

Frame work for the Integrated Water Management Resources for R. Mpanga and R. Semuliki.

PRACTICAL OVERVIEW OF THE CHALLENGES AND OPPORTUNITIES FOR RIVERZONE PROTECTION IN UGANDA.



Prepared and submitted by

Reviewed and confirmed by

Samuel Franklin Tumuhairwe

JOIN FOR WATER

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Executive Summary

River Mpanga passes through districts of Kabarole, Kyenjojo, Kamwenge, Kitagwenda, Ibanda and Kiruhura Districts. The catchment area, estimated at approximately 4670 Km2 lies within the Albertine Rift Montane Eco-region of African Rift Lakes within the Albert Water Management Zone, while the Semliki river is located on the southern shore of Lake Albert and encompasses the delta-shaped river mouth of River Semliki, crossing the boundary of the Democratic Republic of the Congo and Uganda. The two rivers are highly encroached by developers despite the existence of legal regulatory frame works and policies. The legal regulatory frameworks that are in place to manage River Mpanga and River Semuliki include: the Constitution of the Republic of Uganda 1995, the Uganda Vision 2040, the National Environment Act, 2019, land Act, 1998, water Act Cap 152 and Regulations, National Wildlife Act, 2019, The National Environment (wetlands, riverbanks and lake shores management) Regulation 2000, the National Environment (Standards for Discharge of Effluent into Water or Land) Regulations 2020, National Forest and Tree Planting Act, 2003 and Local Government Act, 1997. The policies frameworks are: National Environment Management Policy, 2017, the National Water Policy 1999, the national policy for conservation and management of wetland resources 1995, National Fisheries and Aquaculture Policy, 2017, National Climate Change Policy, 2015, Wetland Sector Strategic Plan 2011/2020, National Development Plan II12016/2020. Despite the existence of these legal regulatory frameworks and polices there was no specific byelaws that was responsible for sustainable management of the two riparian zones.

The case study also reviewed existing institutions such as Ministry of water and environment, National environment management authority (NEMA), National forestry authority, District environment committees, National Non-governmental organizations, community based organizations, Mpanga and Semuliki catchment management committees. Several challenges were reviewed during stakeholders meeting that threaten the River Mpanga and River Semuliki such as gaps in institutional linkages, conflict of interest by land title issuers, political interference, no political will to allocate funds to protect riparian zones, inefficient funds, inadequate enforcement, population pressure, lack of an alternative, use of illegal fishing methods and lack of community sensitization. The projects developed within riparian zones on River Mpanga and River Semuliki are: nursey beds, culvert laying, bee keeping, construction of temporary houses, planting of indigenous tree species and washing bay. Land use activities such as agriculture, illegal fishing, stone quarrying and sand mining, hydropower generation, animal grazing, brick making, illegal trade of cycads and other products, deforestation, poaching and tourism related enterprises were illegally done within riparian zones.

Interventions taken by implementers included the Environmental Restoration Orders, the use of Criminal Law & Community Service Order, community sensitization, formation of Mpanga conservation committees both in the upper stream and downstream of the river, recruitment of staff under natural resources, sharing community benefits and demarcations of the 100m buffer zones. The opportunities that is existing in riparian zones include: the upcoming Ecosystem Based Adaptation, Companies such as Serengeti/ Renewable Energy holdings, cycad village initiative, policies and legal frame works, including the existing structures of environmental committees at parish level, Environmental mainstreaming, adherence to existing legal frameworks and policies, established zones for the catchment areas, and Parish development modal (PDM). The case studies made the following recommendations: Establishing bylaws where they are nonexistent and monitoring their implementation where they exist byelaws, massive community sensitization and awareness, monitoring the existing byelaws, laws and policies, work with existing nongovernmental organizations, provide adequate funding to natural resource department and mainstream environment issues.

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ACRONYMS AND ABBREVIATIONS

CBO	Community Based Organization.
CFR	Central Forest Reserve
DRC	Democratic Republic of the Congo
EBA	Ecosystem Based Adaptation
EIA	Environmental Impact Assessment
EPA	Environmental Protection Agency
EMS	Environment Management Systems.
HEWASA	Health Through Water and Sanitation
IWRM	Integrated Water Management Resource
JESE	Joint Efforts to Save Environment
NBI	Nile Basin Initiative
NEMA	National Environment Management Authority
NFA	National Forestry Authority
NGO	Non-Governmental Organizations
NRDI	Natural Resource Defensive Initiative.
NRC	Natural Resource Center
UNESCO	United Nations Educational, Scientific and Cultural Organization
UWA	Uganda Wildlife Authority
WMD	Wetland Management Department

Integrated water management resources: synthesis scientific framework

1.0. Background

There is no universally accepted definition for a riparian zone. The term "riparian zone" has often been applied to vegetated or partially vegetated areas adjacent to rivers and streams including but not limited to river and stream beds and banks. Riparian areas are the "ribbons of vegetative green" adjacent to and including rivers and streams. Riparian zones are often flooded or subject to high ground water. The term "riparian azone" has been most commonly used to refer to such floodplain areas in the West and Southwest although it applies equally to stream and creek areas and adjacent lands in other parts of the Nation. The word "riparian" is derived from Latin riparian, meaning related to dwelling on the bank of a river or other water body. Riparian zones act as a link between aquatic and terrestrial ecosystems and play a vital role in their ecological functions. The aim of this study is to make a thesis on current legislation and policies, analyze where they are applied, monitored and their challenges on riparian zones.

The laws of Uganda require that all activities around the Riparian zones must be developed in a sustainable manner without compromising the ability of the future generation to meet their own needs in accordance to the National Environment Act 2019 Cap 153. The framework ensures that all activities are sustainable and adhere to the environment conservation policies at all times as different activities have potential adverse impacts on the Riparian zones.

Together with the province of Flemish Brabant in Belgium, Join for Water is supporting a "sister catchment project" between R. Mpanga and R. Semuliki in Uganda together with R. Gete in Belgium. This is with an aim of sharing experiences, knowledge, opportunities, strengths and weakness as well as challenges on the management of the Riparian zones between the two sister catchment areas.

The study will aim to determine climate change adaptation and mitigation measures in the two protected buffer zones in both the two countries through assessing current regulations, policies and existing institutions.

1.1.Geographical Location of River Mpanga catchment.

River Mpanga is located in western part of Uganda. It passes through districts of Kabarole, Fort Portal City, Kyenjojo, Kamwenge, Kitagwenda, Ibanda and Kiruhura Districts. The catchment area, estimated at approximately 4670 Km2 lies within the Albertine Rift Montane Eco-region of African Rift Lakes within the Albert Water Management Zone. It covers a network of unprotected and protected areas. Among them are the world famous Kibale National Park, Queen Elizabeth National Park, The Rwenzori Mountains National Park and the Lake George RAMSAR site. The catchment is of high economic and biodiversity value to Uganda, and the world at large. (MCMP, 2015).

River Mpanga is currently under intense anthropogenic pressure due to deforestation on the slopes of the Rwenzori Mountains where it draws its waters. Deforestation has led to soil erosion, landslides and siltation of the river. Human activities such as mining of sand, gravel and stones although are important for livelihood and survival, they have led to destabilization of the river bank, climate change and hence negatively impacting the river. Washing bays, slaughterhouses, and commercial businesses in Fort-portal contributes to wastes which have threatened the Flora and Fauna in the river. Particularly, anthropogenic activities pose a threat to the rare cycad plants resulting to decline in numbers. The declining water levels in the river as well as Lake George where the river pours its waters reduce overall breeding or nursery sites for some fish species and may affect lake productivity (Water Resource Assessment for river Mpanga, 2009).

A map showing the location of R. Mpanga catchment



1.2. Geographical Location of River Semuliki catchment.

The Semliki River is located on the southern shore of Lake Albert and encompasses the deltashaped river mouth of River Semliki, crossing the boundary of the Democratic Republic of the Congo (DRC) and Uganda. It lies between latitude 1.31 - 0.98 °N and longitude 30.21 - 30.53 °E and covers approximately 830 square kilometers.

The increasing water resulting from snow melting from the Rwenzori Mountains, overgrazing as well as changes to the catchment have resulted to erosion and decrease in the banks of the river in addition to the frequent changes to the course of the meandering lower courses of the River and forming ox-bow lakes in some places. It is estimated that about 10 meters (33 feet) of land on the Ugandan riverside is being lost per year to erosion, and silt from the river is slowly filling in the southern side of Lake Albert.



A map showing the location of R. Semuliki catchment



Figure 1 picture showing how the river banks of river semuliki are bieng eaten away by the fresh water(source: Join for water,2022).

2.0.Policies, legal and regulatory framework.

Sustainable management of natural resources, and particularly the likes of R. Mpanga and R. Semuliki requires integrated institutional framework of legislation, policies, economic tools, institutions and stakeholder's involvement to ensure regulation and utilization. Therefore, there is need to have management plans, national policies and legal frameworks in place, which are relevant in management and conservation of these natural resources. This section, therefore, provides a legal justification to the need and course for regulation of the ecosystem resource use right from the local level, and also, clarifies the threshold for within which environmental justice should be served for these two rivers more importantly in the protection, conservation and restoration of the riparian zones.

2.1. The Constitution of the Republic of Uganda 1995.

The constitution in its national objectives and directive principles of the state policy provides for the protection of natural resources such as wetlands, rivers, lake showers. It provides that state shall protect the natural resources from human activities to ensure sustainable development in the management of natural resources. Article 39 of the constitution of Uganda provides the right of every Ugandan to a clean and a healthy Environment. Article 237 (2)(b) of the constitution provides that land in Uganda belongs to the citizens of Uganda to vest in them according to the land tenure system provided for in the constitution, Government or a local government shall hold in trust for the people and protect the natural lakes, rivers, wetlands, forest reserves, game reserves, national parks and any land to be reserved for ecological and a tourism purpose for the common good of all citizens.

Despite of the above, environmental problems such as population growth, urbanisations and industrialisation are on increase that has resulted to degradation of riparian zones of Mpanga and Semuliki. This has come as a result to failure to balance the needs of conservations versus development along the two catchment areas. High levels of corruption among the implementers and enforcement officers have resulted the developers to utilise the riparian zone without total compliance of the environmental policies.

2.2. The Uganda Vision 2040

Articles 295 and 296 of the Vision 2040 clearly stipulates the efforts to restore and protect ecosystems such as riparian zones and other fragile ecosystems through monitoring and implementation of catchment-based systems, gazetting of critical wetlands for increased protection and use. The Uganda Vision 2040 calls for development of appropriate adaptation and mitigation strategies on Climate Change to ensure that Uganda is sufficiently cushioned from any adverse impact brought by climate change. Further, the Vision identifies sustainable land use and management as one of the fundamentals to be strengthened in order to harness the country's abundant opportunities.

2.3. NATIONAL DEVELOPMENT PLAN (NDPIII) 2020/21 - 2024/2

Sustainable land management is critical for harmonizing environmental, Economic and Social opportunities for the benefit of present and future generations while maintaining and enhancing the quality of the land resources. Sufficient precipitation occasioned by maintaining or increasing forest and wetland cover is vital for hydropower generation, Agriculture, Fisheries, Domestic water supply, industry, navigation, tourism, wildlife and ecosystems. Proper wetland management is necessary to mitigate flood risks, maintenance of aquatic ecosystem, and access to fresh water.

Environment preservation is also critical for human health and tourism. In addition, adaptation and mitigation of climate change orchestrated impact of droughts, floods, heat waves and landslides on the livelihood of vulnerable populations is critical for reducing income inequality.

Natural resource and climate change management are central for the realization of the sustainable industrialization agenda of this plan. This is critical for sustainable exploitation of the key growth opportunities of agriculture, minerals, petroleum and tourism, ultimately contributing to increase in incomes and improved quality of life. Agenda 2030 (SDG 12, 13, 14 and 15) sets targets for combating the effects of climate change and sustainable management of water resources, land, terrestrial ecosystems, forests and the environment.

Nevertheless, there is poor management of Natural resources including land, water, riparian zones and environment coupled with the worsening effects of climate change due to: (i) Poor land use and insecurity of tenure; (ii) Limited capacity for climate change adaptation and mitigation; (iii) Low disaster risk planning; (iv) Rampant degradation of the environment and natural resources caused by low enforcement capacity, limited environmental education and awareness, limited alternative sources of livelihoods and limited research, innovation and adoption of appropriate technology; (v) Limited access and uptake of meteorological information (inaccuracy in information) due to low technology and equipment for early warning and preparedness and ineffective systems and mechanisms for addressing vulnerabilities (vi) Poor coordination and institutional capacity gaps in planning and implementation; and (vii) Absence of appropriate incentives for good environmental management practices.

The goal of the NDPIII is to reduce environmental degradation and the adverse effects of climate change as well as improve utilization of natural resources for sustainable economic growth and livelihood security.

The key results to be achieved over the next five years are: (i) Increase water permit holders complying with permit conditions at the time of spot check; abstraction surface from 78 percent to 82 percent; abstraction groundwater from 76 percent to 81 percent; waste water discharge from 63 percent to 68 percent. (ii) Increase water samples complying with national standards; water bodies at 65 percent by 2025; supplies/water collection point at 80 percent by 2025; (iii) Increase land area covered by forests from 9.1 percent to 15 percent; (iv) Increase land area complying with ESIA conditions at the time of spot check from 40 percent to 90 percent; (vi) Increase the

accuracy of meteorological information from 80 percent to 90 percent; (vii) Increase the percentage of automation of weather and climate network from 30 percent to 80 percent; (viii) Increase the percentage of titled land from 21 percent to 40 percent; and (ix) Reduce land related conflicts by 30 percent.

2.4. The National Environment Act, 2019

In view of management of the riparian zones the Environment Act focus on encouraging the participation by the people of Uganda, in the development of policies, plans and programs for the management of the environment, ensuring that environmental awareness and literacy form an integral part of education and governance at all levels, requiring the cost of pollution to be borne by the polluter, ensuring that environmental costs connected with the actual or potential deterioration of riparian zones are factored into economic activities, promoting the use of economic instruments and compensatory measures in environmental management, promoting green growth in environmental planning and implementation of sustainable development goals in all sectors and promoting circular economy by maximizing production efficiency to conserve the use of the environment and natural resources and to control the generation of waste to the greatest extent possible (NEMA,2019)

The Environment Act is intended to be applied at national level and local level to protect wetlands and riparian areas from adverse impacts resulting from human activities. The application of management measures by lead agencies is described more fully in this National Environment Act to be enforced at national and local levels to protect the resources.

Despite the existence of National Environment Act 2019, ineffective and lack of the participation of the local people in management of the environment has resulted to degradation of riparian zones. Failure to enforce the available laws has resulted to negative impacts on the very resources that they are meant to protect. Institutional conflicts, rivalry and the lack of effective cooperation and coordination both; within and outside government have resulted in ineffective implementation of programs geared towards sustainable resource management especially on the riparian zones and reversing environmental degradation (NEMA,2019).

Under the National Environment Act 2019, Riparian restoration is a core element of many river basin management plans across Uganda. The key challenge for such restoration: many riparian zones has been so highly modified that it is difficult to return ecological conditions and processes to a pre-modification 'reference' state. Where riparian zones have been lost as the result of the construction of a small dam or flood walls, the subsequent removal of such structures may allow for "room for the river" to be restored. In many cases, though, the active transformation of riparian land through alterations to river hydrology and environmental flows, tree-planting, control of grazing, or ceasing of agricultural production is necessary.

2.5.Land Act, 1998

Article 237 (2)(b) of the constitution provides that land in Uganda belongs to the citizens of Uganda to vest in them according to the land tenure system provided for in the constitution. The Act prohibits Government from leasing out or alienating wetlands except as provided for under the law. It also provides for the tenure, ownership and management of land

2.6.Water Act Cap 152 and Regulations.

the water act incorporates regulation for both water resources, water supply and sanitation practices. It provides for the use, protection and management of water resources in a sustainable manner. It provides for the constitution of water, sewage authorities and the devolution of water supply and sewage undertakings.

Section 31(1) of the act prohibits the pollution of water and stipulates that a person commits an offense, which unless authorized under this act causes or allows "water to come into contact with any water, waste to be discharged directly or indirectly into water and water to be polluted".

In view of the above, people are adjacent to the riparian zones (R. Mpanga and R. Semuliki) must take into consideration of water is stipulated in the water act. However, degradation of the riparian zone is on increase despite the existence of the water Act. This because of lack of space for construction, floods and high population growth due to migration.

2.7.National Wildlife Act, 2019

This act ensures 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. Semliki wildlife reserve which is adjacent to the wetland ecosystem is protected under the Act.

2.8. The National Environment (wetlands, riverbanks and lake shores management) Regulation 2000.

It focuses on sustainable principles of management and conservation of the riparian zones. Any activity conducted within the riparian zone must be utilized in a sustainable manner. Special measures are essential for the protection of the buffer zones such as preventing soil erosion, siltation, water pollution.

The objective of this regulation is to facilitate the sustainable utilization and conservation of resources on river banks and lake shore by and for the benefit of the people and community living in the area, promote the integration of wise use of resources in river and lakes into the local and national management of natural resources for socioeconomic development, give effect to clause 2 of article 237 of the Constitution of Uganda, provide for the regulated public use and enjoyment of river banks and lake shores, enhance research and research related activities; and prevent salutation of rivers and lakes and control pollution or degrading activities (NEMA, 2019)

This policy requires any person intending to conduct any activity with the riparian zone must be environmentally sound without causing adverse impacts. Under this policy, it emphasises that implementers to create awareness through training the communities, river banks and wetland inventory, protection, conserve and sustainable management of river riparian.

The protection of riparian zone is an important and can be looked at different angles. Management of riparian zone to be successful managed requires an integrated approach. Participation of all stakeholders in management of riparian zone is very critical to ensure the benefits obtained from them. Despite the existence of national policy, there are number of challenges that have resulted to the degradation of Riparian zone for example population growth, developers, corruption, staffing level and inadequate funding.

Limited priority has been given to riparian zone management in Uganda; therefore this kind of study is to benefit the water resources management institutions in Uganda such as the Directorate of water resource management, Environment management authority in terms of planning and management of water resources, riparian zones and catchment areas. There has been limited of information on riparian zone ecology and management in Uganda since studies have given limited attention to this area despite the existance of number of policies.

It is important to note that the attempt of this study is just an initial step in research on riparian zone ecosystems in Uganda.

2.9. The National Environment (Standards For Discharge Of Effluent Into Water Or Land) Regulations 2020.

The Act requires no person shall discharge effluent into water or land except in accordance with these Regulations and environmental standards; The Water Act, The National Environment (Waste Management) Regulations 2020, the Petroleum (Waste Management) Regulations 2019, the Water (Waste Discharge) Regulations 2020.

It requires that the lead agency responsible for riparian zones may consult any other relevant lead agency or the Authority before making a decision on an application under this Part. 7293 (2) The Authority or relevant lead agency consulted under sub regulation (1) shall review the application and submit its comments and recommendations on the application within period prescribed in the Water (Waste Discharge) Regulations. However, the implementation of this act has number of challenges:

The management gaps and challenges that face the lead agency to implement this act is as follows: weak enforcement of existing laws and regulations on riparian areas by the environmental agency and freshwater fisheries directorate, for instance the 100 meter noencroachment zone is not strictly implemented in Uganda. There is limited public awareness and education on the existing legislation on riparian zones and their importance. There is lack of collaboration among the various sectors that are involved in management of the Riparian rivers. Conflict of interest between natural resources managers and urban planners, especially in terms of the regulation and planning of the riparian area.

This has caused degradation of riparian vegetation and pollution of the catchment since the riparian vegetation cannot effectively purify or filter the wastewater that drains into it. Urbanization creating a lot of pressure on the riparian area of the Mpanga; this process involves space utilization for recreation, access, industrial investments and settlements, thus degrading such a fragile ecosystem. Limited funds to finance riparian zone management projects, especially for rivers like the Mpanga, Semuliki which has been highly interfered with by human activities. It is quite costly to implement appropriate restoration projects in such a riparian zone.

2.10.National Forest and Tree Planting Act, 2003

It makes provision for the conservation, management and development of forest resources in Uganda and establishes the National Forestry Authority (NFA). This act regulates depletion and indiscriminative cutting of trees both on public and private land. The NFA is mandated to oversee and coordinate the Management of Central Forest Reserves (CFRs) in partnership with private sector and local communities which are found within and around the wetland landscape.

2.11.Local Government Act, 1997

Provides for decentralization at all levels of local governments to ensure good governance and democratic participation of all stakeholders in decision making and ownership of natural resources for purposes of their own benefit and maintaining the values of the future generation. It focuses on conservation, protection and restoration of all degraded ecosystems to maintain the benefits derived from them.

3.0.The Policy framework

11% of land area of Uganda is covered by riparian zones (NBI 2020). Currently, Uganda's 1995 National Policy for the Conservation and Management of Wetlands Resources/ riparian zone is in place. Despite having a specific Policy on wetlands management/riparian zones and conservation, the country is experiencing challenges in implementation of the Policy due to inadequate institutional funding, political interference, delay in legal proceeding, policy conflicts such as the Wetlands Policy and the Agricultural policies, eviction procedures, overlapping institutional mandates leading to conflicts. It is important 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 harmonized.

3.1. National Environment Management Policy, 2017

This Policy values riparian zones as 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 riparian management and conservation; Demarcation and gazzetting of buffer zones; strengthening the zoning; preparing and implementing buffer zone management plans; and promoting transboundary cooperation for the sustainable management of cross border riparian zones for instance River Semliki.

3.2. The National Environment Management policy 1995

This policy aims to promote sustainable economic social developments in Uganda. It provides a frame work for environment impact assessment to be conducted for any policy, program or project which is likely to have adverse impacts on the natural resource. This statement is further

embedded in the national environment act 2019 which makes EIA mandatory requirements for all policies and projects carried out on the natural resources.

Despite, the requirements of the above policy, the riparian zones have been encroached by developers due to urbanization and industrialisation leading to siltation of the river banks. Inadequate enforcement of national environment policy has resulted to loss of fragile ecosystems, siltation of the river banks, low levels of water table, floods and drought to people adjacent to riparian zones.

3.3. The National Water Policy 1999.

This policy aims to manage and develop the water resources of Uganda in an integrated and sustainable manner. It requires the application of the environmental impact assessment and for the integration of the water and hydrological cycles concerns in all development water projects.

In light of the above, riparian zones have been encroached by developers due to less attention given to them by the Authorities, high levels of corruption and inadequate monitoring by the policy implementers and regulators.

3.4. The national policy for conservation and management of wetland resources 1995.

The overall goal of this policy is to obtain an optimum diversity of uses and users and consideration of other stakeholders while using natural resources. The objective of this policy includes; establishing the principles by which wetland resources can be optimally used now and future to end practices which reduce wetland productivity, maintaining the biological diversity of natural or semi -natural wetlands, maintaining wetlands functions and values and integrating wetlands concerns into the planning and decision making of other sectors (Wetland policy, 1995)

Integrating concerns of riparian zones (R. Mpanga and R. Semuliki) into planning and decision making has been a challenge due to inadequate budgeting, and shortage of enough environmental staff to implement the activities related to management of the segment.

3.5. National Fisheries and Aquaculture Policy, 2017

20% of Uganda's surface area is covered by open fresh waters resources which includes lakes, rivers, wetlands and water reservoirs among others, which are very important for fisheries and aquaculture development. The Government through the ministry of fisheries has has invested a lot of resources to ensure 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 catchments.

3.6. National Climate Change Policy, 2015

This policy intends to address conservation and restoration of the degraded riparian zones so that they can continue providing the ecological functions. It advocates putting in place mitigation measures and climate resilient to reduce the adverse impacts on the environment. The national and local leaders are responsible to conducted the community sensitization on the restoration, protection and conservation to ensure that these riparian continue offering services for both present and future generation.

3.7. Wetland Sector Strategic Plan 2011/2020

The Wetlands Sector Strategic Plan (2011 - 2020) outlines key objectives on management and restoration of ecosystems; reinforcing public and stakeholder awareness; advocating planning and management, sustainable use; strengthening compliance mechanisms and governance systems; and strengthening institutional and technical capacity for sustainable management of riparian zones at all levels.

4.0.THE INSTUTITIONAL FRAMEWORKS.

4.1.Ministry of water and environment.

The Ministry of Water and Environment is responsible for management of water and environment resources including coordinating and monitoring of all fragile ecosystems both at national and local levels. This is implemented through;

- Albertine water management zone; This is charged with management of water resources including all the riparian zones in Albertine region. Zone is responsible for coordinating, regulating, monitoring and implementation of environment policies and law.
- 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;

4.2.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.

4.3. National forestry authority(NFA)

Established under section 52 of The National Forestry and Tree Planting Act 2007, the NFA is mandated to manage all Central Forest Reserves including swamps in forests in Uganda. It also coordinates activities of sustainable management of tree resources in country through establishment of nursery beds in all central reserves.

4.4.District environment committees

These are responsible for management of riparian zones at local levels. The District Environment Committee is the sub-committee of the District Council that provides policy guidance on the management of natural resources at district level. 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 riparian zones related issues.

4.5.National Non-governmental organizations (NGOs) and community based organizations (CBOs)

These non-state actors are crucial for ensuring sound natural resource management in Uganda. The Associations are also useful in settling disputes over buffer zone protection and tenure land systems. Within the R. Mpanga and R. Semuliki, we have the following organizations who have IWRM as their major thematic area, JOIN FOR WATER, JESE, HEWASA, WATER FOR PEOPLE, NRDI to mention but a few.

4.6. Mpanga and Semuliki catchment management committees.

These committees are composed of representatives of all relevant stakeholder groups, which collaborates with the water management zone during the formulation of a catchment management plan and plays a steering role during its implementation.

4.7 Existing byelaws on Protection and Conservation riparian zones both in upper and downstream R. Mpanga.

There are existing byelaws to ensure protection and conservation of Encephalartos whitelockii cycad species, on L. George and R. Mpanga on the sides of Nyabbani, Kanara and Ntara Sub Counties all in kitagwenda district is hereby made by the respective Sub-County councils.

The objectives of these byelaws were to ensure sustainable management of cycads among the community, to enhance community members' understanding on the need to protect the cycads, R. Mpanga and the steep slopes in the L. George and to create a benchmark for guiding compliance to the sustainable management of the cycad plant and its habitat by community members.

It indicated that protection of R. Mpanga and the associated steep slopes that every owner, occupier or user of land which is adjacent or contiguous to R. Mpanga shall, with advice from the Sub County authority shall have a duty to prevent the degradation or destruction of the river, and shall maintain the ecological and other functions of the river. Farmers whose land is on the steep slopes and river bank shall be obliged to promote soil conservation measures including the following; terracing, mulching, construction of gabions, grassing, indigenous tree planting or Agro forestry and control of grazing.

Under these byelaws, a person commits an offence if he/she; illegally gets involved in cutting, uprooting and burning of cycads, is found stealing cycads, engages in the selling or buying of cycads without a permit, engages in planting of exotic tree species within the 100 m zone of the river reserve, cultivates crops or grazes livestock within 100 m zone of the river reserve and deals in charcoal burning without permission and Cultivates crops on steep slopes without any soil erosion control measure.

The penalties were put in place if a person who commits an offence under Section 12 (1) if found guilty is liable to a fine of one currency point per cycad or imprisonment of twelve months or both. Anyone found in breach of Section 12 (2) is liable to a fine of two currency points per cycad plant. In addition, such a person shall forfeit any plants in his/her possession or serve a term of eighteen months or both. A person who commits an offence under Section 12 (3) is liable to a fine of two currency points per cycad and then forfeit the cycads in possession or imprisoned for eighteen months or both. Whoever contravenes Section 12 (4) is liable to a fine of two currency points per standing tree and then forced to uproot the trees or imprisoned for five months or both. Whoever defies Section 12 (5) shall be liable to a fine amounting to two currency points or imprisoned for six months or both.

Anyone who contravenes Section 12 (6) shall be liable to a fine of two currency points and then forfeit any charcoal in possession or imprisonment for six months or both. Any member found to

be in contravention of Section 12 (7) shall be sentenced to community service for two months and forced to establish soil and water conservation structures on the degraded land.

5.1.Inventory of riparian zones

Mapping Riparian zones in Uganda is done to determine water logged area and dry land in order to put in place a management plan. Since its inception, the Service's riparian mapping system has been applied to several efforts to locate and describe this unique vegetative community in river Mpanga and river Semuliki. The Service is pursuing adoption of the Inventory's riparian classification system as the national standard to ensure uniform mapping of these ecosystems.

Resource Management Applications increasing numbers of migratory birds, fishes, and endangered species need sufficient quality habitat in an ever-changing landscape. Because of continuing habitat alteration, loss and degradation, aquatic species are especially vulnerable. Current map information on these two rivers, coupled with other habitat data and landscape characteristics in digital formats can provide resource managers and decision makers with more powerful tools for needed resource assessments.

However, digital riparian zones map information is not readily available for much of the rivers, catchment areas, wetlands and lakeshores in Uganda. Traditional riparian zones maps, once converted to a digital format are of increased utility for answering resource management questions. This is especially true when they are used in Geographic Information Systems to aggregate and display resource information in maps that can be more easily reproduced or combined with other data layers. While inventories are provided for in the policy framework, very little is done in reality and possibly the bottleneck is in the data gaps identified.

The Inventory is strategically positioned to work with many Services resource programs to develop more powerful computer-based resource assessments. These include assisting Regional Geographic Information System efforts involved with mapping riparian zones. The Inventory can provide contemporary resource information of value to the Partners for Fish and Wildlife Program's wide-ranging aquatic habitat restoration efforts. Digital aquatic habitat information can form the backbone of efforts to assist the Fisheries Management Program in identifying barriers to fish passage throughout the Nation.

5.2.Protection

Protection (also referred to as preservation or maintenance) of intact riparian areas is of great importance, both environmentally and economically. It is distinct from restoration, which addresses degraded systems. Intact riparian areas represent valuable reference sites for understanding the goals and the efficacy of various restoration approaches and other management efforts. In some cases, they are important sources of genetic material for the reintroduction of native biota into areas in need of restoration. For these reasons and others, riparian areas in a natural region warrant a high level of protection (NRC, 1992, 1995; Kauffman et al., 1997).

As a management strategy, riparian protection may entail more than simply preventing humaninduced alterations. For example, actions such as prescribed fire, management of exotic species invasions, and large herbivore management may be necessary to maintain natural characteristics and functions and to sustain them over time. Because degraded riparian areas are so prevalent in many portions of the nation, protecting any that remain relatively uninfluenced by human perturbations should be a high priority. Measures to protect intact areas are often relatively easy to implement, have a high likelihood of being successful, and are less expensive than the restoration of degraded systems (NRC, 1992; Cairns, 1993).

5.3.Restoration

Restoration of degraded riparian areas is often a scientific and social challenge. In some instances, the natural or pristine conditions of a particular riparian area may no longer exist or may not be known with certainty. In others, multiple causes of degradation may have occurred over long periods of time hence, cause and effect relationships that define existing conditions may not be well known or easy to decipher at either local or landscape scales.

Restoration of riparian zones as representing the "re-establishment of pre-disturbance riparian ecosystems functions and related physical, chemical, and biological characteristics is an important attempt to manage these areas." It further indicated that "restoration is different from habitat creation, reclamation, and rehabilitation it is a holistic process not achieved through the isolated manipulation of individual elements." **National Environment Act 2019** requires that all degraded riparian zones to be restored to its original state.

Although ecological restoration may be an achievable and desired goal for some areas, it obviously cannot be attained everywhere. For example, permanent or irreversible changes in hydrologic disturbance regimes (e.g., via dams, trans-basin diversions, irrigation projects, extensive landscape modification), natural processes (e.g., global climate change, accelerated erosion), channel and floodplain morphology (e.g., channel incision, rip-rap, levees), and other

impacts (e.g., extirpation of species, biotic invasions) may preclude our ability to precisely or completely re-create the composition, structure, and functions that previously existed. Riparian areas adjacent to large rivers may represent a greater challenge than those associated with smaller streams and rivers because of the greater number of factors affecting flow regimes at these larger scales (Gore and Shields, 1998). Nevertheless, even in such situations, there are often numerous opportunities to effect significant ecological improvement of riparian areas and to restore, at least in part, many of the functions they formerly performed.

5.4. Riparian Management as Part of Watershed Management

Because riparian areas are integral components of larger watersheds (drainage basins), management of riparian areas should attempt whenever possible to be incorporated into largerscale watershed management plans. Watershed management refers to the managing of water resources (both surface water and groundwater) in a watershed or river basin context (rather than in a political or jurisdictional context) (NRC, 1999).

It is a holistic approach that addresses multiple sources of pollution within a watershed, such as urban and agricultural runoff, landscape modification, depleted or contaminated groundwater, and introduction of exotic species, to name just a few. Environmental Protection Agency (EPA), the watershed approach is a coordinating framework for environmental management that focuses public and private sectors on addressing the highest priority problems within hydrologically defined geographic areas (EPA, 1995). It targets those issues not adequately addressed by traditional point source programs that for the most part have failed to protect riparian zones from the cumulative impacts of multiple activities.

Although riparian zones management may vary in terms of specific objectives, priorities, elements, timing, and resources, it is based on the following principles which are paramount to prevent degradation.

Partnership: All stakeholders affected by management decisions should be involved throughout riparian management and should shape key decisions. This ensures that environmental objectives are integrated with economic, social, and cultural goals. It also provides those who depend upon the natural resources within riparian zones with information on planning and implementation activities.

Geographic Focus: Activities should be specific to geographic areas, typically the areas that drain to surface waters or that recharge or overlay groundwater or a combination of both.

Science-Based Management: Collectively, riparian zones stakeholders should employ highquality scientific data, tools, and techniques in an iterative decision-making process including (1) assessment and characterization of the natural resources, (2) goal setting and identification of objectives based on the needs of the ecosystem and stakeholders, (3) prioritization of identified problems, (4) development of management options and action plans, (5) implementation of management options, and (6) effectiveness evaluation and plan revision (NRC, 2000).

Coordination of the many public and private interests implicated in riparian zones management is a major challenge. Institutional mechanisms for such coordination do not yet exist in most places, and where they have been developed, their effectiveness has been highly variable (Scurlock and Curtis, 2000). Fortunately, the involvement of stakeholders in riparian management has been aided by the emergence of local riparian groups encouraged, in part, by EPA's emphasis on riparian zones approaches, but motivated also by rapidly developing ecosystem.

5.6.Education

Education is a process in which individuals gain awareness of their riparian zones and acquire knowledge, skills, values, experiences, and also the determination, which will enable them to act - individually and collectively - to solve present and future riparian zone problems.

Riparian zone education is a learning process that increases people's knowledge and awareness about the riparian zones and associated challenges, develops the necessary skills and expertise to address the challenges, and fosters attitudes, motivations, and commitments to make informed decisions and take responsible action (UNESCO, Tbilisi Declaration, 2018).

Riparian education enhances critical thinking, problem-solving, and effective decision-making skills, and teaches individuals to weigh various sides of the riparian issue to make informed and responsible decisions.

The components of the riparian zones' education are:

- Awareness and sensitivity to the riparian zones and challenges
- Knowledge and understanding of thriparian zones and challenges
- Attitudes of concern for the riparian zones and motivation to improve or maintain riparian quality

- Skills to identify and help resolve riparian challenges
- Participation in activities that lead to the resolution of riparian zones challenges

Riparian education is aimed at producing a citizenry that is knowledgeable concerning the biophysical of the riparian areas and its associated problems, aware of how to help solve these problems, and motivated to work toward their solution.

Riparian zones education, properly understood, should constitute a comprehensive lifelong education, one responsive to changes in a rapidly changing world. It should prepare the individual for life through an understanding of the major problems of the contemporary world, and the provision of skills and attributes needed to play a productive role towards improving life and protecting the environment with due regard given to ethical values.

6.0. Different projects that have been worked on R. Mpanga and R. Semuliki

Number of projects have been developed by the people adjacent the River Mpanga and River Semuliki after seeking technical guidance from the local governments where the catchments are passing through.

6.1.Nursey beds

Nursey beds are being operated by developers along adjacent to the riparian zones. In River Mpanga nursey beds are located along Kamwenge road and Kampala Road in Fort Portal City. In Kamwenge and Kitagwanda where the catchment passes the nursey beds are also located along the road. These nursey beds are operated after developers receiving permission technical people within the jurisdiction where catchments are passing through. The natural resource departments take responsibility of monitoring all the developers if they are compliance with regulatory frame works.



Figure 2. nursary bed along the down stream of R.Mpanga.

6.2. Planting of indigenous tree species.

Fort Portal city and Kabarole district in partnership with Join for water and other nongovernmental organization, have engaged in tree planting adjacent to the riparian. Tree species such as acacia, engoti and umbrella tree have been planted along the riparian zone. These tree species consume less water as compared to eucalyptus trees that consume too much water. This has been done to protect and restore the riparian zones especially where people have degraded it.



Figure 3The planted indiginous trees along R. Mpanga.

6.3.Construction of temporary seats

Temporary seats have been established by Fort Portal City Council whereby people seat during their leisure. These temporary seats are developed after planting cover grass and umbrella tree that helps to provide shade during too much sunshine. The temporary seats were developed by Fort portal city in conjugation with nongovernmental organisation such as Natural resource defence initiative(NRDI).

6.4.Bee keeping

In the riparian zones people have developed projects in bee keeping as livelihood alternative to protect and restore the fragile ecosystems. During my case studies with River Mpanga and River Semuliki, I found people practice bee keeping. The upstream of Karangura Sub-county in Kabarole and downstream in Kitagwanda district. In River Semuliki also people were rearing bees as a means of living in harmony with riparian zones.



Figure 3 The bee hives in the upper stream of R. mpanga as the other source of livihood.

6.5. Washing bay

The developers have put washing bays along the River Catchment to utilize the water within riparian zones. The washing bays are established after conducting a project brief indicating the management plan to avoid adverse impacts that come along with project especially at operation stage. The developers have to liaise with institutions and regulatory frame works on the management of the riparian zones. The developers have also to adhere to the principles of sustainable management especially on standards of discharge waste into the water sources that would result to water contamination. During focus discussions with developer under this project, I was able to acknowledge that soak pits were in place where the waste water could pass before it enters into the original source of water.



Figure 4 A washing bay along R.mpanga in the down stream.

Achievements of these projects on the riparian zones

- Restore the balance between human and environmental needs towards strengthening resilience of the landscape as a social ecological system including better services provision. This will support the communities in conservation, restoration and sustainable management of ecosystems.
- Ensure sustainable water and food provision and combat climate change impacts and other socio ecological demands. This will be done by considering the needs and interests of a wide variety of people living and working within the catchment.
- There will be enhanced ecosystem integrity and access to ecosystem services through provision of water and agricultural outputs which will be driven by the stakeholders themselves through the improved knowledge.
- There will be enhanced needs for conservation and development through provision of livelihood alternative in the riparian zone.

1. Cooperation

Cooperation was done between Kabarole district and NGOs such Natural Resource Defense Initiative, Join for Water, Joint effort to Save the environment. NGOs have introduced different activities such as bee keeping and planting indigenous trees along the upstream and downstream. In view of the cooperation the district and Fort Portal city have also enforced wetland policy 1995 and National Environment Act 209 to manage the river in a sustainable manner. Besides the various projects and different actors are also important in the management of the upstream and downstream. In the upstream farmers avital to be involved in landscape management. In addition, people around the upstream are involved in sand mining where by the district playa an important role in monitoring and evaluation. NGOs are also important in identifying the alternative of livelihood in order to encourage preservation and conservation of the upstream and downstream. The actors and Government have also spearheaded the awareness on conservation of the upstream and down through forming groups especially the farmers to take part in the management of catchment.

2. Inventory

The people adjacent to upstream and downstream revealed that Kabarole district has mapped the boundaries of the river where by each individual operating long river has to maintain 100m. Mapping of upstream and downstream was done to determine boundaries between water logged area and dry land. mapping system was also done to identify dry area that would be used by the people operating along the river. The people were not allowed to operate in the water logged or even to put drainage around the catchment. The people revealed that quarterly monitoring by the Fort Portal Staff city was done to determine the level of compliance among the people operating along the catchment area.

3. Protection

In the upstream of river Mpanga protection activities were carried out by the people adjacent to the riparian zones. The activities such as planting of indigenous trees around the boundaries of the river, bee keeping. Several interventions to save the river, which include sensitization of residents and chasing them away from the river were done by the government of Kabarole district. Restoration orders were issued by the district for people around the stream to restore the river to its original status and activities that were degrading the river were also stopped. Despite the existence and operation of NGOS in the area, the following challenges were noted:

- During the last dry season, the water levels went down. Early this month of september 2022, the river banks burst carrying heaps of garbage down stream
- Recently, the water turned brownish due to the siltation upstream at the hilly Karangura (the source of the river) where stone quarrying and sand mining are carried out.
- Water pollution that has caused lack of drinking water
- They said that water for production will not be enough because the source is degraded,"

• In the meeting the revealed that the increased human activities on the river banks have led to its contamination.

4. Sustainable management

Sustainable management activities were carried out in upstream and downstream of River Mpanga. For example, bee keeping, tree planting and better methods of farming such as terracing, agroforestry adoption technologies to reduce on disaster reduction. Although sustainable management activities were carried out but the area was prone to landslides, flooding especially during heavy rain fall. The water turned brownish due to the siltation upstream at the hilly Karangura (the source of the river) where stone quarrying and sand mining are carried out. The people around the upstream and downstream of River lacked water for drinking, the bridge upstream people could not cross the river during heavy rain fall. However different stakeholders including the different WASH civil society organizations have sensitized the residents to adopt better conservation practices in order to reduce the disaster in the area.

5. Education

Environmental education in the area was found to be integral part whereby the residents were sensitized on the importance of the conserving the natural resources. They had formed groups in upstream on natural resource conservation and sensitize people in the area. The people of upstream and downstream revealed that the district under natural resource department enforces the environmental laws and policies. The people living the upstream revealed that NGOs such Joint effort to save the Environment, Natural Resource Defence Initiative have been sensitizing people on the management of fragile resources in the area. Despite the integration of education component on management of the river Mpanga, activities damaging environment were found to be practiced such as sand mining in the upstream and culvert laying in the downstream hence resulting siltation of the river and water contamination

6. Restoration

Restoration activities were carried out in upstream and the downstream of catchment. Activities such as sand mining and deforestation were prohibited by the government and NGOs operating in the area. Alternative activities were introduced to be practiced by the people living near the upstream and downstream. In the upstream activities such as bee keeping, tree planting and better methods of agriculture practices such as terracing were conducted. The downstream

activities such as nursery beds, culvert laying after conducting environmental impact assessment were also done. In the downstream people who were carrying out culvert laying revealed that they have put in place a management plan of river Mpanga and quarterly monitoring by the staff Fort Portal City is always carried out. They revealed the Fort Portal City has developed checklist for the people working in the downstream to follow and failure to comply then we can be chased away. Although ecological restoration may be an achievable and desired goal for some areas, it obviously cannot be attained everywhere. For example, permanent or irreversible changes in hydrologic disturbance regimes were observed.

7.0. CHALLENGES IN MONITORING AND ENFORCEMENT OF LEGAL FRAME WORK.

7.1.Gaps in institutional linkages.

The case study on river Mpanga and River Semuliki revealed that there is a challenge arising from failures at different institutional linkages for environmental management. Whereas for example riparian zones/ wetlands are held in trust by Central Government or local Government for the common good of the people of Uganda, recent examples of riparian zones/ wetland abuse have included cases where Local Authorities have been the very violators of these constitutional and legal provisions. Where this has happened, local authorities have indicated that they converted riparian zones for the sake of providing their communities with economic growth opportunities and for fighting poverty. It is therefore a dilemma that the very institutions entrusted with the protection of riparian zones have in some cases not assisted the crusade for their conservation.

7.2.Conflict of interest by land title issuers.

In light of the above, issuing of Land Title in riparian zones by the Central and Local Governments where as it is a constitutional and legal requirement that areas such are Riparian zones, wetlands, riverbanks, lakeshores are held in trust by Government and Local Government for the common good of all the citizens of Uganda, there are incidences where the very institutions that are charged with this responsibility are the very ones who alienate these wetlands and even issued land titles hence becoming a challenge for the department of natural resources and environment to enforce the legal frames and policies.

7.3.Political interference

Studies on River Mpanga and River Semuliki riparian zones have shown that political interference is a major concern for not enforcing and implementing the legal frame works and

policies. Deciding how to employ resources and respond to breaches of environmental law often involves considerable discretion amongst enforcement authorities, national and local administrations have their own traditions and culture in which they operate. Imposing overelaborate, top-down solutions may therefore be inappropriate. Within western region, environmental legislation has generally left the question of enforcement to the discretion of National Environment authority. The Court of Justice of the Uganda has been equally reticent to trespass on the discretion of national authorities in this context, and simply relied upon the general principle that any sanctions employed must be effective, proportionate, and dissuasive.

7.4.No political will to allocate funds to protect riparian zones.

The political will to allocate the necessary funds for riparian zones is inadequate, and there is no enough public awareness regarding environmental issues to push governments to act more effectively. Investment in environmental infrastructure remains low, as does the understanding of the advantages of better environmental management. A well-functioning environmental infrastructure has numerous benefits, not only for the environment and human health but also for the economy. When governments are not fully convinced of the importance of protecting their environment, it is difficult to attract international technical assistance or make optimal use of financial resources.

7.5.Inefficient funds.

lack of funds has inhibited major progress in the enforcement and monitoring of the riparian zones. Outdated standards and measuring methods and obsolete equipment are still widely used. In many cases, monitoring is under the control of different authorities which often have poorly defined responsibilities and/or quite different functional competences. In addition, upstream and downstream of Mpanga catchment, key stakeholders need to strengthen their self-monitoring systems. Improved self-monitoring in river Mpanga and R. semuliki often results in better process performance and more environmentally friendly production, which pay off in economic terms.

7.6.Inadequate enforcement

There is the challenge of enforcement of the legal requirements for protection of the environment and public health. Whereas it is now largely accepted that environment is important worth protecting, and whereas enforcement of environment regulations, is expected to be done through a hierarchy of enforcement levels from national (NEMA), Districts down to community levels, the enforcement capacity available at all these levels appears not to be able to match the widespread nature of the problem of environment degradation.

In addition, the responsibility for Environment management has been vested under the local authorities, cases of local authority intervention on environmental management are still few, implying that even where local authority intervention would have been enough to stop abuses, such cases still continue to be referred to NEMA. It should be stressed that this state of affairs for a dispersed resource such as riparian zones require an enforcement and intervention mechanisms that is closer as possible to the community level if tangible results are to achieved.

Coupled with above, the "anonymous", "holiday" and "awkward hour" dumping syndrome Without an effective grassroots enforcement mechanism, it has been extremely difficult to control indiscriminate dumping of materials in riparian zone along the roads and other remote areas by anonymous individuals such as truck drivers who probably view riparian areas as "good" open space to dump in rather than drive long distances to designated dumping sites. Time and again, people living in and around riparian zones areas where marrum and waste dumping has taken place have indicated that the dumping is done by unknown truck drivers at awkward hours.

7.7.Population pressure

The case studies on River Mpanga and River Semuliki indicated increase in population growth has resulted to encroachment on the riparian zones. Population pressure has caused degradation on riparian zones which have also compromised the functionality of the wetland landscape. Riparian changes have been identified as a consequence of among others, overexploitation of natural resources, unsustainable resource use practices, poor land use planning and unsustainable resource use practices.

7.8.Lack of an alternative

In view of the above, lack of alternative livelihood among the people living adjacent to riparian zones also results to encroachment. The case studies revealed that people have no alternative apart from using the riparian zones to obtain their livelihood has become a major threat while implementing the environment polices and laws.

7.9.Use of illegal fishing methods.

In light of the above, illegal fishing methods is reducing fish stock indiscriminately and breeding sites are disappearing in downstream of River Mpanga and River Semuliki. The increasing

pressure on fish stocks and illegal fishing in protected fish breeding sites is greatly contributing to the decline in fish species. Game meat is acquired through illegal hunting. The game meat in Semliki Delta is mainly from animals such as hippopotamus, crocodiles and buffalos.

7.10.Lack of community sensitization

The case studies on river Mpanga and River Semuliki revealed that communities living adjacent to riparian zones were not sensitized on restoration, protection, conservation and management of the natural resources. This has greatly contributed to depletion of the resources in riparian. This study recommends that NGOs and local government should conduct massive sensitization on importance of riparian zones so that can continue offering ecological services for the both present and future generation.

8.0.LAND USE ACTIVITIES WITH RIPARIAN ZONES OF RIVER MPANGA AND RIVER SEMULIKI.

8.1.Agriculture

The people who are found along River Mpanga and River Semuliki riparian zones have expressed concern that crop production inform of bush burning, use of herbicides, planting of the eucalyptus has emanated the degradation of the riparian zones downstream of River Mpanga and River Semuliki. Poor Agricultural related activities have greatly contributed the contamination of the resources hence making water unsafe for drinking among the people living the downstream of the two catchments.



Figure 5 Sand mining in the upper stream

8.2.Illegal fishing activities

Illegal fishing activities which are conducted in the downstream of river Mpanga whereby fish species were cached hence affecting the population fish species. The increasing pressure on fish stocks and illegal fishing in protected fish breeding sites is greatly contributing to the decline in fish species. Game meat is acquired through illegal hunting. The game meat in Semliki Delta is mainly from animals such as hippopotamus, crocodiles and buffalos.

8.3.Stone quarrying and sand mining

During consultative meetings conducted in River Mpanga and River Semuliki people indicated these two activities have resulted to siltation of the river banks. The increasing siltation in protected of the river banks results to change of water color and death of the biodiversity that live in water. This has greatly contributed to reduction of the species that live within riparian zones.



7. Figure 6 Stone quarrying in the upper stream of R. Mpanga



Figure 7 sand mining in the upper stream of R.Mpanga

8.4.Hydropower generation

People living down stream of river Mpanga acknowledged that hydro power generation has greatly contributed in the reduction of the volume of water levels. Reducing the water levels within the downstream results to climate changes and its related adverse impacts that has contributed to change in seasons among the people adjacent to the riparian zones.

8.5.Animal grazing

The case studies indicated that these riparian zones are used for grazing of animals. Under the national environment Act 2019 provides for regulated activities whereby grazing of animal is part especially during the dry season. Grazing with the riparian zone also has adverse impacts especially when the carrying capacity of animals is more than the capacity of the riparian zones. The participants acknowledged that cattle grazing has greatly result to riparian degraded and sometimes cow dung enters into water sources hence polluting it.

8.6.Brick making

People were found to be laying bricking with in riparian zones of river Mpanga and River Semuliki. This has greatly contributed to siltation the riparian zones whereby debris from brick making after burning it enters into water and it blocks the water to move freely hence limiting some of the species to breed. This kind of the activity has also reduced the stock of fish that breed along the downstream in the River Mpanga and River Semuliki.

8.7.Illegal trade of cycads and other products

In the downstream of River Mpanga, it was found that illegal trade of cycads and other products was taking place. Increasing illegal trade of cycads has resulted to reduction of the species stocks in these two catchments area. This kind of activity has greatly contributed loss of biodiversity in the riparian zones.

8.8.Deforestation for charcoal wood

The respondents revealed that deforestation is on increase due to population growth that have exacerbated pressure on these riparian zones. This has greatly contributed to loss of tree species that would be important in future. This kind of the activity has result to soil erosion and disappearance of the species hence leading to the degradation of the riparian zones.

8.9.Poaching

The case studies on River Mpanga and River Semuliki reported that illegal killing of animals is rampant. Game meat is acquired through illegal hunting. The game meat in Semliki Delta is mainly from animals such as hippopotamus, crocodiles and buffalos. This has greatly contributed to reduction of animal's species that would be importance in future for medical and research purposes.

8.10.Tourism related enterprises

Lastly the respondents revealed people adjacent to the riparian zones, the normally harvest products for craft making. This has result to reduction of the stocks especially cycads and other related products. Removing these products without replacing contributes degradation of the riparian zones.

8.11. Culvert laying

They are several developers that engaged in culvert laying a long River Mpanga. Under the regulatory frame works, they are projects that can be develop within riparian after subjecting it to mandatory environmental impact assessment. The purpose of conducting is to establish whether the project have adverse impacts and how to put in place management plan. During a case study

assessment, it was found that people operating along the riparian zones of river Mpanga and River Semuliki catchments had the legal documents to authorize them to engage culvert laying.



Figure 8 Calvert Laying in the downstream of R.Mpanga

9.0. Opportunities.

9.1. The Ecosystem Based Adaptation (EBA)

This project was started by the Ministry of water and Environment targeting River Mpanga is a huge opportunity. The ministry of water and Environment developed strategies that allow communities to participate in the management of the riparian zones. This helped to ensure community ownership through fully involvement at levels of planning and decision making. It has also resulted to protection and conservation of endangered species in the downstream of the catchment.

9.2.Companies

Such as Serengeti/ Renewable Energy holdings /EMS Mpanga hydro showing great interest in investing in conservation of ecosystems that sustain their business of power generation. These companies have created employment opportunities to people around the downstream hence resulting to the restoration and protection of the Riparian zones. The companies have also provided alternative livelihood among the communities adjacent to the riparian zones.

9.3.Cycad village initiative

This is helping to protect the endemic cycad species in the gorge. Cycads growing on land belonging to community members shall be protected from being destroyed through cutting, burning or unauthorized extraction. Community members with cycad nurseries shall only sell seedlings to persons possessing permits. These initiatives have resulted to restoration and protection of the riparian zones because the people at village level are mobilized and sensitized on the management of natural resources. Community members are aware that River Mpanga and River Semuliki catchments are endowed with important resources that are not yet exploited but requires urgent protection and conservation. Under this intervention down stream of the river they managed to put in place byelaw that is called *THE PROTECTION AND CONSERVATION OF CYCAD SPECIES, THE GORGE AND R. MPANGA BILL NO.1 OF 2015*

This byelaw is made pursuant to the established legal framework cited above; 1) The Constitution of Uganda under Article 206 (2b) enables local councils to make laws, regulations or other instruments for the administration of their areas of jurisdiction; 2) Section 39 (1) of the Local Government Act CAP, 243 gives Urban, Sub-County, Division or Village Council power to formulate byelaws provided they are not inconsistent with the Constitution or any other law enacted by Parliament; 3) The National Environment Act CAP, 153 in Section 34 limits activities that degrade lakes and rivers, Section 38 (2a, 2c, 2d) provides guidance on vulnerability of hilly or mountainous areas with regard to environmental degradation and Section 98 provides for offences and penalties related to environmental standards and guidelines; 4) The Uganda Wild Life Act CAP, 200 under Section 3 provides guidelines on ownership of wildlife; 5) The National Environment (Wetlands, river banks and lake shores management) regulations, S.I No. 3/2000 provide guidelines for protecting rivers and other wetlands from encroachment.

9.4.Policies and legal frame works

These existing policies and legal frame works mandate the local government to ensure that people comply with restoration, protection and conservation. These include National Environment Management policy 1995, the National Water Policy 1999, the national policy for conservation and management of wetland resources 1995, National Fisheries and Aquaculture Policy, 2017, National Climate Change Policy, 2015 e.t.c

9.5.Existing structures at villages

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There are structures at villages levels that are responsible to report any activity causing the degradation of the riparian zones. At the village levels there is a committee composed of the chairperson and secretary trained on how to handle and report the matter pertaining environmental degradation.

9.6. Environmental mainstreaming

The participants revealed that there is an opportunity in integrated environmental activities in all sectors at district. Every department at the district has to include the environmental issues for budgeting and natural resources is supposed to oversee and screen all projects implemented by the district to avoid the associated adverse impacts that can arise as result of the project implementation. Before the initial implementation of the project all stakeholders are involved in order to establish whether project is passing through riparian zones so that management plan can be instituted in place.

9.7.Adherence to existing legal frameworks and policies

People revealed that adhering to existence laws and policies is mandatory requirement for both external and internal assessment. Failure to comply with the principles of sustainable management of the riparian zones then that local government cannot qualify for funds to finance environmental activities at the district.

Legal frameworks also give mandate to districts to oversee the mineral mining such as limestone, sand mining whereby district generates revenue that would help to implement environmental activities.

9.8.Established zones for the catchment areas

The actors have established zoning around the riparian area to protect the catchment from degradation and encroachment. This has ensured maintenance of ecological functions and values of riparian zones in these two catchments. The zoning of the riparian zones is critical for equitable and sustainable use of the riparian for both present and future generation.

9.9.Parish development modal (PDM)

The inception of the parish development modal has become an important aspect for providing the alternative livelihood and reduction the environmental degradation. People who have resorted to degradation of riparian zones now they have alternative livelihood that have lifted up from engaging in subsistence farming into a money economy. With the inception of the parish

development modal that mandates that every project before implementation to subjected to screening and monitoring by all key stakeholders.

10.0.Interventions

The following were interventions to restore riparian zones

10.1.Environmental Restoration Orders

The local government is required to issue restoration orders under section 67 of Cap. 153 requiring a person to restore the riparian zones, or to prevent a person from harming the environment. They may award compensation for harm done to the environment or/and levy a charge for restoration undertaken. Restoration Orders are issued by NEMA or a court giving the person a minimum of 21 days to restore what he has destroyed.

Under Section 70(i) of the National Environment Act Cap 153, "where a person on whom an Environmental Restoration Order has been served fails, neglects or refuses to take action required by the Order, the Authority (NEMA) may with all the necessary workers and other officers, enter or authorize any other person to enter any land under the control of the person on whom that order has been served and take all the necessary action in respect of the activity to which that order relates and otherwise to enforce that order as may deem fit."

10.2. The Use of Criminal Law & Community Service Orders

Criminal law remains a veritable instrument for the control of behavior because of the natural tendency of people to fear the infection of pain, isolation or economic loss. Therefore, the Act provides for serious penalties for infraction of its provisions. As an alternative to imprisonment and fines, persons committing environmental wrongs may be required to perform duties in the community as a reparation to the community for the wrong done.

10.3.Community sensitization

The local government is mandated to create awareness on the importance of conservation, restoration and protection of the fragile ecosystems. Community sensitization is done at levels both villages, parish and district to help people understand the importance of conserving the natural resources.

10.4.Formation of Mpanga conservation committees both in the upper stream and downstream of the river.

Together with Actors and the district the groups have been formed to take management of the riparian zones. These groups are supposed to spearhead protection and conservation of the river Mpanga catchment.

10.5.Recruitment of staff under natural resources

The department of natural resources for all the districts were R. Mpanga crosses as well Ntoroko district (for R. Semuliki) is fully equipped with professional staff that have all required skills and knowledge to implement legal frame works and policies related to environmental management.

10.6.Sharing community benefits

The community have received benefits from the protection of buzzer zones where by NGOs and other actors have constructed schools, installed water pump and supply indigenous trees and bee hive to local people.

10.7.Demarcations of the 100m buffer zones.

Different civil society organizations like of Join for water, JESE, water for people, among others together with the albert water management zone under the ministry of water and environment have demarcated the 100m buffer zone on both R. Mpanga and R. Semuliki to protect it from encroachment and practicing activities that may be harmful to these Rivers.





Figure 9 Pillars for demacationn of the buffer zone in the down stream of R. Mpanga in kamwenge district.

11.0.Recommendations

The government of Uganda should strengthen the local Governments capacity in establishing by laws where they are not existing and monitor their implementation on the management of fragile ecosystems including riparian zones. It was so absurd that some local government manage their riparian ecosystems with no any byelaws. Putting in place byelaw is very critical in the management of such important ecosystems. Byelaws would be generated when conducting bottom-up planning meetings that includes all stakeholders from village level, parish, sub-county level and finally district level.

The local government should continue massive community sensitization and awareness of the importance of managing the riparian zones in sustainable manner. Communities need to be educated on how to manage riparian zones for both present and future generation. This should be done by all stakeholders including technical and political leaders.

The local government should continue to monitor and evaluate the critical riparian zones and compile reports on their status. Most of the riparian zones have been degraded due to lack of monitoring of technical people and political leaders.

The local government especially natural resource department should implement and monitor the existing laws and policies within their area of jurisdiction. It is absurd that laws and policies are in place that mandates natural resource officer and Environment officer to regulate activities that causing omission on the environment but northing is done to manage the riparian.

The local government should work hand in hand with existing non-governmental organizations and community-based organizations to provide alternative projects such planting of indigenous tree, bee hive keeping and nursey beds as a means of utilizing riparian zones in sustainable manner.

The government of Uganda should provide adequate funding to natural resource department. Issues related to environment especially the riparian zones need to be given first priorities during planning and budgeting.

The local government should mainstream environment planning in all development sectors to ensure fully participation and management of the fragile ecosystems by all stakeholders in the district.

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