosystem Assessment, Ecosystems and Human Well-Being: Synthesis*. Island Press, Washington, DC
18. MoALF (2016). Climate Risk Profile for Busia. Kenya County Climate Risk Profile Series. The Kenya Ministry of Agriculture, Livestock and Fisheries (MoALF), Nairobi, Kenya.

19. Mwalo O, M. (1991). The biology and distribution of *Haplochromis* Spp in the Nyanza gulf prior to the Total invasion of the gulf by Nile perch, *Lates niloticus* (L) *Proceedings of the Second EEC Regional Seminar on Recent Trends of Research on The Lake Victoria Fisheries*, 25-27th September 1991, Kisumu, Kenya; 73-83.
20. MWE (2019). *Uganda Water and Environment Sector Performance Report 2019*. Government of Uganda, Ministry of Water and Environment.
21. Nalwanga, D. et al (2012). Dianah Nalwanga, Derek Pomeroy, Juliet Vickery & Phillip W. Atkinson. (2012). *A comparison of two survey methods for assessing bird species richness and abundance in tropical farmlands*. *Bird Study*, 59: 83-95.
22. Nalwanga, D. (2019). *Report on avian diversity: Status of biodiversity in the Sango Bay – Minziro, Semliki Delta and Sio – Siteko Wetlands*. NatureUganda, Uganda.
23. Namaganda, M. (2019). *Documenting plant diversity in the transboundary wetlands of Semliki Delta, Sango Bay – Minziro and Sio – Siteko, Uganda*. Dept. of Plant Sciences, Microbiology and Biotechnology, Makerere University, Uganda.
24. NBI (2020). Biodiversity conservation and sustainable use of ecosystem services in wetlands of transboundary significance in the Nile basin - *Monograph for the Sio-Siteko (Kenya - Uganda) Wetland Landscape*. NELSAP -CU
25. NBI 2019a. *Economic Assessment of Wetland Biodiversity and Ecosystem Services as an Input for Development of Wetland Investment Plans: A Case Study of the Sio-Siteko Transboundary Wetland in Kenya and Uganda*. Draft version 30 November 2019. Prepared by Philip Otieno, Environmental Consultant at Devlink Resources Consultants
26. NEMA (2009), Uganda: Atlas of Our Changing Environment, National Environment Management Authority (NEMA) P. O Box 22255 Kampala Uganda
27. Ogutu-Ohwayo, R. (1990). The decline of the native fishes of lakes Victoria and Kyoga (East Africa) and the impact of introduced species, especially the Nile perch, *Lates niloticus*, and the Nile tilapia, *Oreochromis niloticus*. *Environmental Biology of Fishes*, 27:81-96
28. Ramsar Convention on Wetlands. (2018). *Global Wetland Outlook: State of the World's Wetlands and their Services to People*. Gland, Switzerland: Ramsar Convention Secretariat
29. SMMR-BMP (2009). *Proposed policy, legal and institutional framework for sustainable management and development of water resources in the Sio-Malaba Malakisi River Catchments*. Unpublished Report by NELSAP
30. Taylor, K. E., R. J. Stouffer, and G. A. Meehl, 2012: An Overview of CMIP5 and the Experiment Design. *B Am Meteorol Soc*, 93, 485-498. 10.1175/bams-d-11-00094.1. CCKP data products: prepared and processed by National Center for Atmospheric Research - Research Applications Laboratory (NCAR-RAL)
31. UBS 2014; National population and housing census 2014. Uganda Bureau of Statistics. (2014)
32. Uganda Water Supply Atlas (2017). Uganda Water Supply Atlas, Directorate of Water Development, Ministry of Water & Environment, The Republic of Uganda
33. UN 2019; World Population Prospects 2019, Online Edition. Rev. 1. United Nations, Department of Economic and Social Affairs, Population Division (2019)
34. UNDP 2019a, Multidimensional Poverty Index: developing countries, http://hdr.undp.org/sites/default/files/mpi_2019_table_1.pdf

35. Wetlands International (2019a) *Sio Siteko Focus Group Discussion – Wetland monograph*, notes, Wetlands Across Borders regional workshop, Kampala, Uganda, held on April 9, 2019. (REGIONAL WORKSHOP, KAMPALA)
36. Wetlands International (2019b) *Sio Siteko activity report towards review of transboundary wetland landscape management plan – Stakeholders and resources analysis for wetlands management plan development report*, Wetlands Across Borders project, May 2019. (COMMUNITY AND DISTRICT, UGA)
37. Wetlands International (2019c) *Sio Siteko transboundary wetland management plan 2020-2030 – Progress report*, Wetlands Across Borders project, July 2019. (COMMUNITY AND DISTRICT/COUNTY LEVEL)
38. World Bank (2009). Integrated safeguards data sheet: Concept stage. <http://www.wds.worldbank>
39. WREM (2008). Sio-Malaba-Malakisi Transboundary Integrated Water Resources management and Development Project Investment Strategy. Report Number NBI/NELSAP/SMM-TIWRMDP/RFP01/2006. 148PP

ANNEXES

A. List of Stakeholders Identified from the Stakeholder Analysis

Primary stakeholders	Secondary stakeholders	Tertiary stakeholders
Kenya		
<ol style="list-style-type: none"> 1. Crop farmers 2. Fisher folk 3. Transporters 4. Reed cutters 5. Timber harvesters 6. Charcoal producers 7. Grass cutters 8. Herbalists 9. Traditional healers 10. Non-forest product harvesters (fruits, mushrooms, herbs) 11. Ritual /cultural performers/ leaders 12. Clay and sand miners 13. Papyrus harvesters 14. Water Resource User Associations 15. Beach Management Units 16. Researchers 17. Tourists 18. Grass cutters and weavers 19. Historical site users (religion, culture, spiritual) 20. Brick makers 21. Iron tool makers (knives, machetes etc.) 22. Reed harvesters 23. Builders and construction material makers/suppliers 24. Bait makers 25. Busia Water Company 	<p>Central Government institutions/organisations</p> <ol style="list-style-type: none"> 1. Kenya Wildlife Service 2. National Environment Management Authority 3. Ministry of Environment and Forestry 4. Ministry of Water and Irrigation 5. Ministry of Interior and National Coordination 6. Water Resources Authority 7. National Irrigation Board 8. Department of Agriculture 9. Livestock Department 10. Kenya Water Towers Agency 11. Department of Social Services 12. National Land Commission <p>Local government:</p> <ol style="list-style-type: none"> 1 County Government of Busia 2 Village Administrators 3 Ward Administrators <p>Non-Governmental Organisation (NGOs)/International agencies</p> <ol style="list-style-type: none"> 1 Wetlands International 2 Nature Kenya 3 Ecogreen 4 One world 5 Focus Africa 6 Kenya Red Cross Society <p>Community Based Organisations (CBOs)</p> <ol style="list-style-type: none"> 1. Sio-Siteko Wetland User Association 	<ol style="list-style-type: none"> 1. Religious leaders 2. KIWASH 3. Anglican Development Service 4. Fish Agents 5. USAID 6. GIZ 7. NBI 8. IGAD 9. Media
Uganda		
<ol style="list-style-type: none"> 1. Commercial Water extractors 2. Domestic water users 3. Livestock farmers/watering 	<ol style="list-style-type: none"> 1. LC I 2. LC II 3. LC III 	<ol style="list-style-type: none"> 1. NEMA Uganda 2. Directorate of Water and Development

<ol style="list-style-type: none"> 4. Fish folk 5. Horticultural farmers 6. Rice growers 7. Sugarcane farmers 8. Sand and clay miners 9. Brick makers 10. Herbalists 11. Traditional healers 12. Hunters (rabbits, birds, wild cats, hippos, crocodiles) 13. Tree planters 14. Beekeepers (apiary) 15. Charcoal burners/ Vegetable 16. Wild fruit / vegetable gatherers 17. Cultural rites (circumcision etc.) 18. Traders in wetlands products (yam buyers, mat 19. Transporters 	<ol style="list-style-type: none"> 4. Sub-County chiefs 5. Community development officer 6. Sub – County agricultural officer 7. Sub-County fisheries officer 8. CAO 9. District Forest Officer 10. District Environmental Officer 11. District Natural Resources Officer 12. District Water Officer 13. District Lands Officer 14. District Commercial Officer 15. CBOs – BUDA 16. BUMASI CBO 17. LUMA CBO 18. Youth Environmental Service (YES) 19. EWAD (NGO) 20. Nature Uganda (NGO) 21. Sub-County Area Land Committee 	<ol style="list-style-type: none"> 3. Uganda Wildlife Authority 4. MAAIF
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B. Resource Use by Gender

RESOURCE	VALUES	RESOURCE USE BY GENDER			
		FEMALE ADULT	FEMALE YOUTH	MALE ADULT	MALE YOUTH
<i>Water</i>	Cooking				
	Drinking				
	Cleaning				
	Livestock watering				
	Crop farming				
	Brick making/construction of houses				
	Transportation				
	Recreation				
<i>Fish</i>	Consumption				
	Medicine				
	Animal feed				
	Income generation				
<i>Grass</i>	Livestock fodder				
	House construction (thatch)				
	Crop mulching and manure				
	Handicrafts				
<i>Papyrus and wetland sedges</i>	Pasture				
	Handicrafts				
	House construction (thatch)				
	Income generation				
<i>Trees</i>	House construction (timber and poles)				
	Furniture				
	Fuelwood				
	Charcoal				
	Income generation				
	Fruits				
	Medicine				
<i>Fuelwood</i>	Cooking				
	Brick making				
	Income generation				
	Insect repellents				
<i>Birds</i>	Ornamental/ Decoration				
	Food				
	Tourism				
	Weather forecast				
	Seed dispersal and pollination				

	Cultural rites				
	Medicine				
Bamboo	Handicrafts				
	Medicine				
	Food				
	Water purification				
	Prevention of soil erosion				
	Soil nutrient fixation				
	Fuel wood				
	Construction materials (poles, furniture)				
	Carbon sequestration				
	Clay	Construction			
Pottery					
Cultural practices					
Crop production					
Sand	Construction				
	Water purification				
	Income generation				
	Agricultural production				
Herbs	Medicine				
	Food				
	Fodder				
	Biomass				
	Income generation				
Wild animals	Food				
	Hides and skins				
	Income generation				
	Medicines				
Roots, tubers and mushrooms	Food				
	Medicine				
	Income generation				
	Fuelwood				
Ants (White ants and termites)	Food				
	Income generation				
	Fish bait				
Ornamental	Tourism				
	Decoration				
	Income generation				
	Ceremonial (cultural practices)				

C. Resource use conflicts, coping strategies and suggested solutions

Wherever people with different interests utilise and co-manage natural resources, there is potential for conflicts. This is amplified in the case of transboundary resources such as the Sio-Siteko wetland, where there are different governance systems and stakeholders across the border. If not addressed in an effective and timely manner, these conflicts can adversely affect community livelihoods and result in resource degradation. It is therefore necessary to identify current and potential conflicts, causes and propose viable and solutions – both traditional and alternative - for dealing or resolving the conflicts.

Table 7: Analysis of Resource-Use Conflicts in the Sio-Siteko Wetland

CONFLICT TYPOLOGY	CAUSES	PROPOSED COPING/RESOLUTION MECHANISMS
<i>Domestic water users vs Herders</i>	<ul style="list-style-type: none"> Water scarcity leading to competition over water resources Water contamination by livestock (droppings and urine in open water sources) 	<ul style="list-style-type: none"> Evolve mechanisms for managing access and use to water resource by different users Construction of livestock water troughs
<i>Domestic vs Private/ Commercial water users</i>	<ul style="list-style-type: none"> Over abstraction of water for use in private farms/ industries Point source water pollution from industries 	<ul style="list-style-type: none"> Setting water quota for abstractions Enhance enforcement of water abstraction regulations Raise awareness on laws regarding water use and abstraction permits
<i>Crop farmers vs herders</i>	<ul style="list-style-type: none"> Destruction of crops by livestock Competition over water resources 	<ul style="list-style-type: none"> Proper demarcation or zoning of land uses Fencing of crop land Collective action to address resource action by addressing resource competition
<i>Humans vs Wildlife</i>	<ul style="list-style-type: none"> Encroachment into wildlife habitats Water scarcity Destruction of cropland 	<ul style="list-style-type: none"> Enforce zonation laws Engage community institutions to establish clarity in resource tenure Strengthen both statutory and traditional conflict resolution mechanisms
<i>Border conflicts</i>	<ul style="list-style-type: none"> Conversion of wetlands into farmlands Overfishing/trespassing in transboundary fishing grounds 	<ul style="list-style-type: none"> Promote collective action in natural resource management institutions in Kenya and Uganda as a means of conflict prevention Development and adoption of harmonised by-laws in line with existing regulations

D. Historical Timeline of Key Events in the Sio-Siteko Wetland Landscape

