



REPUBLIC OF UGANDA
MINISTRY OF WATER AND ENVIRONMENT
DIRECTORATE OF WATER RESOURCES MANAGEMENT
Victoria Water Management Zone

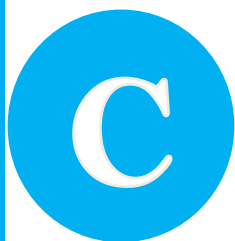


RWIZI

Catchment Management Plan

POPULAR VERSION

March 2020



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1

INTRODUCTION

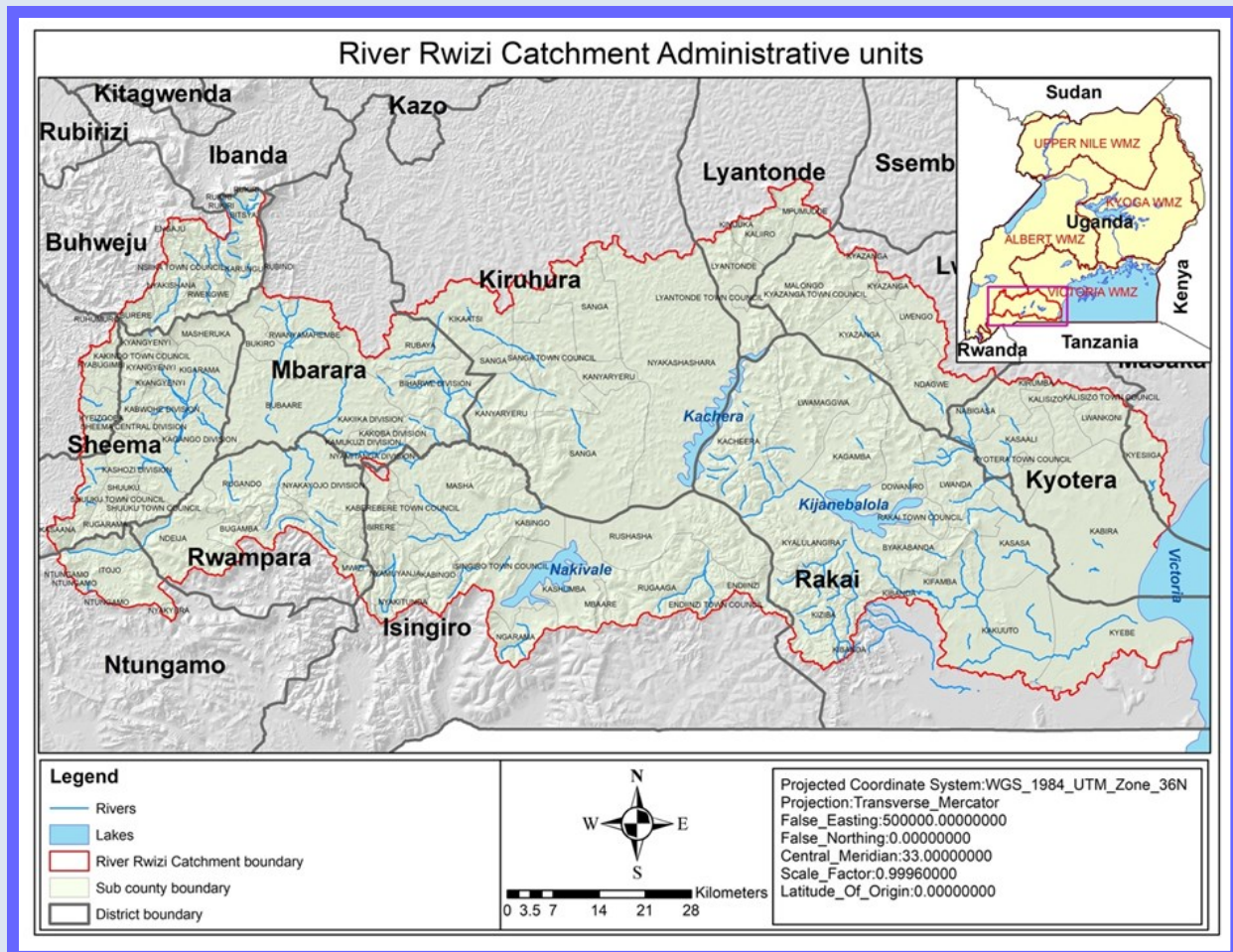


A Catchment Management Plan (CMP) gives guidance on the use and management of the water resources in a specific area. Guided by the Victoria Water Management Zone (VWMZ), stakeholders in the Rwizi catchment drafted the Rwizi Catchment Management Plan (CMP) in 2015. This popular version summarises the contents of the main CMP for easy understanding and use by the various stakeholders in Rwizi Catchment. Rwizi catchment covers approximately 8,554 square kilometers in the following districts: Buhweju, Bushenyi, Sheema, Ntungamo, Mbarara, Rwampara, Isingiro, Kiruhura, Lyantonde, Lwengo, Rakai, and Kyotera (Figure 1). The Catchment had a total population of about 3,000,000 persons in 2019, likely to have doubled by 2040.¹ The average population density in the Catchment is around 174 persons per square kilometre of land. Fifteen percent (15%) of the population will live in urban areas by 2035.²

1.1 Water resources management in Uganda

As part of its water resources management reforms completed in 2005, the Ministry of Water and Environment (MWE), through its Directorate of Water Resources Management (DWRM), implements stakeholder-driven water resources management. Catchment-based Integrated Water Resources Management (CbiWRM) allows stakeholders to jointly plan and manage water and related resources based on hydrological, instead of administrative, boundaries, at the lowest appropriate level, considering the needs and interests of all.

Figure 1: Administrative Units in Rwizi Catchment



¹According to projections based on the National Population and Housing Census 2014

²Ntale. H. K (2012) River Rwizi Water Balance Analysis, Vala Associates Ltd.

The implementation of Water Resources Management in Uganda has its legal basis from international and transboundary conventions and obligations, national legislation, policies, regulations, and several strategies at both national and regional levels. The existing policy and legal framework promote water resources management from the lowest possible level while considering and specifying the roles of different stakeholders, providing the basis for CbiWRM. The overarching structure for implementing Water Resources Management in Uganda cascades from the national level, regional level, catchment level, and district level. No single institution has the full mandate (and, ultimately, resources) to implement CbiWRM; hence, collaboration, coordination, and communication among the mandated institutions are critical to the effective implementation of CbiWRM.

To operationalise CbiWRM, the MWE divided Uganda into four Water Management Zones (WMZs), namely: Upper Nile, Albert, Victoria, and Kyoga (Figure 2). Within each WMZ are smaller hydrological units called catchments, further delineated into sub- and micro-catchments. For example, the Rwizi catchment is one of the six catchments in the Victoria Water Management Zone (VWMZ).

In each Catchment, stakeholders develop Catchment Management Plans, Sub Catchment Management Plans, and Micro Catchment Management Plans in a participatory process following the Guidelines for Catchment Management Planning (Figure 3). Further, a multi-stakeholder coordination structure called a Catchment Management Organisation (CMO) is established following the CMO Procedures Manual to facilitate collaborative water resources management (Figure 4).

Figure 2: Water Management Zones in Uganda (Source: MWE (2019) Uganda Catchment Management Planning Guidelines 2019)

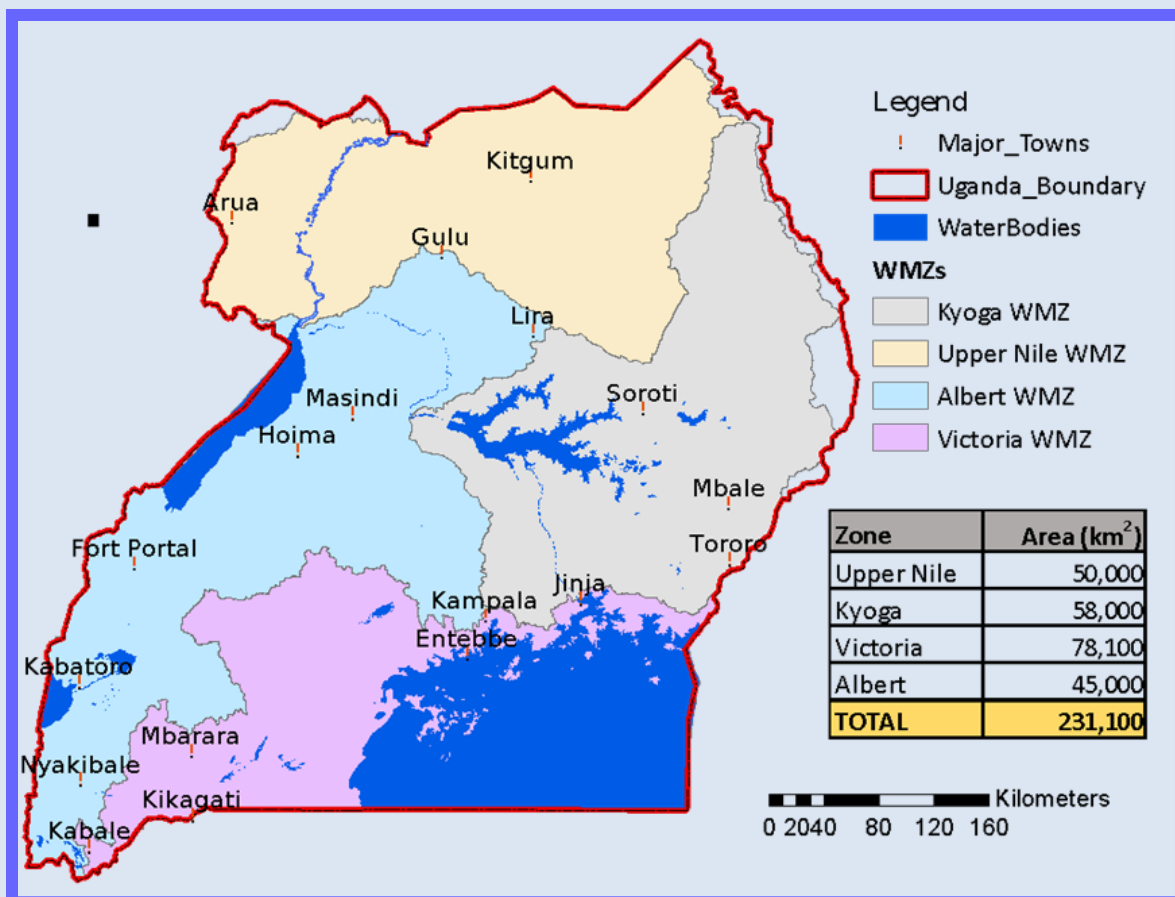


Figure 3: Steps in the Catchment Management Planning process (Adapted from Source: MWE (2019) Uganda Catchment Management Planning Guidelines 2019)

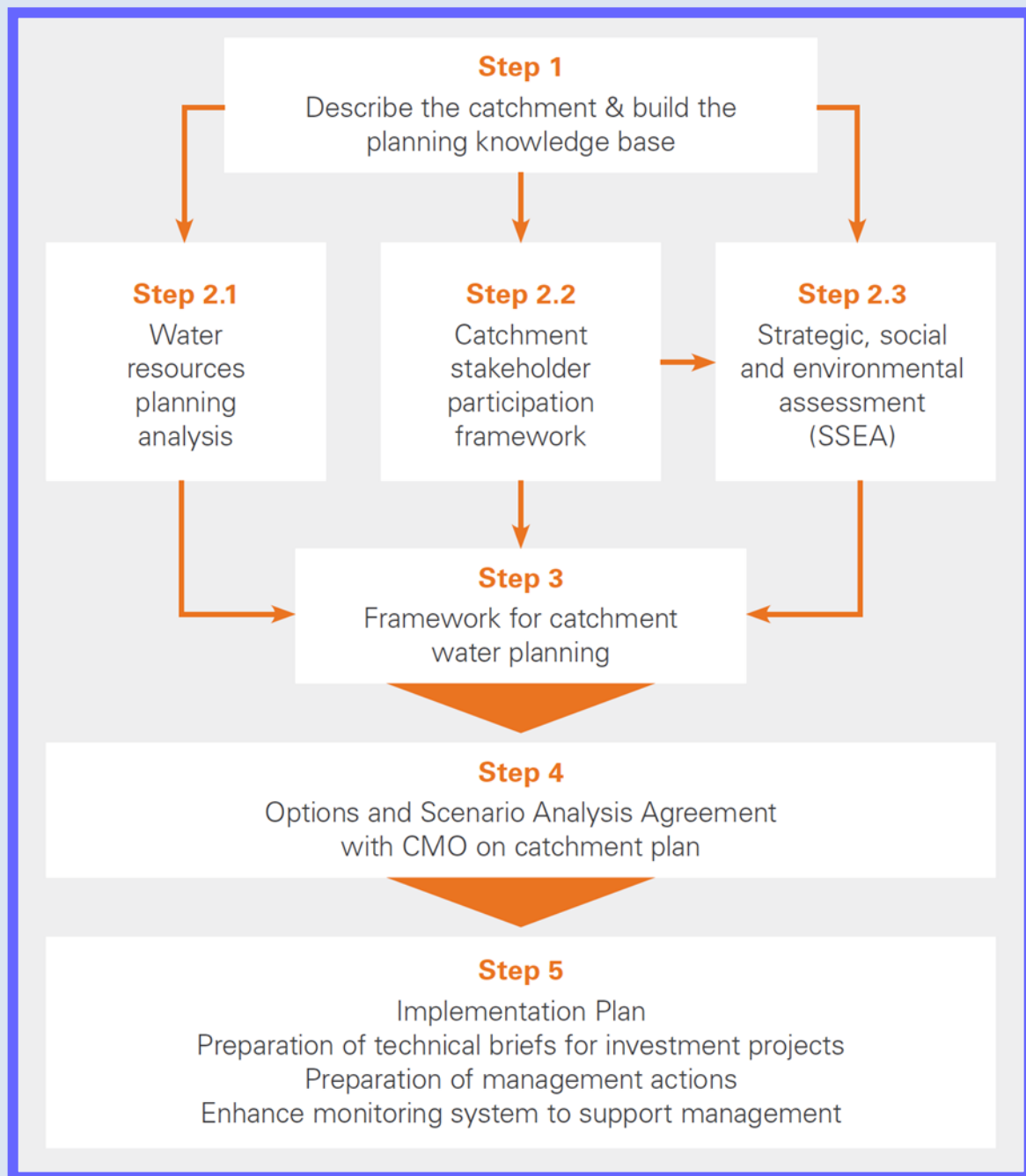
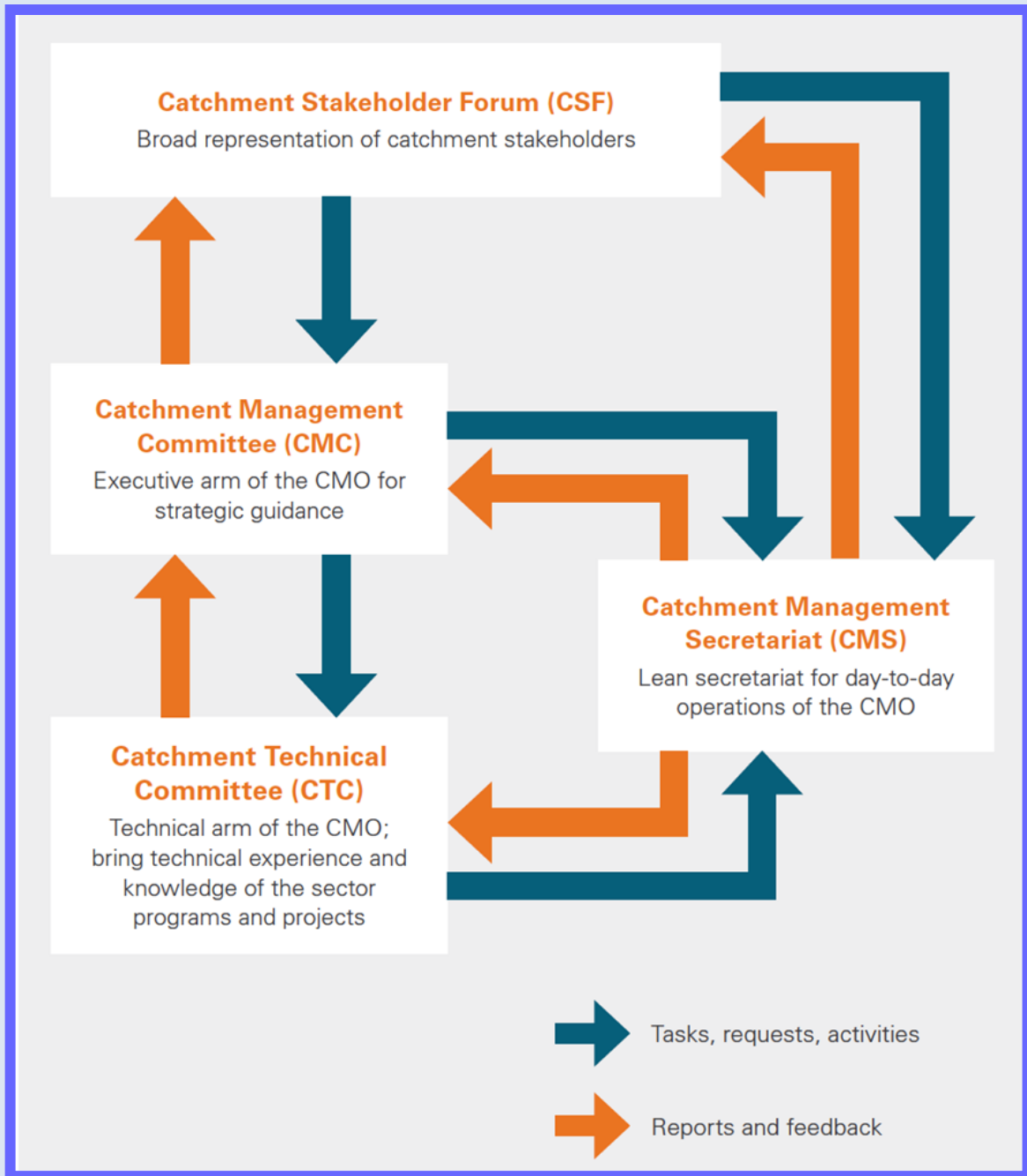


Figure 4: Composition of the Catchment Management Organisation (CMO)

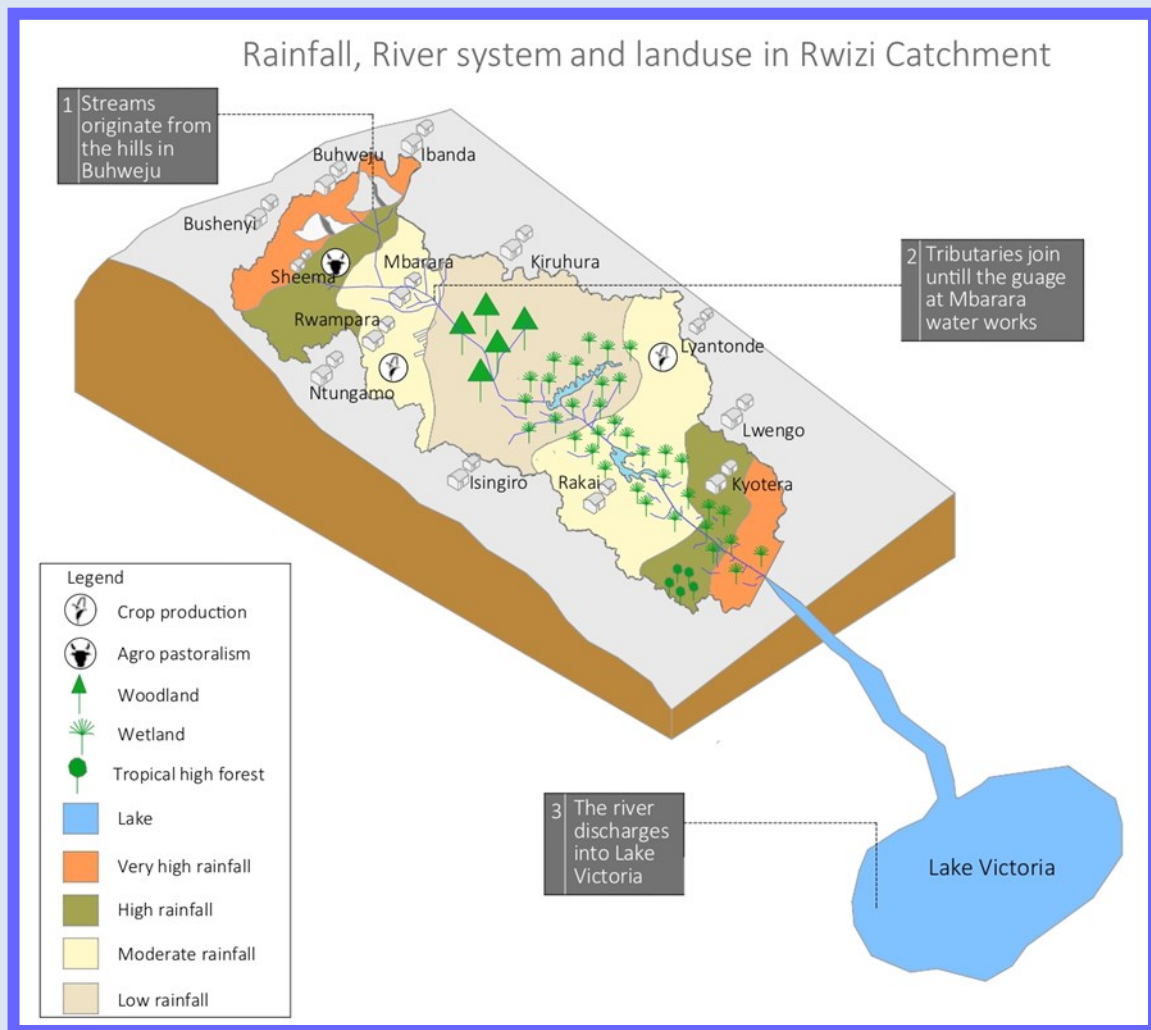


1.2 Description of Rwizi catchment

Rwizi catchment is defined by the river Rwizi, which forms a system of lakes, wetlands, and streams. River Rwizi originates from the hills in Buhweju district and flows in a southerly direction, turning eastwards for about 57 kilometres until the gauge at Mbarara waterworks, discharging its water into Lake Victoria (Figure 5).

Rwizi Catchment is partly flat and sloping. The upper reaches of the Catchment are predominantly hilly, while the middle is generally flat and lies within the cattle corridor (dryland). The lower parts, towards Lake Victoria, are mainly marshland. Altitude in the Catchment ranges from 1,262 metres above sea level (m.a.s.l) at the outlet to 2,168 m.a.s.l. at the very northern part of the Catchment, with an average of 1,517 m.a.s.l.

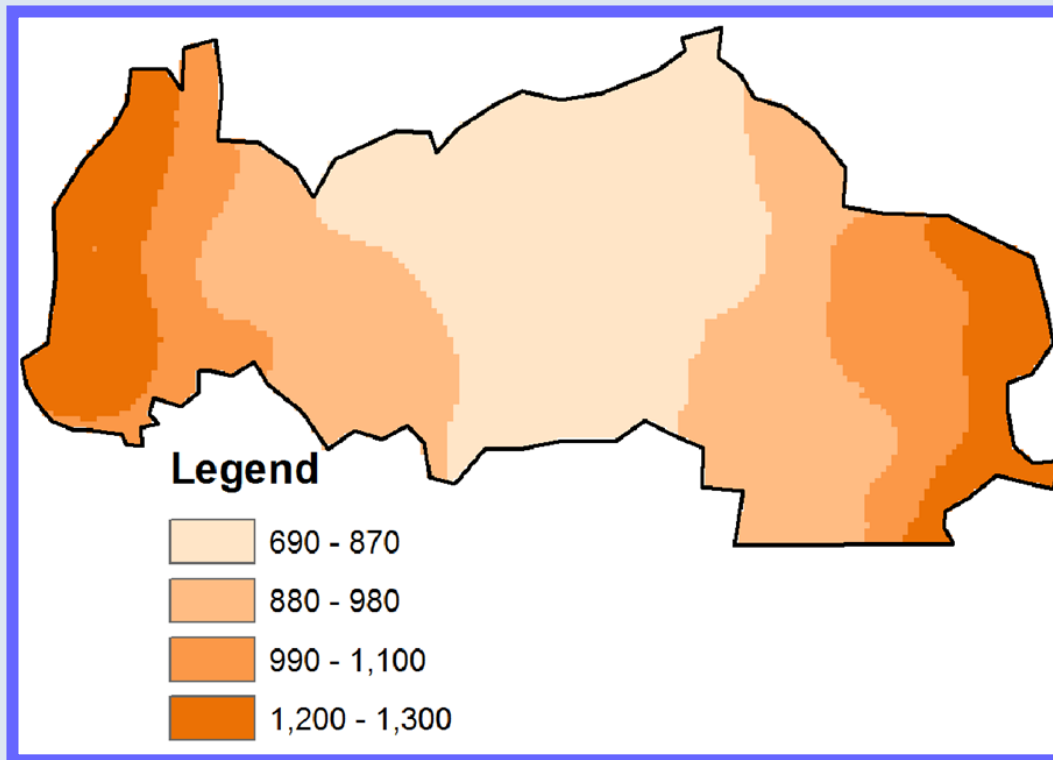
Figure 5: Schematic representation of Rwizi Catchment and its key features



The Catchment experiences two wet seasons: March to May, September to November, and sometimes up to December. Rainfall varies significantly across the Catchment, ranging from 700mm/yr in Isingiro, Mbarara, Rwampara, Kiruhura, and Lyantonde to 1300 mm/yr in Buhweju, Sheema, Bushenyi, Rakai, and Kyotera (Figure 6). The data gaps notwithstanding, available historical data suggests

that rainfall has been relatively stable, with only a slight decrease that has an insignificant effect on water availability in the Catchment. Future climate scenarios indicate that rainfall extremes are likely to increase in Western Uganda by 10% to 12% in the 2050s and 16% to 19% in the 2090s. In South-Western Uganda, rainfall extremes are likely to decrease by 25% in the 2050s and 2090s.

Figure 6: Rainfall Distribution in Rwizi Catchment



The average temperature for the Catchment is a minimum of 13.7°C and a maximum of 26.6°C. Data shows a 2°C increase from 1960 – 1993. January, February, and March are the hottest months of the year. Future climate scenarios suggest that the dry season could become cooler while the wet season could become warmer. The increase in maximum temperatures during the wet season could increase evaporation and, consequently, increase water loss from the system.

Soils in Rwizi catchment are dominantly clay loam, sand clay loam, sandy loam, and peaty loam soils. The geology of the Catchment is composed of metamorphic rocks overlain by alluvial deposits in some places. Within the upper parts of the Catchment, the rock system is complex and therefore not easily eroded. In contrast, the rock system in the middle and lower parts of the Catchment suggests that the soil is easily erodible.

1.3 Water and related resources in Rwizi Catchment.

Rwizi catchment has many wetlands and the major ones include: Nyarubungo, Katerera, Nyaruhandagazi, Kizimbi, Kasaana, Kibaare, Katukuru, Rwemigina, Nyabikungu, Bujaga, Kicwamba, Rugaaga, Nyamuyanja, Nyakabaare, Mirama, Rukindo, Nakisharara, Kooga, Ruceece, Kyarutengura, Kalunyiga, Mazinga, Katara, Kanyabukanja, Rushanje, Kibingo, and Nyakambu. The lakes include Nakivale, Kachera, Mburo, and Kijanibalora.

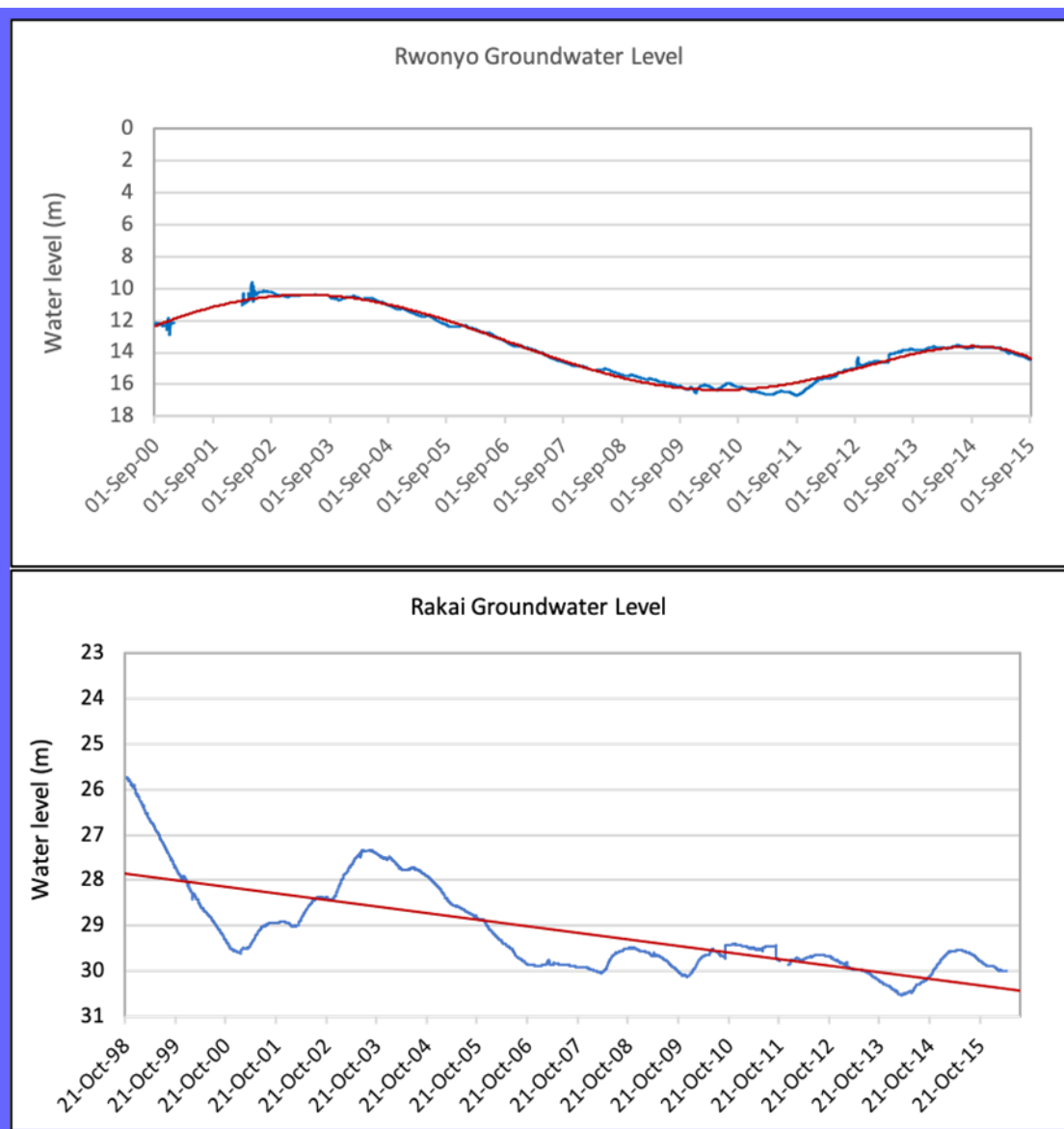
Groundwater in the Rwizi catchment is poor and highly variable. The poor groundwater potential is also attributed to the dry Ankole cattle corridor – most of the wells drilled in the dry corridor are either dry or low yielding.

Even at its lowest flows of 60.86 Million Cubic Metres per year (MCM/yr), available surface water exceeds the Catchment's current (2020) and projected (2040) consumptive water demand of 26.35 MCM/year and 37.58 MCM/yr, respectively. The available surface water resources are supplemented by the groundwater resources estimated at 875 MCM/yr. Consequently, the water available in the Catchment per year exceeds the total annual consumptive water demand.

Therefore, water available in the Catchment can meet all current (2020) and projected (2040) consumptive water needs in the Catchment if the water would be distributed evenly in time and space.

Surface water sources have water of good quality except for Lake Nakivale that indicates contamination from human excreta deposited in the lake by the high population of refugees living along the shoreline. The River Rwizi water is turbid due to the reclamation of wetlands as they are converted to different land use. In contrast, groundwater water shows high levels of hardness and high contents of calcium, magnesium, iron, fluoride, manganese, and other elements, making it unpotable. Observations made at the Rwonyo and Rakai groundwater monitoring stations indicate that groundwater levels are declining (Figure 7), possibly due to increased abstraction, indicating that the groundwater aquifers have a reduced recharge from rainfall.

Figure 7: Groundwater levels at Rwonyo and Rakai monitoring stations



1.4 Stakeholders in Rwizi Catchment

The main stakeholder categories in the Rwizi Catchment include the Central Government, Local Governments, Civil Society Organisations, water supply and sanitation operators, the private sector, semi-autonomous agencies, academic and research institutions, and local communities.

- Central Government Ministries, Departments, Agencies put the enabling environment for catchment management, such as management guidelines, policies, and institutional frameworks. Also, this category bears the responsibility of providing relevant strategic information and technical support to the other stakeholders. Further, they can directly implement water resources management interventions.
- Political, technical, and administrative offices of Local Governments at the District, City, Municipality, Town Council, Sub-county, Parish, and Village Council levels are interested in ensuring that the persons they represent access resources and services. This category provides the necessary policy, legal and institutional frameworks at the local level and co-financing for implementation.
- Civil Society Organisations (CSOs) and Development Partners are interested in sustainable resource use and management, and community livelihoods support. They play a "public watchdog role" in monitoring the quality of governance and lobbying duty-bearers to deliver water resources development as provided for in the policy aspirations of the country. Further, this category is the Government's partner of choice in development by sourcing complementary resources for implementing development initiatives. CSOs can guide communities on the wise use of catchment resources and provide knowledge and experiences on best practices from elsewhere.
- Water supply and Sanitation Operators, including the National Water and Sewerage Corporation, water boards, water user associations, etc., want assurance of adequate quantities and quality of water to supply to their customers and, lately, invest resources in catchment restoration and management.

- The private sector's interests are in catchment goods and services (e.g., water, agricultural produce, livestock and livestock products, etc.). When adequately engaged, they can invest resources in catchment restoration and management. Some of these stakeholders have already committed resources to support projects and programs related to catchment restoration in the Catchment.
- Academic and research institutions are interested in studying various aspects of water resources management, aquatic biodiversity, ecosystem services restoration, impacts of climate change on water resources and related livelihoods, and social issues.
- Local Communities, including crop and livestock farmers, fisherfolk, and business persons, both male, and females of various ages, use the Catchment's resources and services to satisfy their livelihood and development needs.

The challenges hindering the full participation of stakeholders in water resources management in the Catchment include limited awareness of the importance of water resources management (WRM), little prioritization (and therefore funding) of WRM by Central and Local governments, inadequate stakeholder capacity in WRM planning and implementation, limited coordination and collaboration among stakeholders, and negative attitude towards natural resources conservation in general. In addition, the lack of information and data related to water resources management in the Catchment compounds the above challenges.

1.5 The social and environmental context of Rwizi Catchment

The main economic activities dependent on water resources in the Catchment are: subsistence and commercial crop farming, including eucalyptus plantations, livestock rearing, fish farming and rudimentary fishing on the lakes, tourism, manufacturing and processing industries, local industries such as brick-making, sand mining, and the use of papyrus reeds for making baskets, mats, and crafts.

The cattle corridor receives low rainfall and experience increasingly high drought conditions, resulting in an acute shortage of water and pasture during the dry season. Lack of water and pasture during the dry season results in animal emaciation (Plate 1), reducing milk and beef production.

The Catchment faces increased pressures due to the increasing human and animal population, seasonal migrations by pastoralists, land reclamation for farming and construction, clearing of hill slopes for agriculture, and sand mining from the river bed. These pressures have resulted in the degradation of the natural environment, particularly along livestock corridors, wetlands, and hill slopes. Nakivale refugee settlement (185 square kilometres), established in 1960, located in Isingiro District, has become an ecological hotspot because of the increasing population and the resultant demand for natural resources.

The growing population in the Catchment has the following impacts:

- Increased demand for water and other natural resources for domestic and commercial use
- Increased demand for land for settlement, urban infrastructure development, and crop farming, thereby accelerating land conversion from other forms of land use. For example, by 2019, 168 hectares of Mbarara Forest Reserve had been encroached upon for urban development since 2007.
- Increased solid and liquid waste generation could increase the risk of pollution of the environment if the wastes are mishandled.

The analysis of land cover change in the Catchment indicates that bushland, forest, grassland, and wetland have reduced by 64%, 63%, 48%, and 46%, respectively, between 2005 and 2019. The reduction is attributed to the increased demand for charcoal and wood products (refugee influx in the Nakivale refugee settlement), urbanisation (in the Upper and middle parts of the Catchment and around Lake Kachera), high demand for land for settlement and crop farming by the increasing human population, leading to encroachment on bushland, forests, woodland, riverbanks, and wetlands in the Catchment.

Plate 1: An emaciated cow due to lack of pasture and water during one of the severe droughts in Isingiro



On the other hand, the area under built-up area and farmland increased by 77% and 85%, respectively, in the same period. The draining of wetlands for eucalyptus growing has contributed to the loss of valuable wetland flora and fauna. Community members plant eucalyptus in wetlands to drain the wetlands for the establishment of crop or livestock farms.

The loss of trees and other vegetation can accelerate runoff generation, resulting in increased soil erosion, reduced crop yields, increased flooding

downstream, and reduced capture of greenhouse gases. In addition, the large-scale loss of trees affects a landscape's microclimate (i.e., local temperatures, atmospheric pressure, and water vapor), reducing rainfall formation. Flooding leads to the destruction of crop fields (Plate 2) and property.

Plate 2: A banana plantation flooded and destroyed during a heavy downpour in Isingiro district





1.6 Main issues, causes, and impacts

Table 1 summarises the major water resources-related issues in Rwizi Catchment, their causes, and potential impact. Also, the table gives some of the areas most affected by the problems.

Table 1: Summary of the main issues in the Rwizi Catchment

Main issues	Hotspot areas	Causes	Impact
Low safe water coverage	Widespread	<ul style="list-style-type: none"> Groundwater potential is poor and variable Poor quality of groundwater water 	<ul style="list-style-type: none"> Shortages of water supply for domestic use High risk of spreading waterborne diseases
Poor solid and liquid waste management	Urban areas, especially: <ul style="list-style-type: none"> Mbarara city, Kaberebere Kyotera: Kyotera Town, Kalisizo Town Kiruhura: Sanga Town Lyantonde: Lyantode Town Lwengo: Kyazanga Town Rakai: Rakati Town Landing sites: <ul style="list-style-type: none"> Kiruhura: Nyakasharara Rakai: Kachera, Lwamaggwa Nakivale refugee settlement	<ul style="list-style-type: none"> Wastewater treatment facilities for industries are either lacking or inadequate Improper solid waste management practices both at source and dump sites Low latrine coverage, especially in the Nakivale refugee settlement 	<ul style="list-style-type: none"> Pollution of water sources High risk of spreading sanitation-related diseases
Shortage of water for animals	Cattle corridor	<ul style="list-style-type: none"> Existing valley dams and valley tanks do not cover livestock demand Shortages are aggravated by the low and increasingly variable rainfall received in the cattle corridor High livestock numbers increase the demand for water 	<ul style="list-style-type: none"> Animal mortality Low income as a result of reduced productivity of animals (beef and milk)
Low agricultural productivity	Widespread	<ul style="list-style-type: none"> Limited investment in soil and water conservation practices Poor agricultural practices undermine soil fertility Limited access to agricultural inputs Increasingly erratic weather patterns resulting from global climate change 	<ul style="list-style-type: none"> Low income as a result of crop failure High vulnerability to disasters Increased risk of food insecurity

Table 1 cont.: Summary of the main issues in the Rwizi Catchment

Main issues	Hotspot areas	Causes	Impact
Encroachment of lakeshores, riverbanks, and wetlands	<p>Sheema: Nyakambu wetland</p> <p>Isingiro: Nyamuyanja wetland</p> <p>Kyotera: Wetlands in Kyebe and Kakuuto Sub-counties, Katengo wetland in Kyotera TC, Kisoma wetlands (Kisasa Sub-county)</p> <p>Urban areas throughout the Catchment</p>	<ul style="list-style-type: none"> Population growth has led to increased demand for land for settlement and urban development Community members plant eucalyptus in wetlands to drain the wetlands for the establishment of crop or livestock farms. 	<ul style="list-style-type: none"> Land degradation in and around urban areas Loss of aesthetic value of the environment Deposition of sediment into the water Increased vulnerability to natural disasters, especially floods and droughts
Accelerated deforestation de-vegetation	<p>Widespread, but hotspot areas include:</p> <p>Buhweju: Karungu, Nyakishana, Rwegwe</p> <p>Shema: Kakindo</p> <p>Isingiro: Nyamuyanja, Kabingo, Birere</p> <p>Kiruhura: Sanga, Kanyaryeru, Kikaatsi</p> <p>Lweng: Malongo, Lwengo, Ndagwe</p> <p>Rakai: Kifamba</p> <p>Kyotera: Kyebe</p>	<ul style="list-style-type: none"> High dependence on firewood and charcoal for energy Trees are cut for commercial charcoal production for urban centres within and outside the Catchment Increased demand for land for settlement and crop farming by the increasing human population 	<ul style="list-style-type: none"> Soil erosion Increased frequency of floods and droughts
Deterioration in attitude and behavior towards management of natural resources	General	<ul style="list-style-type: none"> Failure to attach economic value to the environment and natural resources Failure in extension service delivery at the household level to raise awareness about the importance of the environment and natural resources. 	<ul style="list-style-type: none"> Environmental degradation
Limited stakeholder coordination and collaboration	General	<ul style="list-style-type: none"> Lack of capacity, primarily financial and human capacity, for the institutions to implement their mandate. Uncoordinated planning and implementation of projects and programs. 	<ul style="list-style-type: none"> Environmental degradation
Lack of information and data related to water resources in the Catchment	General	<ul style="list-style-type: none"> Weak mechanisms for collection, analysis, and sharing of water resources management information and data 	<ul style="list-style-type: none"> Environmental degradation

2

VISION, OBJECTIVES, OPTIONS, AND SCENARIOS FOR RWIZI CATCHMENT MANAGEMENT



2.1 Vision and strategic objectives

Based on the critical issues identified, their causes, and impacts, Catchment stakeholders agreed on a vision for the Catchment:

To achieve this shared vision, the CMP addresses four strategic objectives, which the stakeholders formulated:

"A sustainable, beautiful Rwizi Catchment environment for better livelihoods."

2.2 Options and Scenarios

1. To ensure that farming, animal husbandry systems, and industrial establishments are productive, drought and climate-resilient, and improve household income.

2. To ensure sustainable access to water of adequate quality and quantity for domestic use and production

3. To restore degraded natural resources.

4. To strengthen natural resources management systems and

To achieve the vision and strategic objectives, there is a need to undertake measures that address the main issues and reverse the trends that undermine sustainable development in the Catchment. These measures are called options. A set of options combined with external factors, government policy, ongoing trends, and projections for the future then forms a scenario.

Considering the issues faced and the stakeholders' vision and objectives for water resources management in Rwizi Catchment, three scenarios were developed:

- **Scenario 1: Ecosystem Protection and Conservation** envisages investments towards ecosystem protection

and conservation with limited water infrastructure development for multipurpose uses. The envisaged infrastructure investments include construction and rehabilitation of valley tanks and earth dams for livestock watering, gravity flow schemes for domestic water supplies, boreholes equipped with hand pumps, and motorised groundwater abstractions for rural domestic/urban water supplies and direct water abstractions from River Rwizi for urban water supplies.

- **Scenario 2: Water Infrastructure Development** envisages investments towards developing potential multipurpose water storage reservoirs in the Catchment and bulk water transfer schemes to meet water demands in the long term.
- **Scenario 3: Ecosystem Protection and Conservation and Water Resources Infrastructure Development** envisages investments in ecosystem protection and conservation and optimal development of identified potential multipurpose water storage reservoir sites, bulk water transfer schemes, and optimal development of irrigation potential in the Catchment.

A water resources analysis was undertaken to check the feasibility of each scenario, determine if the available water resource can meet the projected demand, and estimate the need for storage associated with each scenario in the different sub-catchments (or group of sub-catchments). Multi-criteria analysis was used to compare the three scenarios. Considering the vision and objectives for water resources management in Rwizi Catchment, Scenario (iii), combining ecosystem protection and conservation and water infrastructure development, is the maximum-benefit Scenario for the Catchment. The scenario foresees interventions that will showcase the benefits of Integrated Water Resources Management at the Catchment level. These interventions include (i) Strengthening the Catchment Management Organization, (ii) investing in ecosystem restoration, (iii) investing in water and sanitation (and related infrastructure), (iv) investing in economic development, including investments in income-generating activities for livelihood improvement, infrastructure development and green economy investments aimed at achieving sustainable development while combating poverty.

2.3 Strategic interventions for the maximum benefit scenario

Table 2 shows the priority interventions and activities for the maximum benefit scenario.

Table 2: Main Issues, their locations, and Proposed Interventions

Main issues	Intervention	Priority actions
Lack of information and data related to water resources in the Catchment	Water Resources Monitoring Network	<ul style="list-style-type: none"> Expand and automate the monitoring network for surface water, groundwater, and climate
Accelerated deforestation de-vegetation	Catchment Afforestation	<ul style="list-style-type: none"> Establish and support tree nurseries Support agroforestry and tree growing for timber
Encroachment of lakeshores, riverbanks, and wetlands	Wetland restoration	<ul style="list-style-type: none"> Verify maps for wetlands Establish Wetland Management Committees Develop community-based Wetland Management Plans, including bush fire management Demarcate wetlands zones (critical zones, protection, buffer zone, production zone for cultivation and settlement) Develop by-laws and ordinances for wetland protection Implementation of by-laws and ordinances Demarcate protected zones (e.g., using trees or pillars) in the wetlands and decide/agree on permitted activities for the zone Enforce regulations on unsustainable activities (environmental degradation) in the protected zones Establish a fund for wetland protection (e.g., Community Environment Conservation Fund)
	River Banks and Lake Shores Rehabilitation	<ul style="list-style-type: none"> Identify, map, and designate sites where sand or gold mining can sustainably take place Demarcate buffer zone using live markers Restore degraded river banks and buffer zones (tree planting, grassing) Riverbank stabilization, e.g., by using gabions and other structural interventions Build capacity of extension services on soil and water conservation measures (mulching, composting, manuring), good agricultural practices, pest/disease control

Table 2 cont.: Main Issues, their locations, and Proposed Interventions

Main issues	Intervention	Priority actions
Low safe water coverage	Development of Water Allocation Plan	<ul style="list-style-type: none"> • Develop Rwizi Water Allocation Model • Train Staff in the use of the model • Use model in water resources planning at Catchment and sub-catchment levels
	Rainwater harvesting	<ul style="list-style-type: none"> • Promote rainwater harvesting at the household level • Promote rainwater harvesting at the institutional level – schools, health centres, faith-based institutions • Promote rainwater harvesting at the community level
	Bulk water transfer schemes	<ul style="list-style-type: none"> • Undertake feasibility and detailed engineering design studies • Undertake environmental and social impact assessments • Develop Resettlement Action Plans • Implement feasible schemes
Shortage of water for animals	Develop Multipurpose Water Resources Infrastructure	<ul style="list-style-type: none"> • Undertake feasibility and detailed engineering design studies for multipurpose water storage infrastructure • Undertake environmental and social impact assessments • Develop Resettlement Action Plan • Implement feasible schemes
Low agricultural productivity	Improved and climate-resilient farming	<ul style="list-style-type: none"> • Promote soil and water (SWC) measures, including regenerative agriculture • Support small-scale irrigation • Support private sector development for input supply
Poor solid and liquid waste management	Waste management systems	<ul style="list-style-type: none"> • Improve solid waste collection and management systems in collaboration with local entrepreneurs • Stakeholder sensitization on proper handling and disposal of waste (including sorting) • Encourage and support ventures that can utilize (reuse or recycle) solid waste, especially by working with community groups and local entrepreneurs
<ul style="list-style-type: none"> • Deterioration in attitude and behavior towards management of natural resources • Limited stakeholder coordination and collaboration 	Institutional Strengthening and Capacity Development	<ul style="list-style-type: none"> • Implement CMO governance system • Support and strengthen the CMC • Establish a technical support team for CMP implementation • Monitoring and evaluation of CMP implementation • Sub-catchment, micro-catchment, and community action planning • Awareness-raising on CMP

3

FINANCING AND IMPLEMENTATION PLAN



3.1 Funding requirements

The priority interventions of the maximum benefit scenario are grouped into the below investment priorities, each with a corresponding budget need (Table 3).

Finalise the Catchment Management Plan (CMP)

components: The implementation of the CMP will require updating the stakeholder analysis and mapping of ongoing interventions vis-a-vis the existing hotspots. It will also require undertaking field data collection and verification for modelling surface and groundwater and validating the Catchment's water balance. Additionally, Funds will be needed to popularize the CMP to trigger implementation, targeting all stakeholder categories.

Institutional strengthening: Resources are required for supporting the Rwizi Catchment Management Organisation. The specific interventions include supporting and strengthening the CMC, and establishing and supporting the Catchment Management Secretariat, supporting and strengthening the CSF, and establishing a Catchment Technical Committee. Resources are also required for developing and implementing a CMP monitoring and evaluation framework. The other areas requiring funding under institutional strengthening are sub-catchment, micro-catchment, and community action planning. Budget for implementing management plans at these levels and learning, communications, and knowledge management, is prioritised.

Ecosystem protection and restoration: Resources are needed for improving the management of Central and Local Forest Reserves, forestation of bare hills, greening the charcoal production and firewood value chains, and promoting the use of alternative sources of energy. Additionally, funding is required to protect and rehabilitate rangelands, including establishing water for production facilities

for livestock. Other areas requiring funding under ecosystem protection and restoration include funds for interventions on protecting wetlands, flood plains, rivers, and riverbanks, including enhancing the reach of the Community Environment Conservation Fund.

Water and sanitation: Resources will be required for learning and knowledge management, including promoting capacity building, supporting extension services, and improving communication and knowledge management on water and sanitation. Additionally, resources are required to support the monitoring and planning services through strengthening monitoring networks for surface water, groundwater, and water quality and enhancing compliance monitoring. Further, the piped water network will be extended to underserved areas, and operation and maintenance of point water sources will be improved. Moreover, sanitation programmes will be upscaled, and waste management will be enhanced.

Agricultural and economic development: One of the proposed interventions is to improve agroforestry in banana growing and livestock farming communities, requiring commensurate research and developing and implementing a plan to improve access to water for livestock. The other priorities requiring funding in agriculture and economic development are improving rain-fed farming, promoting small-scale (<2ha) and medium-scale (>2ha) irrigation, promoting road water harvesting, and promoting alternative Income Generating Activities.

Table 3: Funding required to implement the CMP

IMPLEMENTATION PLAN - RWIZI CATCHMENT MANAGEMENT PLAN					
ID	Sub-activities	Budget for implementation (UGX)		Budget for O&M (UGX/year)	
	INTERVENTION 0: FINALISE COMPONENTS OF THE CATCHMENT MANAGEMENT PLAN	78,750,000		0	
Sub-total	FINALISE COMPONENTS OF THE CATCHMENT MANAGEMENT PLAN		78,750,000		-
	A1. Strengthen the Catchment Management Organization	608,875,000		264,000,000	
	A2 Monitor and evaluate the implementation of the CMP	82,250,000		214,250,000	
	A3 Coordinate at district level	30,700,000		110,000,000	
	A4 Sub-catchment, micro-catchment and community action planning	992,250,000		1,600,000,000	
	A5 Funding of the Catchment Management Plan	854,625,000		-	
	A6 Learning and knowledge management	1,406,525,000		36,000,000	
Sub-total	A) INSTITUTIONAL STRENGTHENING		3,975,225,000		2,224,250,000
	B1 Productive and protected forests and woodlands	33,838,542,143		296,140,000	
	B2 Promoting productive and sustainable rangelands	321,076,429		20,000,000	
	B3 Protecting wetlands and flood plains	774,904,301		46,900,000	
	B4 Protecting rivers and riverbanks	585,628,571		-	
Sub-total	B) ECOSYSTEM PROTECTION AND RESTORATION		35,520,151,444		363,040,000
	C1 Learning and knowledge management	203,975,000		20,860,000	
	C2 monitoring and planning of water services and resources	600,498,214		169,200,000	

Table 3 cont: Funding required to implement the CMP

IMPLEMENTATION PLAN - RWIZI CATCHMENT MANAGEMENT PLAN					
ID	Sub-activities	Budget for implementation (UGX)		Budget for O&M (UGX/year)	
	C3 Piped water supply systems	67,848,000,000		3,388,125,000	
	C4 Rural water supply	763,812,500		18,328,125	
	C5 Sanitation and waste management	3,683,250,000		220,710,000	
Sub-total	C) WATER AND SANITATION		73,099,535,714		3,817,223,125
	D1 Improve agroforestry in banana growing communities Livestock farming	995,435,000		15,000,000	
	D2 Improve Rainfed farming	471,055,000		18,750,000	
	D3 Promoting irrigation (small scale (<2ha) and medium scale (>2ha))	342,500,000		-	
	D4 Promote road water harvesting	178,500,000		6,000,000	
	D5 Promote Income Generating Activities	637,500,000		-	
Sub-total	D) AGRICULTURE AND ECONOMIC DEVELOPMENT		3,067,490,000		39,750,000
Grand total			115,741,152,158		6,444,263,125

3.2 Sources of funding

The first source of funding for the CMP is the Central Government through relevant Ministries and Agencies, starting with the Ministry of Water and Environment, which is the custodian of water resources in the countries, and others whose operations affect or are affected by the status of water resources in the Catchment. Other funding sources include local governments, CSOs, Development Partners, and the private sector.

3.3 Roles and responsibilities

The CMP is implemented by the Rwizi Catchment Management Organisation (CMO) in close collaboration with the Victoria Water Management Zone (VWMZ). VWMZ and the Rwizi CMO take the initiative and guide implementation. However, project implementation can be done by any stakeholder willing to contribute financial, human, and other resources. Therefore, stakeholders ranging from resource users to development partners and the private sector can collaborate or contribute to the implementation of the CMP. Table 4 summarises some of the roles and responsibilities of various stakeholders.

Table 4: Roles of stakeholders in Catchment Plan Implementation

Stakeholder	Roles and Responsibilities
Rwizi CMO	<ul style="list-style-type: none"> • Facilitate and promote the implementation of catchment management and source protection plans • Facilitate inclusion of plan projects and programs into District Development Plans • Monitor CMP implementation • Promote and facilitate compliance regulations and permitting system
VWMZ	<ul style="list-style-type: none"> • Coordinate all implementation activities • Facilitate and support DWRM coordination of central level implementation and financial resource mobilization • Facilitate implementation of catchment plan projects by central departments • Identify modalities for zonal and Catchment level implementation among its public and private sector partners • Mobilize funds (MTEF, budget, donors, private sector) with the assistance of DWRM for implementation of zonal and Catchment level projects • Coordinate, manage, and undertake project preparation for zonal and catchment level plan projects • Assess water use permit applications under existing regulations • Facilitate implementation and installation of upgraded and expanded monitoring network and WIS, and operate the system within the zone • Monitor hydrologic and meteorological conditions, compliance with regulations, implementation of sub-and micro catchment plans and source protection plans • Support and facilitate the continuing role of the CMC and CTC, and other stakeholder groups, including keeping all stakeholders informed of implementation progress
MWE - DWRM	<ul style="list-style-type: none"> • Organize and coordinate review of the draft catchment plan and facilitate the Ministry's approval and adoption of the final agreed plan • Organize and coordinate the technical review of plan project proposals and assignment of implementation to the appropriate department • Mobilize funds for plan implementation and WMZ support • Review policy, legal and regulatory revision needs based on plan recommendations and manage the process for updating and revision
MWE - NEMA	<ul style="list-style-type: none"> • Review the environmental regulatory needs (actions, new or revised regulations) based on the adopted final plan • Issue required regulations, notices, and permits following legal and regulation requirements

Table 4 cont: Roles of stakeholders in Catchment Plan Implementation

Stakeholder	Roles and Responsibilities
MWE – Line departments	<ul style="list-style-type: none"> • Undertake preparation of projects and investments proposed in the adopted final catchment plan (feasibility studies) • Supervise and manage project implementation (designs, tender documents, procurement, construction) • Operate the completed project following the permit and operating rules agreed with the WMZ
Line departments in the concerned sector Ministries	<ul style="list-style-type: none"> • Undertake preparation of projects and investments within their area of responsibility • Supervise and manage project implementation (designs, tender documents, procurement, construction) • Operate the completed project following the permit and operating rules agreed with the WMZ
District Local government	<ul style="list-style-type: none"> • Facilitate and support the implementation of the adopted final CMP • Incorporate priority projects and program into the District development plan as appropriate
Donor partners and NGOs	<ul style="list-style-type: none"> • Implement priority projects and program in collaboration with the WMZ and stakeholders following agreements and Memoranda of Understanding (MOUs) with the WMZ and DWRM
Private sector	<ul style="list-style-type: none"> • Facilitate and support the implementation of the adopted final catchment plan





Acknowledgement

The Rwizi Catchment Management Plan was developed in 2015 by Victoria Water Management Zone (VWMZ) of the Directorate of Water Resources Management, Ministry of Water and Environment of the Republic of Uganda. Over the years, stakeholders of Rwizi Catchment have made valuable contributions during meetings, fieldwork campaigns, piloting ideas, and stakeholder engagement workshops within the catchment that have contributed to the improvement and finalization of the plan.

The 2020 review and finalization were done by VWMZ and the Rwizi Catchment Management Committee (CMC) with financial support from Advocates Coalition for Development and Environment (ACODE).

The CMP was launched by the Minister of State for Environment, Hon. Beatrice Anywar, on 19th March 2020, during a Symposium on Restoration of River Rwizi and enhancing transition to a green economy in Uganda.



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