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United Nations Educational, Scientific and Cultural Organization

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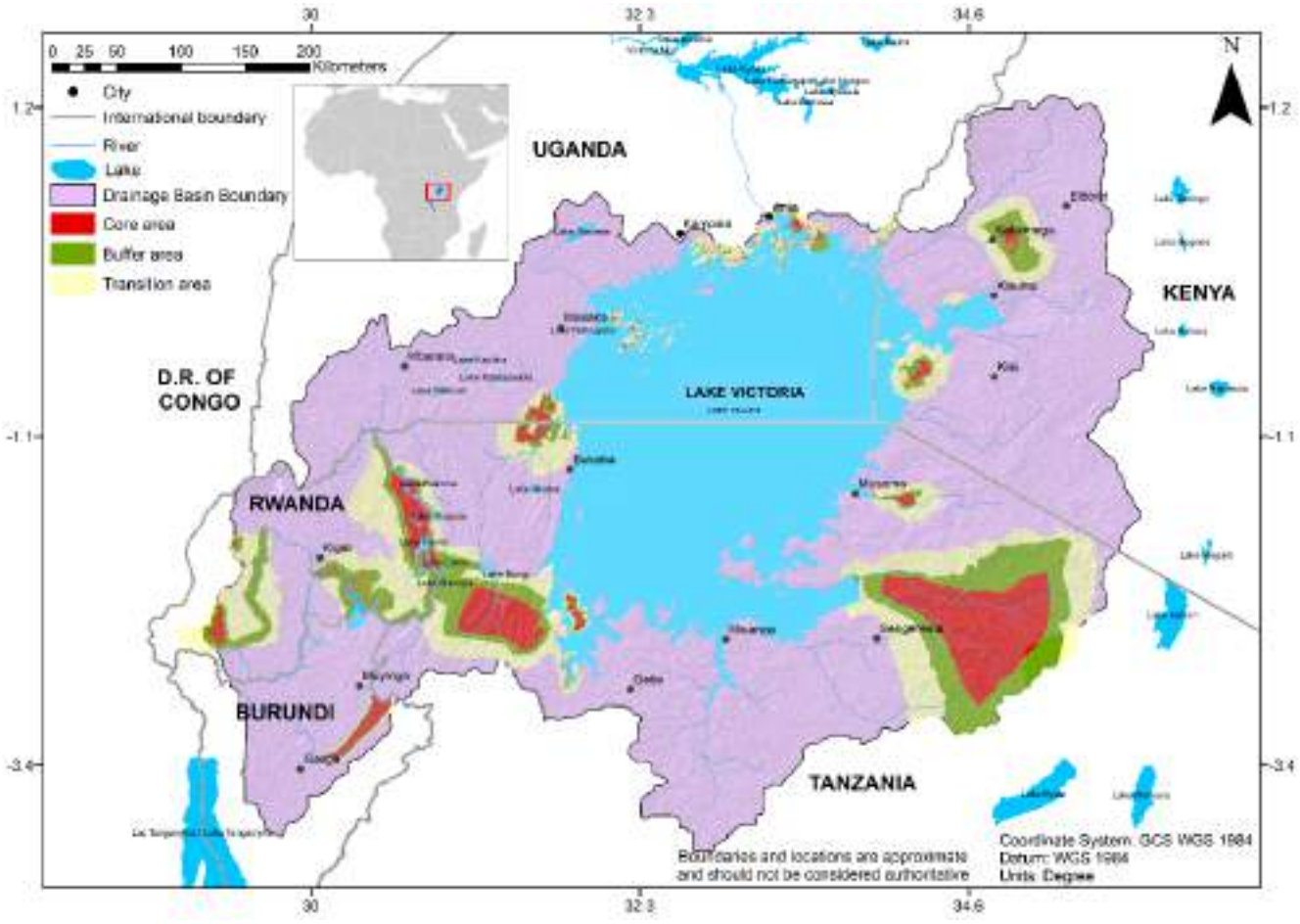
Organisation des Nations Unies pour l'éducation, la science et la culture

Commission Nationale du Burundi pour l'UNESCO o.G.

LAKE VICTORIA BASIN ECOSYSTEM TRANSBOUNDARY BIOSPHERE RESERVE PROJECT



IMPLEMENTED BY

THE NATIONAL COMMISSIONS FOR UNESCO IN EAST AFRICAN COMMUNITY COUNTRIES OF UGANDA, UNITED REPUBLIC OF TANZANIA, RWANDA, BURUNDI, KENYA.

A PARTICIPATION PROJECT

2020-2021 BIENNUM

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Topographic Mapping and Zonation for Nomination of Lake Victoria Basin Ecosystem Transboundary Biosphere Reserve Project.

A Project Implementation Report

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Disclaimer
The Views in this document do not necessarily represent the official views of the Uganda National Commission for UNESCO or UNESCO and do not commit the Organisation in any way

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By

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Cover Photo: *The Proposed Lake Victoria Basin Ecosystem Transboundary Biosphere Reserve showing the zonings in the sixteen Component Biosphere Reserve Sites of the Transboundary Biosphere Reserve*

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List of Abbreviations and Acronyms

BI	Birdlife International,
BR	Biosphere Reserve
CSO	Civil Society Organization.
CSUDP	Civil Society Urban Development Platform
EAC	East African Community
EANATCOMs	East African National Commissions for UNESCO
EASWN	East African Sustainability Watch Network
GEF	Global Environment Facility
GIS	Geographic Information System
GPS.	Geographic Positioning System
ICT	Information Commuication Technology
IGAD	Intergovernmental Authority for Development
IGCP /IGGP	International Geosciences and Geoparks Programme Committee.
IHP	Intergovernmental Hydrological Programme
IUCN;	Intertnational Union for Conservation and Nature.
KBO	Kagera Basin Organisation
KENTTEC	Kenya Tsetse and Trypanosomiasis Eradication Council
KFRI	Kenya Forest Research Institute
KMD	Kenya Meteorological Department
KWS	Kenya Wildlife Service (KWS);
NMK	National Museums of Kenya
MNFR	Minziro National Forest Reserve
LVBC	Lake Victoria Basin Commission
KWS	Kenya Wildlife Service for Kenya
LREB	Lake Region Economic Block
LVB	Lake Victoria Basin
LVBC	Lake Victoria Basin Commission.
LVBE	Lake Victora Basin Ecosystem
LVBETBR	Lake Victoria Basin Ecosystem Transboundary Biosphere Reserve
LVEMP	Lake Victoria Environmental Management Project
LVFO	Lake Victoria Fisheries Organization,
LVLPP	Lake Victoria Lead Partners Platform
LVRLAC	Lake Victoria Region Local Authorities Cooperation.
MAB	Man and Biosphere Programme,
NatCom	National Commission for UNESCO
NBD	Nile Basin Discourse (NBD),
NBI	Nile Basin Initiative
OBPE	Burundi Environment Authority (OBPE),
REC	Regional Economic Cooperation

SDGs	Sustainable Development Goals (SDGs)
TANAPA	Tanzania National Parks Authority
TBR	Transboundary Biosphere Reserve
UCSD	Uganda Coalition for Sustainable Development (UCSD),
UNATCOM	Uganda National Commission for UNESCO
UNDP	United Nations Development Programme
UNEP	United Nzations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNESCO	United Nations Educational Scientific and Cultural Organisation
UNHABITAT	United Nations Organization for Human Settlements
UTM	Universal Transverse Mercator
UWA	Uganda Wildlife Authority.
SDGs	Sustainable Development Goals (SDGs)
WGS	World Geodetic System
WRTI	Wildlife Research and Training Institute
WWF	World Wildlife Fund (WWF);

FOREWORD

This is the second activity report about the planned nomination of Lake Victoria also known as Nalubaale or Victoria Nyanza to UNESCO for designation as a Transboundary Biosphere Reserve. The first work on this single most important unifying ecosystem that stretches across the five East African Community Countries was in the 2018-2019 biennium and reported on in August 2020. As one of the African Great Lakes, Lake Victoria is the continent's largest lake, the largest tropical lake in the world, and the second largest freshwater lake in the world in terms of its surface area. It is also most well known as the source of the White Nile, the longest branch of the Nile River that also has an extensive river basin stretching right from its headwaters, the Kagera providing water to all the countries it passes through enroute to the Mediterranean Sea. Lake Victoria is therefore a critical determinant of weather and climate in the region. This and many other attributes make the Lake Victora Basin Ecosystem (LVBE) a huge resource which, if well utilized, could bring about major progress to the region. This project is meant to respond to the problems that affect the LVBE in terms of major threats including depletion of natural resources due to over-exploitation, increasing population pressure, unsustainable agricultural practices, over-fishing, pollution, rampant conversion and destruction of the wetlands in the ecosystem.

The decision taken in 2017 by the East African National Commissions for UNESCO (EANATCOMs) for a common regional project that supported Uganda's proposal for the nomination of the Lake Victoria Basin Ecosystem as a transboundary biosphere reserve was a great turning point in terms of the huge benefits that will accrue to the region. This report is a documentation of the work so far done on the topographic mapping and zonation of the individual intra-country potential Biosphere Reserve sites and other inter-country transboundary ones as components of the planned Transboundary Biosphere Reserve. Together with the Baseline Report mentioned earlier, the two reports are key documents that will form the basis for preparation of the nomination dossier for the transboundary biosphere reserve designation.

I therefore recommend it as a reference material for the remaining task ahead in the nomination process.

Rosie Agoi
Secretary General,
Uganda National Commission for UNESCO

ACKNOWLEDGEMENTS

Uganda National Commission for UNESCO (UNATCOM) on behalf of the East African National Commissions for UNESCO (EANATCOMs) wishes to thank all those who made the successful implementation of the project possible. In the first place, we wish to thank UNESCO for funding this project and the first phase under 2018-2019 biennium that laid a foundation on which this current project was implemented ion the succeeding biennium of 2020-2021.

UNATCOM also thanks the Second Deputy Prime Minister and Minister for East African Community Affairs, Rt. Hon.Rebecca Alitwala Kadaga for her keen interest and officiation at one of the workshops for consensus-building on the direction of the undertaking. We thank the representatives of all the Ministries, Agencies and Departments across the five countries for their support and cooperation in the implementation of the project. Of special mention are Eng. Hilda Luoga of Lake Victoria Basin Commission, Mr. Mercy Stephen Sebuliba of Lake Victoria Lead Partners Platform and others of Nile Basin Initiative and Kagera Basin Organisation among others. We also recognize the role of the Chairpersons and members of the Specialised National Committes of the Man and Biosphere Programme, Intergovernmental Hydrological Programme and the International Geosciences and Geoparks Programme Committee.

Further thanks go to all the Secretaries General, their deputies and the relevant Programme Officers of the National Commissions for UNESCO in the five Countries for their collaboration towards the successful implementation of this project. We also thank the five consultants namely Prof. Tatien Masharabu of Burundi, Eng. Mr. Peter Hongo of Kenya, Eng Jean Pierre Habyaremye of Rwanda, Dr. Amina A. Hamad of United Republic of Tanzania and Mr. John Diisi of Uganda for executing the tasks assigned to them. Together with the consultants we recognize the role of the Assistant Secretary General, Dr Dominic V. Mundrugo-Ogo Lali, and the Project Coordinator who guided the consultants and worked closely with them. We thank all the staff of the NATCOMs across the region for the relentless efforts.

UNATCOM extends further thanks to the Information Commuication Technology (ICT) Team at the Ministry of Education and Sports, Mr. Valentine Owor and Ms Joan Namono under the coordination of Ms Atukunda Angela of UNATCOM who made it possible to hold the two hybrid (online and physical) workshops.

The final acknowledgement is to the efforts of all others not mentioned here by name, who contributed to the success of the project directly or indirectly.

EXECUTIVE SUMMARY

This report is an account of work accomplished towards the planned nomination of Lake Victoria also known as Nalubaale or Victoria Nyanza to UNESCO for designation as a Transboundary Biosphere Reserve (TBR). This lake which is Africa's largest lake, the world's largest tropical lake and also the world's second largest freshwater lake in terms of its surface area has a unifying basin ecosystem stretching across the five East African Community Countries. The planned nomination when successfully designated will make Lake Victoria the first penta-state TBR in the world. This project implemented under the 2020/2021 biennium aimed to achieve detailed topographic mapping and zonation of Lake Victoria Basin Ecosystem (LVBE) as a trans-boundary biosphere reserve. The LVB falls under the institutional umbrella of the East African Community ("EAC"), a regional intergovernmental organization comprising Kenya, Uganda, Tanzania, Rwanda and Burundi. The Lake Victoria Baisn Commission (LVBC) under the East African Community holds the key position for policy making for the management of the LVB resources. The LVB is a Transboundary entity and needs a framework, which transcends national boundaries, for joint management as a shared resource. This undertaking is under UNESCO's Major Programme II, Strategic objective 5, focusing on promoting (international) scientific cooperation on critical challenges to sustainable development. The National Scientific Committees of the Intergovernmental Hydrological Programme (IHP), the Man and the Biosphere Programme (MAB) and the International Geoscience Programme (IGCP) were involved in the project.

The project targets addressing the key threats affecting the lake like declining water levels and degradation of the surrounding wetlands, which have both ecological and hydrological functions, intensively cultivated and overgrazed, the degradation and inability to perform their ecological and hydrological function such as trapping of sediments and biodiversity conservation.

The consultants of the baseline survey in their report recommend that sixteen (16) zones of the ecosystem be demarcated for designation with detailed zonation as per the requirements of biosphere reserves. The recommended zones cover the five riparian countries and they have the following common attributes: they are representative of typical key areas of the lake in the riparian countries, carry many of the endemic fish species, face heavy intensive fishing pressure, some have a few representatives of endangered fish species, are important as breeding or nursery grounds for both commercial and threatened fish species, some form refugia for surviving non-target fish species, they contain a variety of habitats including riverine habitats, wetlands, sheltered littoral zones, variety of substrates such as muddy, sandy, and rocky bottoms and are accessible to researchers either by road or through water.

The mapping and zonation activities on the sixteen (16) sites that had been earlier identified across the five countries as potential Biosphere Reserves were conducted by GIS experts in each of the five countries. In Uganda, there are five sites namely Sango Bay, Sesse Islands, Murchison Bay, Napoleon Gulf and Macdonald Berkely Bays. In Kenya, there are **three** (3) sites namely Kakamega

Forest, Ndere and Ruma. In Tanzania, there are five sites namely Mara-Shirati Bay, Speke Gulf, Mwanza Gulf, Emin Pasha Gulf and Kagera-Rubafu Bay. In Rwanda the sites are Kagera-Rubafu Bay shared with Tanzania, Rusumo and Nyabarongo River Basin considered as part of the upper headwaters of the river Nile. In Burundi the only site is Ruvubu river valley.
The mapping and zonation involved a total of 170 local communities across all the sites. Later, validation and consensus meetings were held attended by 137 participants consisting of representatives of government ministries agencies, civil society organizations, the Regional Agency Lake Victoria Basin Commission, the National Commissions for UNESCO and the specialized National Committees of MAB, IHP and IGCP. Proposals were also shared about management structure and activity plans. The participants that made commitments towards ensuring the nomination is successfully achieved included Uganda's Deputy Prime Minister and Minister for East African Community, Rwanda's representative of the Ministry of Environment, Uganda's representative of the Ministry of Tourism, Wildlife and Antiquities, Tanzania's National Commission for UNESCO, Kenya's representatives of the Forest Services, Wildlife Services and National Commission for UNESCO. Among the United Nations Agencies, the UNDP Country representative and UNESCO Regional Office, Nairobi made commitments of support.

Two consultative meetings were held one of which served as validation and another as dissemination and consensus building. The meetings welcomed the initiative observing the importance of all stakeholders joining hands to make the nomination process a success. The representative of LVBC pledged to take up the matter of TBR nomination and promised to talk to the various development partners that LVBC is working with as well as present the matter to the Sectoral meeting. Stakeholders recommended that all areas protected by legislation including fish breeding areas and other fragile locations be zoned as the core zone while other activity areas like small-scale agriculture areas be zoned in the transitional zone. It was recommended that the management structure presented in the meeting be adopted subject to being inclusive of relevant stakeholders and in compliance with UNESCO guidelines for BRs and TBRs with leadership provided by government not Civil Society Organization. It was further recommended that the LVBC appoints a focal point officer dedicated to Biosphere Reserve issues as it takes lead of the nomination process by tabling before the sectoral committee and the EAC Council of Ministers with the support of the National Commissions for UNESCO. That the resource book being developed for community sensitization and capacity building be translated into other languages such as Kiswahili and French for easy information sharing with communities. It was also proposed to have an emailing list of all experts and all participants to enable continuous engagements on the Lake Victoria basin and after the GIS experts have refined the zonation areas as recommended with complete information and the final report prepared, work on the compilation of the nomination dossier begins immediately.

SUPPORT FOR DETAILED TOPOGRAPHIC MAPPING AND ZONATION OF LAKE VICTORIA BASIN ECOSYSTEM AS A TRANS-BOUNDARY BIOSPHERE RESERVE.

1.0. INTRODUCTION

1.1. Background

Lake Victoria or Victoria Nyanza also called Nalubale is one of the African Great Lakes that has a Basin Ecosystem stretching across the five East African Community Countries. Lake Victoria is the continent's largest lake, the largest tropical lake in the world, and the second largest freshwater lake in the world in terms of its surface area of 26,560 square miles (68,800sq. Km. Its maximum depth is 276feet (84m) and mean depth is 131feet (40 m) with water volume of 2,750cubic kilometers (2.2million acre-feet) and water catchment area of 71,040 square miles (184,000 square kilometers). It is also most well known as the source of the White Nile, the longest branch of the Nile River (***http://www.newworldencyclopedia.org/entry/Lake_Victoria)*.** It has a basin area of 193,000 km2 with Tanzania occupying 44 per cent, Kenya 22 per cent, Uganda 16 per cent, Burundi 7 per cent and Rwanda 11 per cent. Geographically, the lake lies within an elevated plateau in the western part of Africa's Great Rift Valley. The lake has a shoreline of 2,138 miles (3,440 km) and has more than three thousand islands, many of which are inhabited. Geologically, the lake is approximately 255miles (410km) long and 155miles (250km) wide, occupying a shallow depression 250ft or 75m deep) on the Equatorial Plateau(alt.3,725ft/1,135) between the two arms of the Great Rift Valley, confirming that it was formed during the upheavals that created the Great Rift Valley about 12 million years ago.

Lake Victoria's importance to the region and globally is related to its being the largest inland water fishing sanctuary, a major inland water transport linkage for the three East Africa countries; a source of water for domestic, industrial and commercial purposes and a major reservoir for hydroelectric power generation. It is rich in biodiversity; and a major source of livelihood to people in and around its basin (LVB). This makes the LVB a huge resource which, if conserved and well utilized, could bring about major progress to the region.

Left: Map 1: Lake ***Victoria and the Great Rift Valley****. Right: Map 2: Lake Victoria seen from space (an arc)*

The Lake Victoria shoreline is irregular with the many islands. The Lake Victoria plays a vital role in supporting the millions of people the millions of people living around its shores, in one of the most densely populated regions on earth.

Map 3: L. Victoria Topography: https://en.wikipedia.org/wiki/

The cities of Mwanza, Kampala and Kisumu as well as several major towns like Bukoba, Entebbe, Jinja and various urban centers within the basin with a total population of nearly 5 million receive their water supply directly from the lake. Besides the cities, towns and urban centres, several rural villages get their water supply from the lake and rivers within the basin. Lake Victoria and the rivers flowing into it form a major reservoir for hydroelectric power.

As the LVB falls under the institutional umbrella of the East African Community ("EAC"), a regional intergovernmental organization comprising Kenya, Uganda, Tanzania, Rwanda and Burundi, the East African Community holds the key position for policy making for the management of the LVB resources. The objectives of the EAC are to "develop policies and programmes aimed at widening and deepening co-operation among the Partner States in political, economic, social and cultural fields, research and technology, defence, security and legal and judicial affairs, for mutual benefit." This is because the LVB is a Transboundary entity and needs a framework, which transcends national boundaries, for joint management as a shared resource. So far the programme has developed a regional vision for the development of the LVB. The vision is: "A prosperous population that lives in a healthy and sustainably managed environment providing equitable opportunities and benefits".

1.2. Context and Justification of the Project

The LVB alone is estimated to have around 30 million people in all the five Countries including Kenya, Uganda, Tanzania, Rwanda and Burundi. Wildlife is abundant and the southern side of the basin has several national parks and game reserves widely used for tourism and as a source of livelihood for those living around wildlife areas. The main rivers in the Lake Victoria basin are important for lake fisheries by providing spawning grounds for some types of fish, and by replenishing the lake with water and nutrients (Odida et al, *2006*)

The EAC has an Environment Agenda: "*A Healthy Natural Environment for Present and Future Generations"* The objective of the Environment and Natural Resources Management sector is to promote sustainable use and management of natural resources and promote adaptation to climate change. Articles 111, 112 and 114 of the EAC Treaty provide for co-operation in environment and natural resources. The five Partner States of the EAC namely, Kenya, Rwanda, Burundi, Uganda and Tanzania have agreed to take joint effort to co-operate in efficient management of these resources. The partner states designated Lake Victoria and its Basin as an area of common economic interest and a regional economic growth zone to be developed by the Member States. These Partner States share many terrestrial and aquatic ecosystems which are primary assets and a store of wealth - wildlife, flora and fauna, which if well managed, could contribute to poverty alleviation[2].

The African Union Agenda 2063, first ten-year implementation plan 2014-2023 lists seven aspirations. Of importance to this project is the first aspiration: "A Prosperous Africa, based on Inclusive Growth and Sustainable Development" and goal (7) aimed at environmentally sustainable and climate resilient economies and communities. The priority areas under this goal include: Bio-diversity, conservation and sustainable natural resource management, Water security, Climate resilience and natural disasters preparedness and prevention, Renewable energy[3].

Under UNESCO's Major Programme II, Strategic objective 5, focus is on promoting (international) scientific cooperation on critical challenges to sustainable development. This involves generation and sharing of knowledge in relation to the natural resources, and capacity development through scientific collaboration for the protection and sustainable management of terrestrial ecosystems, biodiversity, freshwater security. The National Scientific Committees of the International Hydrological Programme (IHP), the Man and the Biosphere Programme (MAB) and the International Geoscience Programme (IGCP) will strengthen scientific cooperation and bring knowledge and evidence on freshwater, biodiversity, ecosystem services, earth sciences and Disaster Risk Reduction into the policy mix. Through the MAB, IHP, IGGP as well as Local Indigenous Knowledge (LINKS), the science-policy interface concerning natural resources will be strengthened and linkages established with various stakeholders. During implementation, disciplines like sustainability science under the Major Programme III will also be applied including the 2030 Agenda, the Addis Ababa Action Agenda, the 2011 Aichi Biodiversity targets of the Convention on Biological Diversity, the Sendai Framework for Disaster Risk Reduction 2015-2030, and the United Nations Framework Convention on Climate Change (UNFCCC) Paris Agreement. UNESCO is uniquely positioned to demonstrate that economic development can be reconciled with sustainable management of national resources. Under the Main Lines of Action 2 and 3, through its IHP, MAB and IGGP, this project will improve the lives of millions of people and help in scaling-up innovative scientific approaches and good practices progressing towards the Sustainable Development Goals. This project will conclude the process already began in the last biennium that has already gathered the baseline information and received widespread endorsement.

1.3. Problem Statement

In the course of the 2018-2019 biennium, the pressure on Lake Victoria became a matter of concern. This was against the background that the lake has dynamically fragile ecosystems, its relatively shallow depth with limited inflow and the large surface area relative to its volume, all of which make

2. (**http://www.eac.int/sectors/environment-and-natural-resources/nrm/environment-nrm-protocol**).
3. The African Union Commission, 2015

it vulnerable to climate changes. The ecosystems of the lake basin face major threats, which include depletion of natural resources due to the rising population pressure, expansion in human activities; over-exploitation, unsustainable agricultural practices, over-fishing, pollution, rampant conversion and destruction of wetlands in ecosystems such as Lake Victoria. The extensive resource exploitation, which has constrained its productivity, has resulted in drastic decline of biodiversity in general and fisheries in particular. Among the factors that have led to the destruction of the native and endemic components of the lake included intensive nonselective fishing, extreme change in the drainage basin vegetation, pollution due to industrialization and agricultural development and the introduction and invasion of exotic species. Currently the basin is experiencing severe threats contributing to losses amounting to millions of dollars annually. Key among the threats is the declining water levels with the surrounding wetlands, which have both ecological and hydrological functions, intensively cultivated and overgrazed. This has resulted in their degradation and inability to perform their ecological and hydrological function such as trapping of sediments and biodiversity conservation. The ecosystem of LVB has also been badly affected by the population in the area with increased from less than 25 inhabitants per square kilometer in 1960s to over 100 persons per square kilometer by 2015. The Lake Victoria Environmental Management Project (LVEMP) under the Lake Victoria Basin Commission of the EAC was intended to be a comprehensive regional development programme covering the whole of Lake Victoria and its catchment areas. Unfortunately, it has insufficient coverage to the various parts of the basin. Worse still, it does not address the problems of the lake in a sustainable ecosystem-based approach.

The interventions in addressing the problems of the lake had so far been implemented in two phases. The first phase was a participatory project in 2018-2019, during which a baseline survey was conducted by consultants. Over 200 Communities in the Lake Basin were interviewed and over 20 Officials from the riparian countries' ministries responsible for water and environment, Fisheries, Tourism and Lands, about 10 officials of the regional bodies like Lake Victoria Basin Commission and the Lake Victoria Fisheries Organization, representatives of Lake Victoria Fish processors and 63 members of the Lake Victoria Region Local Authorities Cooperation. A number of options of sustainable management schemes under UNESCO's networks were presented to the participants for consideration. These included: World Heritage facility, Wetlands Convention Facility (Ramsar sites), Geopark Facility or Biosphere Reserve facility. The most appropriate scheme endorsed by the communities was that of designation under a scheme that ensures a balance between resource exploitation for development, Research and Conservation. This was the Biosphere Reserves Scheme. When subjected to further validation, all endorsed the decision to nominate the Lake for designation as Transboundary Biosphere Reserve.

However, as shown in the **map 4 below**, the Lake Victoria Basin is a very large area. The consultants of the baseline survey report recommended that sixteen (16) zones of the ecosystem be demarcated for designation with detailed zonation as per the requirements of biosphere reserves. The zones recommended cover the five riparian countries and they have the following common attributes: they are representative of typical key areas of the lake in the riparian countries, carry many of the endemic fish species, face heavy intensive fishing pressure, some have a few representatives of endangered fish species, are important as breeding or nursery grounds for both commercial and threatened fish species, some form refugia for surviving non-target fish species, they contain a variety of habitats including riverine habitats, wetlands, sheltered littoral zones, variety of substrates such as muddy, sandy, and rocky bottoms and are accessible to researchers either by road or through water. The communities living around these zones are homogeneous many being traditional fishermen who are

keen about the future of the lake which they would like preserved for posterity. Some of the rivers flowing into the selected zones are the main conduits of non-point pollution into the lake and some of the zones have a history of earlier studies and there is therefore some baseline data for cooperative purpose

Map 4: Showing the area coverage of the Lake Victoria Basin Ecosystem.

On the basis of the above criteria, the following sixteen (16) zones have been identified and provisionally selected in Burundi (1), Kenya (3), Ruanda (2), Tanzania (5), and Uganda (5). Ten (10) of the zoned sites are national while six (6) zones are transboundary to 3 countries with each zoned site shared by two (2) countries. The selected Zones as Biosphere Reserve are shown as oval shapes on the maps. These zones are named below and shown in the subsequent maps 5, 6, 7.

1. Uganda

Five (5) zones have been identified as both national and trans-boundary Biosphere Reserves in Ugandan side of the basin of the lake as:

(a) The Sango Bay (Trans-boundary) **9584 km^2**.
(b) The Sesse Islands: 80 islands and measuring **4842 km^2**.
(c) Murchison Bay: **991 km^2**
(d) Napoleon Gulf
(e) Macdonald Berkely Bays (Trans-boundary): **5125 km^2.**

2. Kenya

Three (3) zones have been identified in Kenya side of the basin of the lake with two being transboundary and one being a national Biosphere Reserve namely:

(a) The Berkley Bay Biosphere Reserve Zone (Trans-boundary)- **5125 km^2**was
(b) The Nyakach Bay Biosphere Reserve Zone-**7254**
(c) Karungu/Mara Shirati Bay Biosphere Reserve Zone (Trans-boundary)-**11,774 km^2**

Later, during the mapping in the second phase, the Kenyan MAB National Committee substituted Kakamega Forest, Ndere and Ruma for the three sites of Berkeley Bay, Nyakach Bay and Karungu/Mara Shirati Bay sites.

3. Tanzania

Five (5) zones have been identified as Biosphere Reserves in Tanzanian basin of the lake consisting of two transboundary and three as national reserves as below:

(a) The Mara-Shirati Bay Biosphere Reserve (Trans-boundary)
(b) Speke Gulf Biosphere Reserve Zone
(c) Mwanza Gulf Biosphere Reserve Zone (4610 km^2)
(d) Emin Pasha Gulf Biosphere Reserve Zone (9795 km^2)
(e) Kagera-Rubafu Bay Biosphere Reserve (Trans-boundary) (9584 km^2)
(a) Kagera-Rubafu Bay Biosphere Reserve (Trans-boundary) (9584 km^2)

This is trans-border Zone which is continued northward into Ugandan side by the Sango Bay Zone.

4. Special Case of River Kagera Basin (Burundi, Rwanda, Tanzania, and Uganda)

The Kagera River Basin (KRB) is spread over Burundi, Rwanda, Tanzania and Uganda with a total area of 59,800 km^2. Four (4) zones have been identified as Biosphere Reserve sites in Kagera River Basin within the Lake Victoria Basin ecosystem as:

(a) Kagera-Rubafu Bay Biosphere Reserve (Trans-boundary) (9584 km^2)
(b) Rusumo Falls Biosphere Reserve (Trans-boundary involving Four Countries)
(c) Ruvubu Biosphere Reserve (Burundi)

(i) Rwanda

(a) Kagera-Rubafu Bay Biosphere Reserve

One of the Zones is **Kagera-Rubafu Bay Biosphere Reserve** that has been described under Tanzania, but embraces Uganda and Rwanda. The other three are:

(b) Rusumo Falls Biosphere Reserve (Trans-boundary involving Four Countries)

Rusumo Falls is where the two head-streams of Ruvubu from Burundi and Nyabarongo in Rwanda converge close to Rwanda/Tanzania border, from where River Kagera flows North into the border with Uganda. This trans-boundary Zone is ideal as a Biosphere Reserve.

(c) Upper Nyabarongo River Basin Biosphere Reserve (Rwanda)

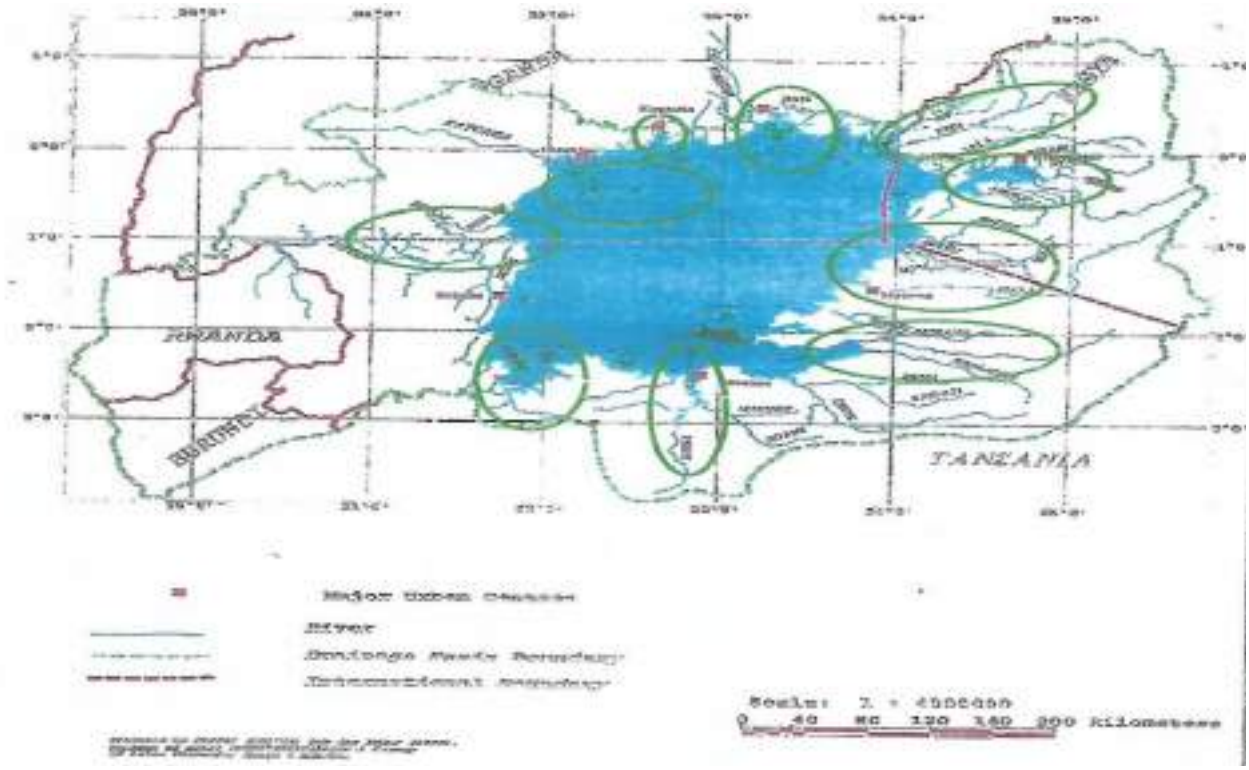
The **Nyabarongo** (or **Nyawarungu**) is a major river in Rwanda, part of the upper headwaters of the Nile. At 297 km (184 miles), it is the longest river entirely in Rwanda. It is considered ideal for the choice of Upper Nyabarongo River Basin **(Fig. 5)** as a Biosphere Reserve (demarcated with green oval in the Map):

(ii) Burundi

(a) Ruvubu Biosphere Reserve in Burundi

The main Ruvubu Stream rises in several branches east of Bujumbura in Burundi to form the upper Kagera River complex of waters. It flows first south and then north-northeast to form a part of the Tanzania-Burundi border. It eventually joins the Kagera River in southern Rwanda, some 30 km southeast of the town of Kibungu, Rwanda. The Ruvubu Stream is approximately 480 km in length, and its longest headstream, **the Ruvyironza**, with which it joins near Gitega Town, is considered the remotest source of **River Nile** in the Lake Victoria Basin. The area demarcated in Green on the map 7 (below) has been identified as Biosphere Reserve. This Zone is ideal as a Biosphere Reserve for the reasons that River Ruvubu is the remotest extension of River Kagera and is the most remote head stream of River Nile as River Kagera is formed at the confluence of two rivers: Nyabarongo (Rwanda) and Ruvubu (Burundi). These include: The Kagera River Basin that lies in the South-Western part of Lake Victoria Basin and makes up 75% of its basin. It forms the western border between Rwanda and Tanzania and encloses a total area of 59,700km2 spread over four countries: Burundi (23%), Rwanda (34%), Tanzania (35%, 20,765km2) and Uganda (8%).

These sites are indicated in the maps 5, 6, 7, below.



Map 5: Proposed Sites to be zoned for designation in the multi-zoned LVB Ecosystem as TBR.

Map 6: Upper River Nyabarongo Basin (Marked Green). Map 7: Ruvubu Biosphere Reserve (Marked Green)

1.4. Justification for the Project

Having identified the sites outlined and marked on the maps above, the key interest was to map them by way of detailed topographic maps with co-ordinates to provide zonation that are in line with the UNESCO Statutory requirements of the World Network of Biosphere Reserves.

In addition, during the baseline survey, a number of concerns and proposals were made with regard to the multiplicity of stakeholders whose roles need to be clearly defined, structured and an appropriate Organogram drawn that needs to be established and oriented in the principles of management of a transboundary biosphere reserve. Conflicts have also raged on between the Army that has taken over enforcement of good fishing practices and the fishermen on the lakes. All these conflicts could be resolved by strong orientation of all stakeholders in their roles and assigning appropriate tasks. Hence, the initiative taken with this project majorly to support the detailed topographic mapping and zonation of the Lake Victoria Basin Ecosystem as a trans-boundary biosphere reserve.

1.5. Objectives of the Project

1.5.1. Overall Objective

The main aim of the project is to support the nomination of the Lake Victoria Basin Ecosystem for designation as a Trans-boundary Biosphere Reserve,

1.5.2. Specific Objectives

Specifically, the project is aimed to:

1. develop a detailed topographic map with coordinates and proposed zonation of Lake Victoria Basin Ecosystem as a trans-boundary Biosphere Reserve;
2. establish a comprehensive mechanism for coordination of stakeholders including legal, policy and institutional frameworks;
3. build the capacity of the stakeholders associated with the Lake Victoria ecosystem to ensure effective and sustainable management of the Lake Victoria Ecosystem Basin in manner

consistent with the Sustainable Development Goals (SDGs) or Agenda 2030 and in particular and the 2016 Lima Action Plan of Biosphere Reserves;

4. develop an Action Plan for each of the sites to be zoned as BR;
5. develop a reference manual on BR Management.

2.0. METHODOLOGY AND APPROACHES

2.1. Literature Review

This project being the second phase of the initiative to nominate the Lake Victoria Basin Ecosystem as a Transboundary Biosphere Reserve (TBR) was implemented based on the foundations laid in the first phase. Work started with deskwork on the review of the baseline data and information generated in the first phase of the 2018-2019 biennium as a basis for embarking on this project phase.

Information was also generated through a review of other relevant literature, interviews of key stakeholders, from focus group discussions with resident communities. The literature reviewed included among others the following:

1. Published journal articles and reports on water and land resources especially in Lake Victoria basin in Tanzania
2. Government Reports from Fisheries, Forestry, Wildlife and Tourism in Tanzania
3. Government Policies, legal and institutional frameworks in Kenya and Tanzania
4. TANAPA reports on National Parks in Tanzania
5. Baseline report for promoting the nomination of Lake Victoria basin ecosystem as a transboundary biosphere reserve in all the five countries.

2.2. Fieldwork by Geographic Information System (GIS) Experts

Whereas in the initial project proposal write up, one Geographic Information System (GIS) expert based in Kenya who also doubles as the Man and Biosphere Programme Chairman had been proposed to UNESCO, it became necessary after stakeholder consultations to get separate GIS experts for each country. Accordingly, letters were written to the Secretaries General of the National Commissions in each Country to identify experts to undertake the work in each country in line with the terms of reference specified to them. Five GIS experts were nominated and each of them conducted the work in the respective countries. The tasks given to each GIS expert included preparing an inception report on the implementation of the assignment, creating and/or increasing awareness of the communities in and around the lake basin, and other partners on the need for designation of the basin, conducting consultations and building consensus on the appropriate zonation for the sites to be designated as individual Biosphere Reserves (BRs) and using the opportunity of the topographic mapping to build capacity of the residents and other stakeholders in the development of all-inclusive and engendered management and conservation plans. The expected output was detailed topographic maps with accurate graphic representations of features that appear on the Lake's surface clearly indicates the three biosphere reserve zones: Core, Buffer and Transitional (Manipulation) Zones. The features include, but not be limited to the following:

- **Cultural features:** Any developments by humans like buildings, names of places and geographic features, administrative boundaries, state and international borders, reserves
- **hydrography:** lakes, rivers, streams, swamps, coastal flats
- **relief features:** contours, depressions etc

- **vegetation:** water plants, wooded and cleared areas.

During the fieldwork survey activities, observation was a very important method.
The following steps were used by the consultants during preparation and planning processes:

- Reconnaissance,
- Carrying out field inspection, verify information and validation,
- Gathering all existing information on ground
- providing detailed topographic maps

GIS model has used during this services and active involvement of all stakeholders in the formulation of development policies and strategies and in the analysis, planning and details topographic map.

Site Surveys:

1. Details of topographic survey on site,
2. Historical background on sites of interest

Data used:

- Topographic data from topographic survey,
- National Land Use & Development Master Plan (NLUDMP)
- Capturing of Aerial photography
- Country Base map

Softwares used:

- ArcGIS Pro for analyzing and demonstrating the site plans of different purpose requirement and also to make buffer zone map, providing current ortho image through ArcGIS Online;
- Auto CAD2018&CAVADIS16 was used in the topographic surveying reporting to make details of topographic map and mapping of existing features;
- Terravision 3D 3.0 for 3D visualization and exporting Topographic details;
- ERDAS IMAGINE 9.2.2 for image visualization and interpretation, classification also change detection;
- Excel used in data management and in the reporting;
- Microsoft word was used in writing and combining the layout from other softwares.

In detailed description, the materials and tools used in the production of the project results included but not limited to satellite images for 2022 from sentinel 2 sensor, Onscreen Digitizing of the zones and field mapping using Global Positioning Systems, field maps, cameras and Tablets with Computers and an assortment of office hardware and software for data preparation and analysis.

Data

The activity required combining together several GIS layer to analyse the Biosphere reserves and generate the different zones of the proposed biosphere reserves. The datasets used in the analysis of the zones and deriving the topographic maps include.

- Land cover data to identify different types of land uses and ecosystems
- Rivers and Lakes for hydrology and water reservoirs
- Contours, digital elevation Model for terrain
- Administrative units for location
- Forest Reserve boundaries and other protected areas
- Roads networks for accessibility

Acquisition and preparation of satellite imagery

For this project, Sentinel-2A satellite imagery were acquired for the year 2022. The Sentinel-2A Images were selected taking into consideration the high spatial resolution of 10m that could easily guide the delineation and mapping of zones for each of the ecosystems. The sensor was considered the most suitable for this project work due to the readily available cloud free images for the five zones, the satellite imagery is captured frequently by the European Space Agency (ESA). All the images with less than 30% cloud cover were obtained from the ESA Copernicus data hub for 2022.

Data preparation and image pre-processing

Data preparation involved unzipping of the downloaded images and combining selected bands (2, 3, 4, 5, 6, and 7) and stacking them to create multi-band images. Image stacking is the process of merging two or more co-registered images together in order to enhance detail, suppress noise and leverage on data contained across multiple exposures of the same scene. The satellite images guided the delineation of the different zones and assessing the vegetation of the project areas.

Digitizing of the zones

The zones were digitized using GIS software's, onscreen digitizaton was done and subjected to field visits to ascertain the zone status. This was guided by natural features such as drainage (rivers and streams), wetlands, forests, open water bodies, elevation (contours) and components of human development and infrastructure.

Field Data collection and Ground Truthing

Field data collection through ground-truthing was carried out as a standard procedure in assessing the biosphere reserve vegetation cover, topographic features and drainage of the zones. Field checks were done to ascertain important sites in the ecosystem that form part of key hotspots in the Lake

Victoria basin. Emphasis was put on checking sensitive ecosystems, vegetation cover types, biodiversity and land uses whose signatures were ambiguous and areas of high human activity. Coordinates of the sample sites were collected using GPS to ease access and analysis of the areas.

2.3. Stakeholders Consultation Meeting

Stakeholder consultation was one of the key methods used to collect information and views regarding the proposed zonation, protected areas as well as the willingness of the stakeholders to engage in protection of the biosphere zones proposed. Stakeholders resdident in the LVBC area were consulted. The rest of the stakeholders were consulted onsite where the proposed sites are located. Others that include the government Ministries, Agencies, CSOs, NatCom officials across East Africa and developners partner. This was done in hybrid sessions of physical and virtual meetings.

2.4. Dissemination of the Mapping Results and Consensus on the nomination process.

The dissemination meeting was aimed at sharing the validated results and building consensus on the roles of stakeholders and responsibility centers, achieve a broader buy-in from various Ministries, Departments and Agencies within the East African Community (EAC) as the Regional Economic Cooperation (REC) Structure and other structures set up within the EAC for managing regional interests including inter-territorial and inter-governmental sectoral arrangements and systems.

3.0. RESULTS OF THE LITERATURE REVIEW, MAPPING, STAKEHOLDERS' CONSULTATIONS AND CONSENSUS BUILDING P ROCESSES.

3.1. Literature Review

This project being in the second phase of the initiative to nominate the Lake Victoria Basin Ecosystem as a Transboundary Biosphere Reserve (TBR) relied most on the work done in the first phase. Therefore, work started with deskwork on the review of the baseline data and information generated in the first phase of the 2018-2019 biennium was carried out as a basis for embarking on this project phase. Information was also generated through a review of relevant literature, interviews of key stakeholders, from focus group discussions with resident communities. The literature reviewed included among others the following: Published journal articles and reports on water and land resources especially in Lake Victoria basin in Tanzania, Government Reports from Fisheries, Forestry, Wildlife and Tourism in Tanzania, Government Policies, legal and institutional frameworks in Kenya and Tanzania TANAPA reports on National Parks in Tanzania and Baseline report for promoting the nomination of Lake Victoria basin ecosystem as a transboundary biosphere reserve in all the five countries.

Additional information not documented in the introductory part of the project documents is that Lake Victoria is a transboundary water body lying between Tanzania and Uganda and Kenya. It is the second largest freshwater body in the World with an area of 68,800 km^2. It is exceeded in size only by Lake Superior in North America. The lake is situated at latitude 0 ^{o} 21N and 3^o 0S and longitude 31^o 39 E and 34^o 53E at an elevation level of 1,134 m above sea level. The lake also has more than 200 fish species of which the Tilapia and Nile perch are the most economically important. There are a number of rivers draining into Lake Victoria but the Nile River is the only outlet draining away towards the Red Sea. In recent years, Lake Victoria Basin has witnessed the rampant influx of human population looking for livelihood opportunities around its catchments and bays. Unfortunately, some of the human activities carried out are threatening the sustainability of the lake, wetlands and bays to offer various ecosystem services and perform various ecological functions. Unsustainable agriculture, overfishing and growth of water hyacinth are among the problems associated with human population influx in this vital fresh water ecosystem. The distribution of the lake basin across the coutries in the region as presented by the East African Community (EAC) Lake Victoria Basin Management Agency, the Lake Victoria Basin Commission (LVBC) as shown in Table 1 next page.

DESCRIPTION OF LAKE VICTORIA

Country	Flag	Lake Surface Area		Catchment Area		Lake Shoreline (4828 Km)	Population
		Sq Km	%	Sq Km	%	%	(million)
Tanzania		35,124	51	79,570	44	33	7.4
Uganda		29,613	43	28,857	15.9	50	7.5
Kenya		4,113	6	38,913	21.5	17	15.9
Rwanda		-		20,550	11.4	0	8.8
Burundi		-		13,060	7.2	0	5.3
Total		**68,870**		**180,950**		**100**	**44.9**

Table 1: Showing catchment, area, shoreline and population of the Lake Victoria Basin Ecosystem (Adapted from LVBC).

The literature quoted in the Baseline Report (UNATCOM, 2020) reported four broad types of Ecosystems:

(a) The Lake's Ecosystem comprising Lake Victoria and the 50 or so satellite lakes in the basin that are geologically and ecologically related to the main lake. These include the Koki and Nabugabo lakes in Uganda (Wakwabi, Balirwa & Ntiba, 2006), the Kanyaboli, Sare, Nambayo, and Simbi (Masai, Ojuok & Ojwang, 2005). In addition to large reservoirs in Kenya, the Kagera lakes in Rwanda and Burundi, and Lakes Bisongo, Kajumbura, Lwelo, Mujunju, Rushwa, Burigi, and Ikimba in Tanzania (Wakwabi, Balirwa & Ntiba, 2006).

(b) The Riverine Ecosystem comprising all the rivers and shore streams that drain into the satellite lakes and subsequently into Lake Victoria. The main rivers from the Kenyan catchments are Njoia, Sio, Yala, Nyando, Kibos, Sondu-Miriu, Kuja, Migori, Riaria, and Mawa in addition to the eastern shore streams; those from Tanzania side include Mara, Kagera, Mirongo, Grumeti, Mbalangeti, Simiyu, and Mori and the southern shore streams; and Uganda has Bukora, Katonga, and Kagera as major rivers, in addition to the northern shore streams (UNEP, 2006; USAID, 2016). The rivers from Rwanda and Burundi all drain into River Kagera that ultimately flows into the main lake through Tanzania and Uganda.

(c) The Wetlands Ecosystem that includes all the wetlands found along the shorelines of lakes and rivers and in floodplains. Sango Bay, Nabugabo Lake, Sio/Malaba, Mara, Kagera, and Winam Gulf wetlands are the major ones (UNEP 2006).

(d) The Catchments Ecosystem includes the terrestrial areas occupied by upland vegetation and land used for productive activities like agriculture, forestry, mining, settlements, etc.Ecological diversity is used here to refer to the variation in the ecosystems found in the Lake Victoria basin including both terrestrial and aquatic ecosystems.

The land resources in the basin were reported to be used for various activities that include production of crops and livestock products for food security, development of human settlements, reclamation of dry lands and marginal lands for expanded economic land use as well as other purposes like ecotourism, urban development and transport. The existing forests and woodlands in the basin reduce soil erosion rate, impede surface run-off and control its release into rivers, lakes and wetlands within the basin. The forest and woodland resources have experienced large, rapid and adverse changes due to rapid population increase, commercialization of timber and fish processing industries, need for agricultural land, unsustainable agricultural practices, increased energy demand, introduction of terrestrial invasive species and lack of appropriate technologies for forests and woodland conservation (UNEP, 2006).

A healthy resource base depends on the preservation of the existing forests and woodland reserves. Forests and woodlands play important roles in livelihood strategies of the people of the Lake Victoria basin. They provide resources for use as energy, food, timber and non-timber products. They also sustain many cultural and religious values and the socioeconomic development of local industries.

The Biosphere Reserve Zones and functions

The three zones of the core zone, buffer zone and the transition area were adopted following the set criteria by UNESCO for creating zones based on sensitivity and human intervention and the baseline report for promoting the nomination of Lake Victoria basin ecosystem as a transboundary biosphere reserve.

Figure 1. The Zonation of Biosphere Reserves

The Core Zones

These zones comprise at least 5 % of the total BR area and include sites that represent characteristic ecosystems or habitats which are near natural or relatively undisturbed by humans. Their conservation is of paramount significance in maintaining unique biodiversity, genetic resources and ecological integrity. As strictly protected no-use zones, they will be legally protected by a special legislation, which could be enacted under national and EAC regulations for national and regional parks development and protection and the fishery regulations. The specific objectives of a Core Zone are to:

- Protect representative sections of natural and near-natural ecosystems entirely committed to the natural dynamics of strictly protected zones;
- Promote maximum protection and conservation of those habitats and ecosystems important for maintaining genetic pool variation, species and populations, and ecological integrity;
- Provide opportunities for basic and applied scientific researches and long term ecological monitoring;
- Provide ecologically acceptable/comparable models of land use changes occurring outside the zone;
- Provide a minimum critical area for dynamic fluctuations of wetland habitats with dispersal corridors to conserve viable populations of the endangered Papyrus species.

The Buffer Zones

Peripheral to the Core Zones are the Buffer Zones that comprise at least 10 % of the total BR area where restrictions are placed upon resource use or special socio-economic development activities, which are undertaken to enhance their conservation value. Within these zones traditional land-use practices and commercial activities, which are compatible with the objectives of the Core Zones will be allowed to generate tangible benefits for the communities. These activities require a management plan to guarantee the long-term production of resources without significant impacts on them or their adjacent ecosystems. These Buffer Zones may include seasonally closed sites and habitats, e.g. important breeding grounds of animals and corridors for riverine spawning fish stocks.

The specific objectives of the Buffer Zones are to:

- Allow only activities compatible with the Core Zones;
- Safeguard the integrity of the Core Zones by reducing the pressure on their resources;
- Maintain and develop cultural landscapes with use-contingent biological and landscape diversity;
- Develop ecologically, economically and socio-culturally acceptable models of land use, which ensure sustained livelihoods for local people and conserve the functional capacity of natural systems and processes;
- Provide subsistence and commercial fisheries for those local people who are resource use dependents with contemporary cultures (fishermen and marginal groups whose life is relied on the resources) in a sustainable way;

- Promote ecologically sound activities including environmental education, training and public awareness raising, recreation and ecotourism;
- Permit controlled utilization of natural resources based on the ecological situations of the area;
- Strengthen traditional knowledge and practices in cultural and natural resources conservation and management.

The Transition area

Sustainable resource management practices are promoted in the Transition or Development Zone. **This includes the whole of Lake Victoria Basin**. As the largest zone of a BR it encompasses settlements, urban areas, industries, cultural landscapes, arable lands and other surrounding areas of influence. The human activities are based on appropriate use of resources through a harmonized interaction between Man and the Biosphere (MAB). The specific objectives of this area are to:

- Maintain and develop cultural landscapes with uthe sustainable use of biological and landscape diversity in order to sustain long-term agricultural production;
- Develop, ecologically, economically and socio-culturally acceptable land-use models and practices, which ensure sustained livelihoods for local people and conserve the functional capacity of natural systems and processes;
- Conserve, develop and manage agro-ecological systems important for agrobiodiversity;
- Provide significant contribution to integrated ecosystem management approaches
- with appropriate ecological development through demonstrating the harmonized

- relationship between Man and the Biosphere;
- Provide opportunities for integrated ecosystem management research and long-termecologically oriented environmental monitoring;
- Contribute to water quality management of the water bodies of the lake and thevarious tributaries.

Ecosystems forming the different zones

The proposal of the total basin of Lake Victoria as the BR is a crucial question for the zonation because it influences the minimum required area proportions of the Core and Buffer Zones and the balance as Transition Zone. To start with, the whole of Lake Victoria Basin has been identified as BR. From the ecosystem point of view this can be seen as one landscape unit, in which hydrological and geomorphological processes like siltation occur. In order to conserve fish breeding habitats and fishstock, places like river mouths have been included in the Core or Buffer Zones where management plan will be necessary to prohibit destructive fishing gears and methods. The Core and Buffer Zones include some primary wetlands and forests which are bird breeding sites and fish spawning grounds, as well as river mouths and shore areas that are important wildlife habitats.

Zone within a BR	Proposed areas and land-cover types
Core Zones	• Forest remnants including church forests • Primary Wetlands • Primary river systems • Shore areas and open waters in the lake • River mouths as seasonal closures (fish breeding) • Important Bird Areas (IBAs) • Breeding and roosting sites (Crowned Crane) • Wildlife Sites: crocodile, hippopotamus, etc.
Buffer Zones	• Participatory Forest Management Areas • Small Islands • Secondary Wetlands (seasonally flooded agricultural lands and wetlands Plains) • Secondary River Systems and river banks • Gulfs in Bays • Priority areas for afforestation and soil and water conservation (SWC) measures • Dams and the surrounding areas up to the two dams • Degraded shore land areas
Transition Zone	• Agriculturally used areas • Urban Areas and Settlements • Industrial areas • Surface infrastructure and buildings • Peri-urban areas

3.2. Fieldwork by Geographic Information System (GIS) Experts

The tasks given to each GIS expert included preparing an inception report on the implementation of the assignment, creating and/or increasing awareness of the communities in and around the lake basin, and other partners on the need for designation of the basin, conducting consultations and building consensus on the appropriate zonation for the sites to be designated as individual Biosphere Reserves (BRs) and using the opportunity of the topographic mapping to build capacity of the residents and other stakeholders in the development of all-inclusive and engendered management and conservation plans. In terms of numbers, more than one hundred and thirty residents and stakeholders were met, sensitized and consulted across the region. Fourteen in Burundi, twenty-nine in Kenya, forty-three in Rwanda, twenty-nine in United Republic of Tanzania and over twenty in Uganda. The list of the stakeholders is in the **Annexes 1-4** of the report.

The conceptual approach adopted here is the one by the Kenyan GIS Expert

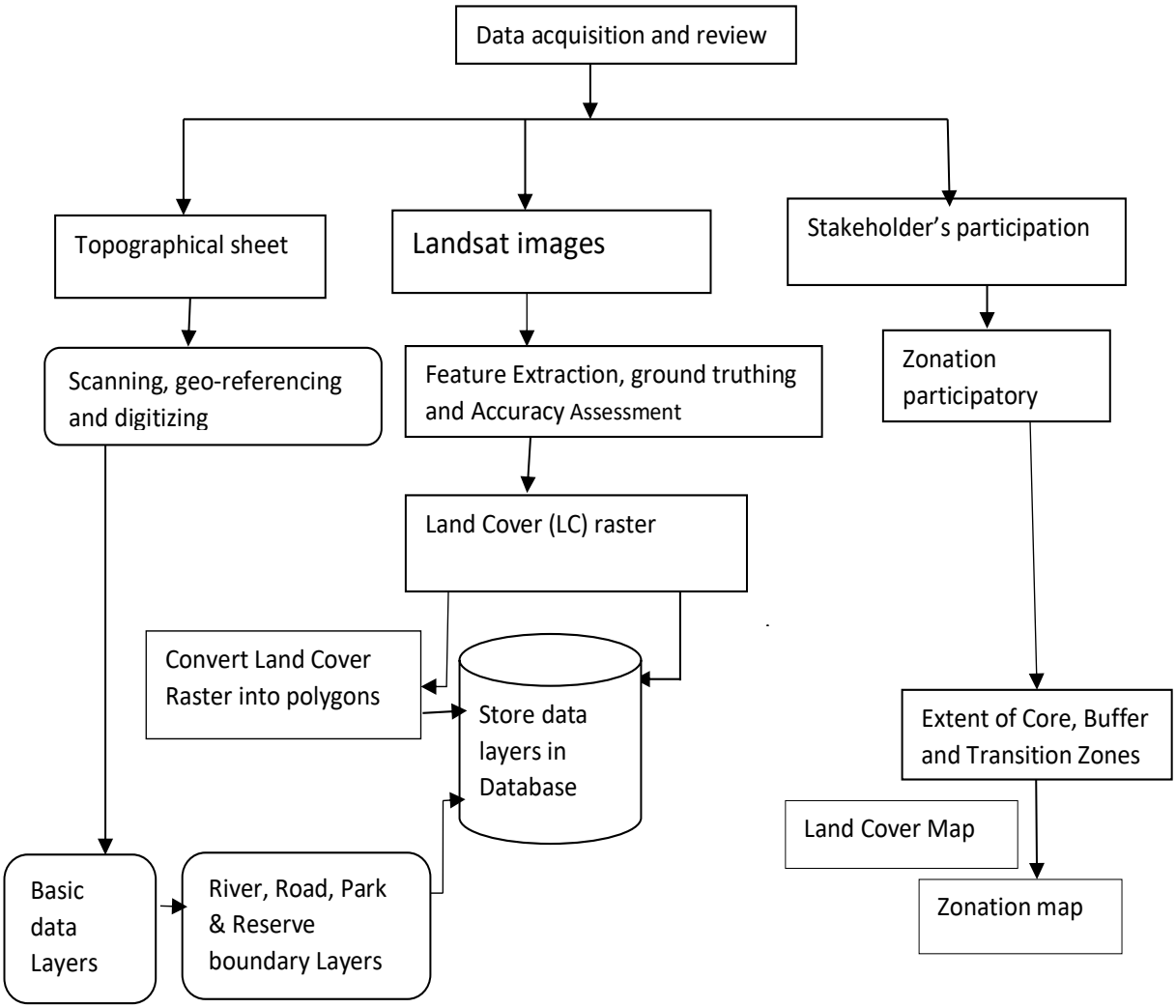


Figure 2: Flow diagram for developing zonation map (Hongo and Mulako, 2020)

3.3. Stakeholders Consultation Meeting

Stakeholder consultation targeted key informants/respondents consisting of diversity of stakeholders including environment officers, forestry officers, water resource engineers, wildlife officers, local government chairman and other government officials who have direct link with the basin activities. Discussions with the residents in proposed zones were conducted (see photos in the relevant places in the texts below). The discussions targeted selected people such as farmers, fishermen and livestock keepers whose interest is directly linked to the basin but also experiences the importance of conservation of the resources. Some villages in the ecosystem were visited in each zone for the discussions. Due to limited time the consultants had to find these people in their localities at the time of the mapping exercise. During consultations stakeholder were asked to identify the protected areas (core) in the google maps but also areas that are not protected but not yet utilized which they agree should be left unutilized for the purpose of conservation. They were also asked about their

willingness to participate in conservation activities in the biosphere reserves as the immediate residents close to the core and buffer zones.

Later, a hybrid physical and online meeting was convened for consultations and validation of the results of the mapping and zonation. The Programme for this meeting is in **Annex 2**.

This was also an opportunity for sensitization and awareness creation about the project and the funding Agency, UNESCO as well as the operations of the Man and the Biosphere Programme. It was also meant to build partnership and ownership of the project and agree on the appropriate management structures and systems for realization of the objectives of the project. An overview and objectives of the Workshop and the Project were presented by the Project Team Leader, who also holds the position of the Assistant Secretary General (ASG). Having outlined the background and overview of the meeting, he presented the planned objective as aimed at receiving the progress reports from the work in the field, sharing information on successes and challenges and proposing a way forward in supporting the nomination process. Specific objectives included receiving drafts of detailed topographic maps and proposed zonation of LVBE as a TBR from the GIS experts, sharing ideas on the proposals for establishing a comprehensive mechanism for coordination of stakeholders including legal, policy and institutional frameworks, sharing a draft Reference/Training Manual for building the capacity of the stakeholders associated with the Lake Victoria ecosystem to ensure effective and sustainable management and learning from the stakeholders about any existing action plans for any of the sites or organizations in the ecosystem with view to benchmarking on it to plan for each of the sites zoned/to be zoned as BR.

In her welcoming and official opening remarks, the Secretary General of UNATCOM as host and representing the colleagues in the region sensitised the participants about UNESCO, its foundation in 1945, its four fields of competence namely Education, Sciences, Culture and Communication & Information as its fields of competence and its five Programmes of Education, Natural Sciences, Social and Human Sciences, Culture and; Communication and Information. She further sensitized the participants on the National Commissions for UNESCO (UNATCOMs) as the interface of UNESCO with the Member States and the role in promoting the activities of UNESCO in those mentioned Programmes. She then explained that the project is in the Natural Sciences Sector especially UNESCO's Strategic Objective of promoting (international) scientific cooperation on critical challenges to sustainable development through generation and sharing of knowledge on natural resources, and capacity development through scientific collaboration for the protection and sustainable management of terrestrial ecosystems, biodiversity and freshwater security. She lauded the regional project led by the Uganda National Commission (UNATCOM) as a way of exercising UNESCO's roles of laboratory of ideas and foresight, standard-setting, capacity-building and catalyst of sustainable on the region-wide issues affecting our major freshwater lake, Victoria (Nyanza in Kenya, Nalubaale in Uganda) and thanked the Lake Victoria Basin Commission for sharing similar ideas for sustainable management of the Lake Victoria Basin Ecosystem. The speech is in the **Annex 3.**

The meeting received presentations of the draft results from each GIS expert and these are summarized in the **section 3**. A number of comments were made to the presentations and some amendments needed to be made by the experts to their work. Some had not yet completed the fieldwork and so their presentations were considered preliminary. This meeting attracted about fifty participants. The attendance list is in the **Annex 4**

There were also presentations on draft Resource Books for Community Sensitization and Civil Society Proposala through the Lake Victoria Lead Partners/Lake Victoria Regional Local Authorities Council (LVRLAC) which is presented in **sections 3.5.1 to 3.6.5**.

3.4. Dissemination of the Mapping Results and Consensus on the nomination process.

The dissemination meeting involved a wider stakeholder participation than the previous one. It targeted the wide spectrum of sectors relevant to the Lake Victoria Basin Ecosystem including the sector minister for East African Community Affairs, the Lake Victoria basin Commission, the Ministries responsible for Water and Environment, Tourism, Wildlife and Antiquities, agencies like the Wildlife Services, National Environment Management in each of the partner states were involved to make ministerial commitments in terms of their mandates. Also involved was the UNESCO Natural Sciences Specialist in the Regional Office, Nairobi and the UNDP Resident Representative in Uganda, the Local Government Authorities Council in the Lake Victoria Region (LVRLAC) and the Civil Society Organisation named the Lake Victoria Lead Partners Platform (LVLP). The memberships of the National Scientific Committees of the Intergovernmental Hydrological Programme (IHP), the Man and the Biosphere Programme (MAB) and the International Geoscience Programme (IGCP) were also involved so as to strengthen scientific cooperation and bring knowledge and evidence on freshwater, biodiversity and ecosystem services into the policy mix. The attendance list is in **Annex 5.**

3.5. Awareness of stakeholders enhanced, capacity of Stakeholders strengthened, partnership built and a comprehensive mechanism for coordination of stakeholders including legal, policy and institutional frameworks established.

A total of over a hundred stakeholders were sensitized, capacity strengthened, partnership built and a comprehensive mechanism for coordination of stakeholders including legal, policy and institutional frameworks established. Participants learnt about UNESCO and its programmes and the value of biosphere reserves as model for conservation and sustainable land use. Stakeholders' roles were also discussed and responsibilities assigned as basis for partnership building.

Some of the presentations of the draft results from GIS experts are summarized in the following texts and maps.presentations and some amendments needed to be made by the experts to their work. Some had not yet completed the fieldwork and so their presentations were considered preliminary. This meeting attracted about fifty participants. The attendance list is in the **Annex 4.**

3.5.1. Sensitization and consultative meeting with stakeholders

3.5.1.1.Burundi

Venue for sensitization and consultation was Muremera, Kigamba Commune, Cankuzo Province of the Bureau of Burundi Environment Authority, OBPE (Office Burundais pour la Protection de l'Environnement), Head Office of Ruvubu National Park.

The sensitization was about cooperation, ownership, partnership and coordination of the sustainable management of the Ruvubu mainstream with a particular focus on the Ruvubu National park and its surroundings. It was to to inform the stakeholders about the Ruvubu stream as a site proposed for mapping and zonation in the framework of the proposed nomination of Lake Victoria Basin as a transboundary biosphere reserve.

As key achievements, a total of 13 stakeholders participated in the sensitization and witnessed the mapping. The facilitators included Mr Marc Bakundintwari, Chief Park Manager, Ruvubu National Park who highlighted the mission and current situation of the park in terms of biodiversity, ecosystems, tourism and anthropogenic pressure. Further information was provided by the GIS expert Prof. Tatien Masharabu (University of Burundi), who was hired by Uganda National Commission for UNESCO, to conduct the mapping, zonation and the stakeholders meeting in support of the proposed nomination of Lake Victoria Basin (LVB) as a transboundary biosphere reserve, Burundi Chapter. He empasized on the fact that the LVB is a huge resource which, if conserved and well utilized, could bring about major progress to the region considering its rich biodiversity, and seen as a major source of livelihood to people in and around. The organization of biosphere reserves into zonation and special management aiming at the fulfillment of the three basic functions of conservation, development and logistics which are complementary and mutually reinforcing was emphasized. A short session of questions and answers was also organized before the end of the workshop.

The participants were representatives from the local community, Burundi Environment Authority (OBPE), fishermen, Security, Field Assistants and Tourists as presented in the Annex

Photo showing *GIS Expert, Prof. Tatien Masharabu-University of Burundi (wearing a yellow t-shirt) together with some of the Ruvubu National Park Staff members at the Gate of Gasave in Buhinyuza Commune, Muyinga Province, Burundi.*

Photo showing *A Section of participants who attended Sensitization and consultative meeting with stakeholders during the Detailed Topographic Mapping and Zonation of River Ruvubu as part of Lake Victoria Basin Ecosystem as a Trans-Boundary Biosphere Reserve.*

3.6. Detailed topographic mapping and zoning of the Lake Victoria Basin Ecosystem with coordinates as a multi-site Trans-boundary Biosphere Reserve (TBR).

The topographic mapping involved the use of the latest landcover map in each of the countries which was developed using landsat 8 satellite images. Ten different landcover classes were distinguished including bare soil, grassland, cultivated area, built-up area, bushland, forest, water and wetlands among others. These were used to extract protected areas of forests, wetlands and others for zonation. It also provided GIS layers for water bodies and rivers.

The zonation included legally constituted core area or areas devoted to the long-term protection of biodiversity, according to the conservation objectives of the biosphere reserve, and of sufficient size to meet these objectives. The main focus of the core area is to provide information about ecosystem functions and processes. The buffer zones were identified as fulfilling buffering functions, surrounding or contiguous to the core area or areas, where only activities compatible with the conservation objectives can take place. The main focus of the buffer zone is to allow management techniques to be developed, explored and learned about, in order to maintain semi-natural ecosystems, including their biodiversity. Furthermore, buffer zone is managed to accommodate a greater variety of resource use strategies, and research and educational activities . The transition zone is the outermost part of the Biosphere Reserve. This is an area of active cooperation between reserve management and the local people, wherein activities including settlements, cropping, forestry, recreation and other economic uses continue in harmony with people and conservation goals.

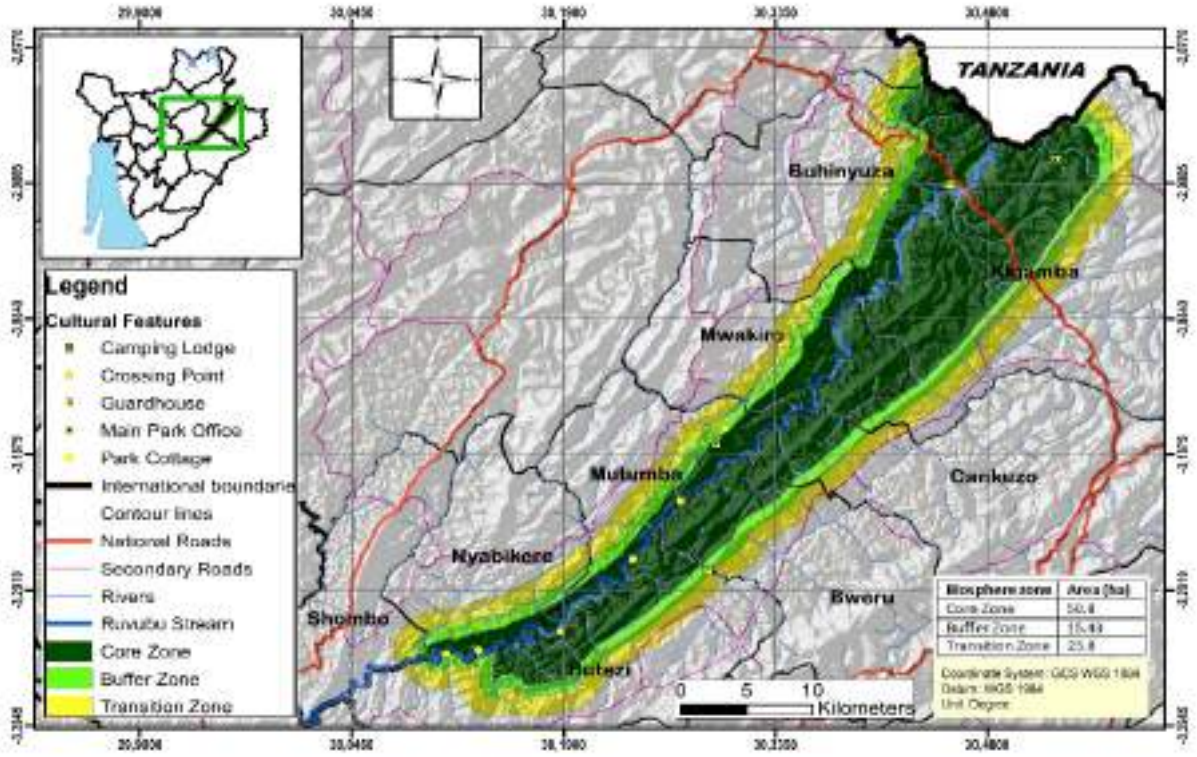
Topography was deduced from Shuttle Radar Topography Mission (SRTM) digital elevation data with a 30-meter resolution. This data was used to generate rivers in the basin using hydrology spatial analyst tool in ArcGIS software. The digital elevation data was also used to generate hill shade and used as base map in all the maps in order to visualize the terrain of the area mapped.

Mapping used the World Geodetic System (WGS) coordinate system. The System is a standard for use in cartography, geodesy, and satellite navigation including GPS. The latest revision is WGS 84 (also known as WGS 1984, EPSG: 4326), established and maintained by the United States National Geospatial-Intelligence Agency. For obtaining metric measurements of the areas the Universal Transverse Mercator (UTM) projected coordinate system was used. The system divides the earth into 60 zones. Tanzania lies between 36 and 37th zone south of equator but for the case of the basin it is in the 36th zone hence UTM zone 36S was used.

3.6.1. Burundi Proposed Biosphere Reserve Site: Ruvubu National Park as Biosphere Reserve. Mapping and zonation of the Ruvubu National Park, candidate Transboundary Biosphere Reserve.

The mapped and zoned site is the Ruvubu National Park (RNP), the biggest protected area of the Republic of Burundi. The park remains a sanctuary and a last refuge for large mammals that have disappeared elsewhere in the country, mainly buffaloes. Created in 1980, the RNP covers an area of 50800 ha and is located between latitudes 2 ° 54 '- 3 ° 22 ' S and longitudes 30 ° 6 '- 30 ° 33 ' E, in the North-Eastern Burundi. The altitude ranges from 1350 to 1836 m^2. According to Köppen classification, it has a tropical climate classified as (AW_3)s. The main vegetation features are made of savannas, riparian forests and swamps. The park extends south-westwards from the border with Tanzania along a 65 km stretch of the valley of the Ruvubu stream. The south-western boundary of the park lies some 20 km to the east of the town of Gitega. Its borders fall within the provinces of Karuzi (532,377 people in 2022), Muyinga (771,419 people), Cankuzo (279,182 people) and Ruyigi (488,570 people). The area of its core zone is 50,902 ha, its buffer zone 15,393 ha, and its transition area is 23,819 ha. The cardinal points are as follows (Table below):

Cardinal points	Longitude	Latitude
Centroid	30,3516	-3,12645
Northern most	30,58298	-2,87457
Southern most	30,58298	-3,39145
Eastern most	30,58298	-2,87457
Western most	30,07531	-2,87457



Map 8: Zonation of the Ruvubu National Park, candidate site of the Transboundary Biosphere Reserve

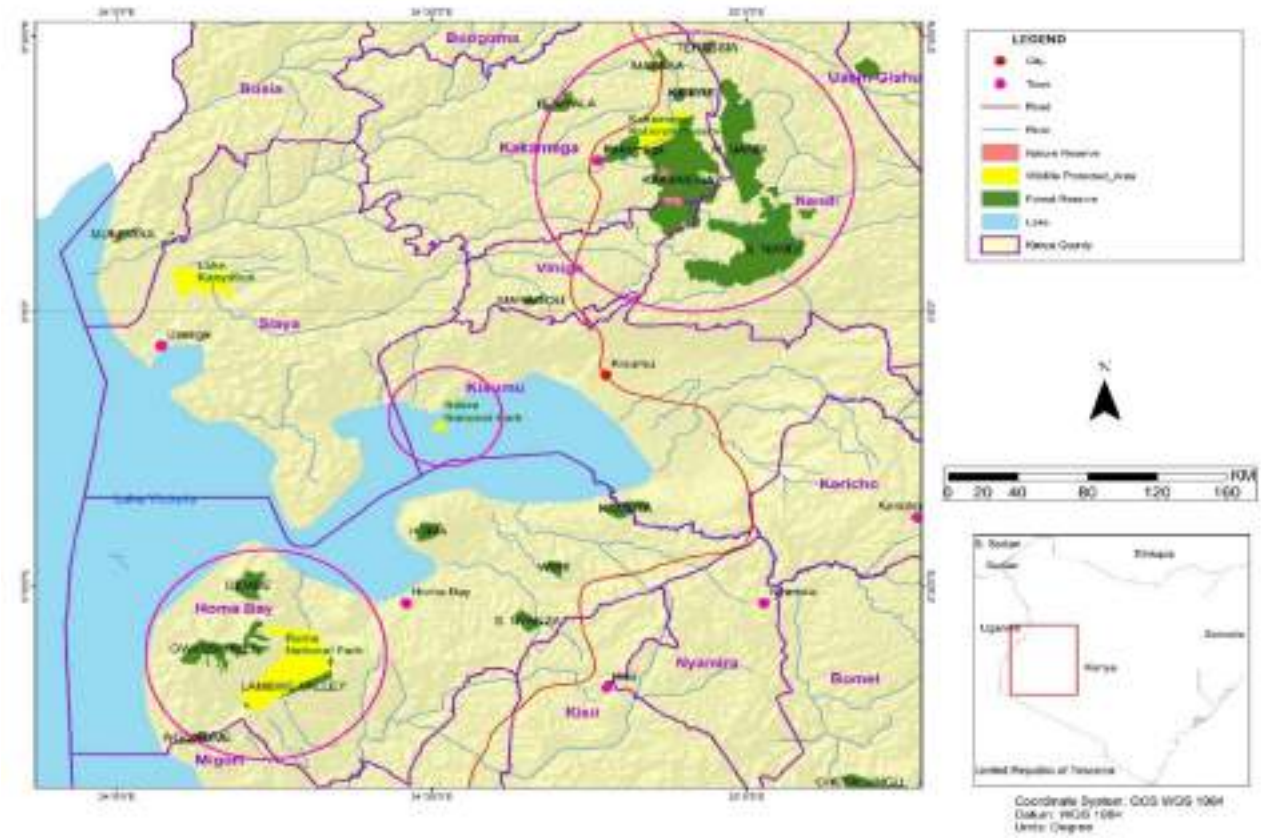
The Ruvubu stream valley mapped above comprises a series of meanders flanked by swamp vegetation, gallery forest and, further inland, savanna woodland. The latter comprises *Hyparrhenia* grassland with *Brachystegia, Jukbernardia, Combretum*, *Terminalia* spp. And *Acacia seyal* plus *Periocopsis* and *Parinari* spp. on hillsides. Riverine forest lines the Ruvubu, interspersed with areas of *Cyperus papyrus* and *Phoenix reclinata*. There are also areas of flood-plain grassland, while *Papyrus* swamps with sparse *Syzygium* occur along the drainage lines of the smaller valleys. On the high ridge which forms the southern boundary of the park, *Protea* sp. is common. The last inventories showed that, animal populations of the RNP included Cape Buffalo, antelope, crocodiles, hippos and a variety of bird life. More than 200 bird species have been recorded, including *Ardeola idae*, *Circus macrourus*, *Falco naumanni* and *Gallinago media*. Large numbers of waterbirds occur with counts of over 1,000 *Pelecanus onocrotalus* and large numbers of *Mycteria ibis*. Other species recorded include *Neotis denhami*.

Today, there are conflicts between managers and former owners of cultivable lands regarding territories which are now integrated to the park. These famers have claimed for expropriation indemnities that they never received. The biosphere reserve is the only scheme to address the problem.

The recent Research Activities include among others:

- Characterization of anthropogenic disturbances on the vegetation of the Ruvubu National Park, Burundi
- Fire dynamics in the Ruvubu National Park, Burundi
- Conflicting cohabitation between the Ruvubu National Park and local population
- Flora and vegetation of the Ruvubu National Park, Burundi: diversity, structure and implications for conservation.

3.6.2. Kenya Biosphere Reserve sites



Map 9 : showing the three (3) Biosphere Reserve sites in Kenyan side of Lake Victoria Basin Ecosystem

3.6.2.1 RUMA PROPOSED BIOSPHERE RESERVE

Ruma is located in Lambwe Valley between Ndhiwa, Suba North and Suba South Sub-Counties in Homa Bay County within the Lake Victoria Region, Western Kenya. The park which is the core zone was gazetted under Legal notice no 100 of 14th June 1983 in consultation with the then South Nyanza County Council as a National Park from its previous protected area category as Lambwe Game Reserve. It covers an area of 120Km^2 as per FR349/91 and LR No 28041.

The Lambwe valley floor which forms Ruma Core zone is sandwiched by a myriad of panoramic sceneries such as Gwasi Hills and Kanyamwa Escarpment. In the vicinity there are Gembe Hills and Ruri Hills to North West and North of the Park respectively.

The area has a population of about 425,331

Research activities

Ruma is a research area for both in-situ and ex-situ conservation. Research is open for local and international scientists and researchers. The institutions undertaking research include:

- Kenya Wildlife Service (KWS);
- Wildlife Research and Training Institute (WRTI)
- ICIPE
- Kenya Tsetse And Trypanosomiasis Eradication Council (KENTTEC)
- Universities (Maseno University,)

There are also some community groups within the Biosphere Reserve willing to assist in the environment conservation activities

The significance for biological diversity conservation

Exceptional Resource Values in Ruma include:

- Rare and locally endemic species such as the Roan Antelope
- Globally threatened species such as the Black rhino, white rhino
- Migratory avian species such as the intra-African Migrant Blue swallow and other parleactic migrants.
- The largest single population of Rothschild Giraffe in Kenya
- Scenic landscapes provided by Kanyamwa Escarpment and surrounding Hills.
- The Lambwe River and the accompanying riverine Forest
- Rolling savannah plains with tall *Themenda triandra* and *Hyparrehia* grass studded with the outstanding *Balanytes aegyptiaca.*
- Luo and Abasuba culture
- Historical monument such as Gor Mahia grave site

Cultural

The Biosphere Reserve is surrounded by the Luo and Abasuba and to some extent the Abagusi communities. The Abagusi are farmers while Luo and Abasuba are farmers and fishermen. These communities also have unique and interesting cultural rites that are accompanied with song, dance boosted with traditional instruments.

A number of Caves of ancient geographical origin exists in the island and surrounding Hills and are used as traditional shrines and shrines and for religious pilgrimage. These include Baboon cave in Gembe hills used commonly for prayers. Soklo ki penji, a peninsula with 5 caves used as shrines and for prayers and some have remnants of ancient pottery.

RESULTS: RUMA ZONATION

The total area of the Proposed Biosphere reserve is 2966 Km^2 as in Figure 2-4 comprising of the following:

- Core areas is 120 Km^2, consisting of the Ruma National Park which is protected under the Wildlife Conservation and Management Act 2013.
- The Buffer zone is 281Km^2 consisting of the forests around the core zone. The forests are protected by the forest Act.
- The Transition zone is 2565 Km^2 which is comprised of 1275 Km^2 terrestrial and 1290 Km^2 covered by water.
- Based on the zonation, the site is fulfilling the three functions of the Biosphere Reserve namely: conservation, development and logistics

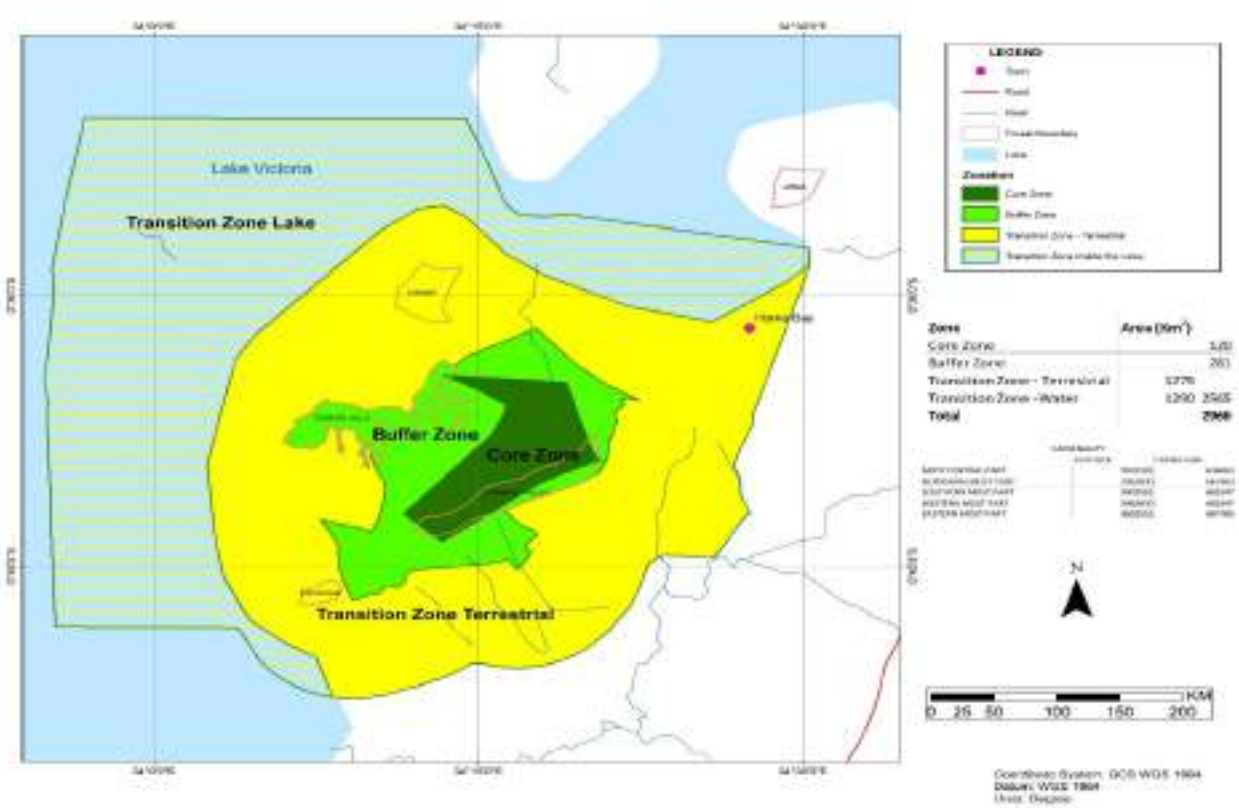


Figure 3: Map showing Proposed Ruma Biosphere Reserve Zonation

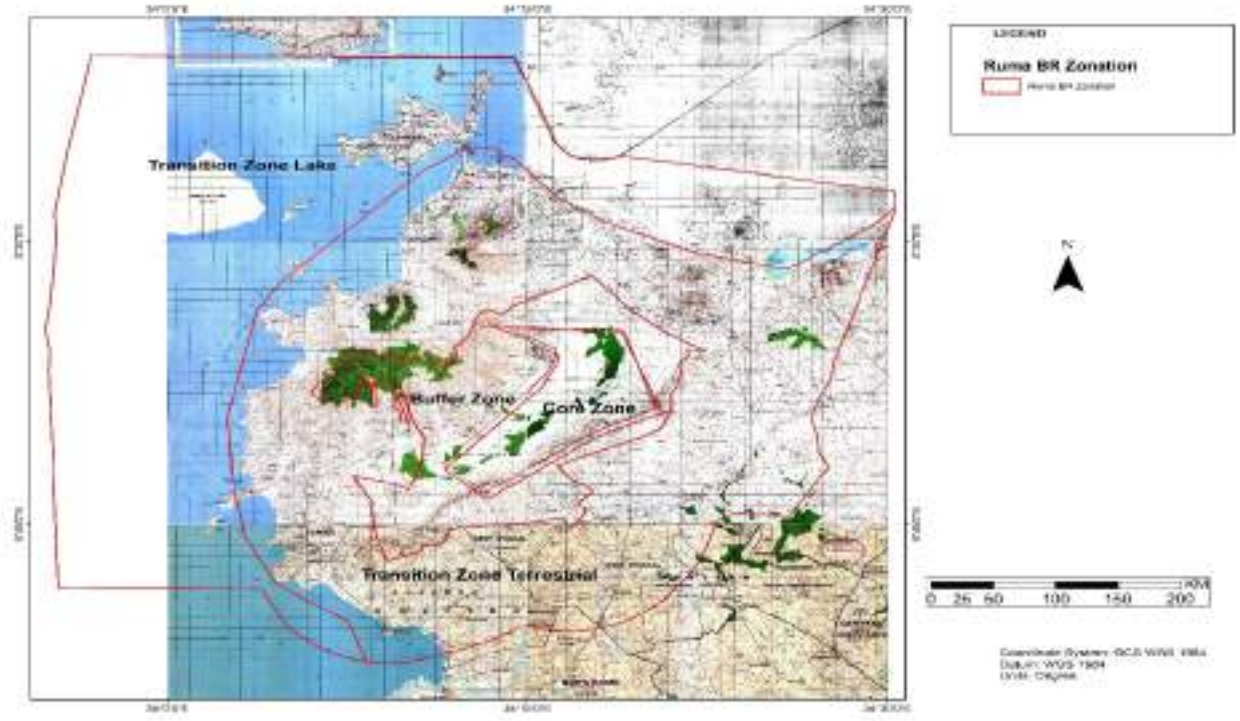


Figure 4: Map showing Proposed Ruma Biosphere Reserve Zonation on Topographical sheet

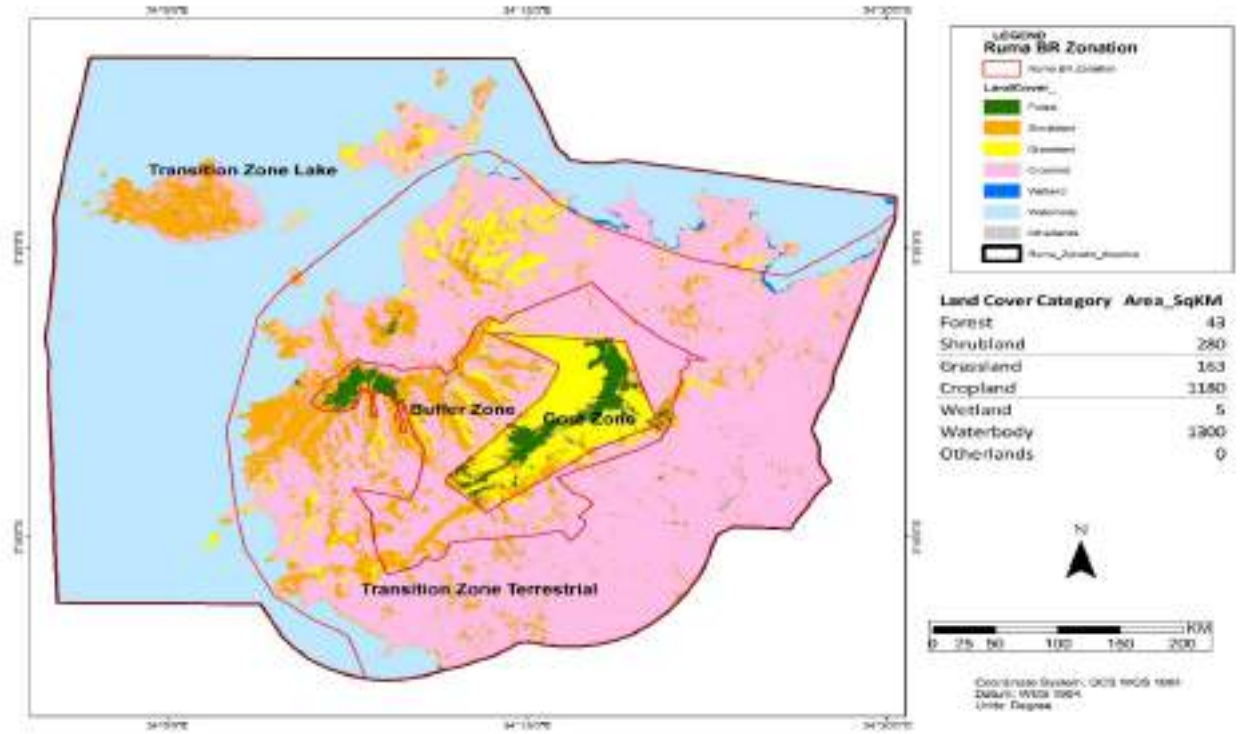


Figure 5 : Proposed Ndere Biosphere Reserve Zonation

3.6.2.2. NDERE PROPOSED BIOSPHERE RESERVE

Ndere is situated in Winam Gulf of Lake Victoria in Kenya. Ndere means a "meeting place" in Dholuo. According to Luo folk tales, early tribal migrants rested up near Ndere after their long journey south up the Nile River Valley. They found the shoreline to be attractive and habitable that they stayed.

The fauna in Ruma includes animals found in the lake such as hippopotamus, crocodiles, monitor lizards and a variety of fish species. On the island, are impalas, baboons, vervet monkeys, sitatungas, reptilesbirds, butterflies and snails.

The area has a population of about 153,292

Research activities

Ndere is a research area for both in-situ and ex-situ conservation. Research is open for local and international scientists and researchers. The institutions undertaking research include:

- Kenya Wildlife Service (KWS);
- Wildlife Research and Training Institute (WRTI)
- Universities (Maseno University, Egerton University)
- ICIPE
- Kenya Tsetse And Trypanosomiasis Eradication Council (KENTTEC)

There are also some community groups within the Biosphere Reserve with the of assisting in the environment conservation activities.

The significance for biological diversity conservation

The exceptional resource values for Ndere include diverse butterfly species, sitatunga which is listed IUCN as threatened, other biodiversity include Nile crocodile and Hippopotamus. The scenic values include mosaic of vegetation communities, water around the island. The social values include fish breeding ground. Final cultural values include Kit Mikayi and boat race by Ndere community.

RESULTS: NDERE ZONATION

The total area of the Proposed Biosphere reserve is 490.2 Km^2 as in Figure 5-7 comprising of the following:

- Core areas is 4.2 Km^2, consisting of the Ndere Island National Park which is protected under the Wildlife Conservation and Management Act 2013.
- Buffer zone is 14Km2 consisting of the water body the core zone
- Transition zone is 472 Km2
- Based on the zonation, the site is fulfilling the three functions of the Biosphere Reserve namely: conservation, development and logistics

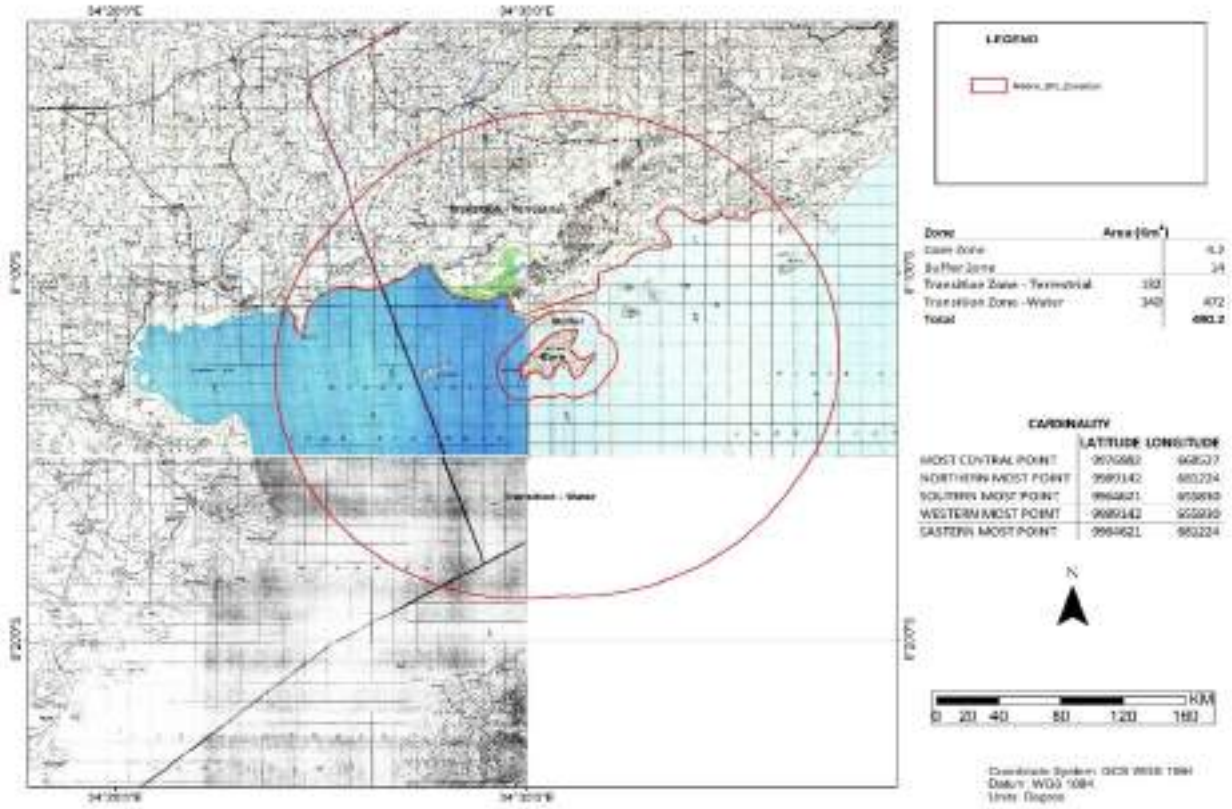


Figure 6: Proposed Ndere Biosphere Reserve Zonation with topographical sheets at the background

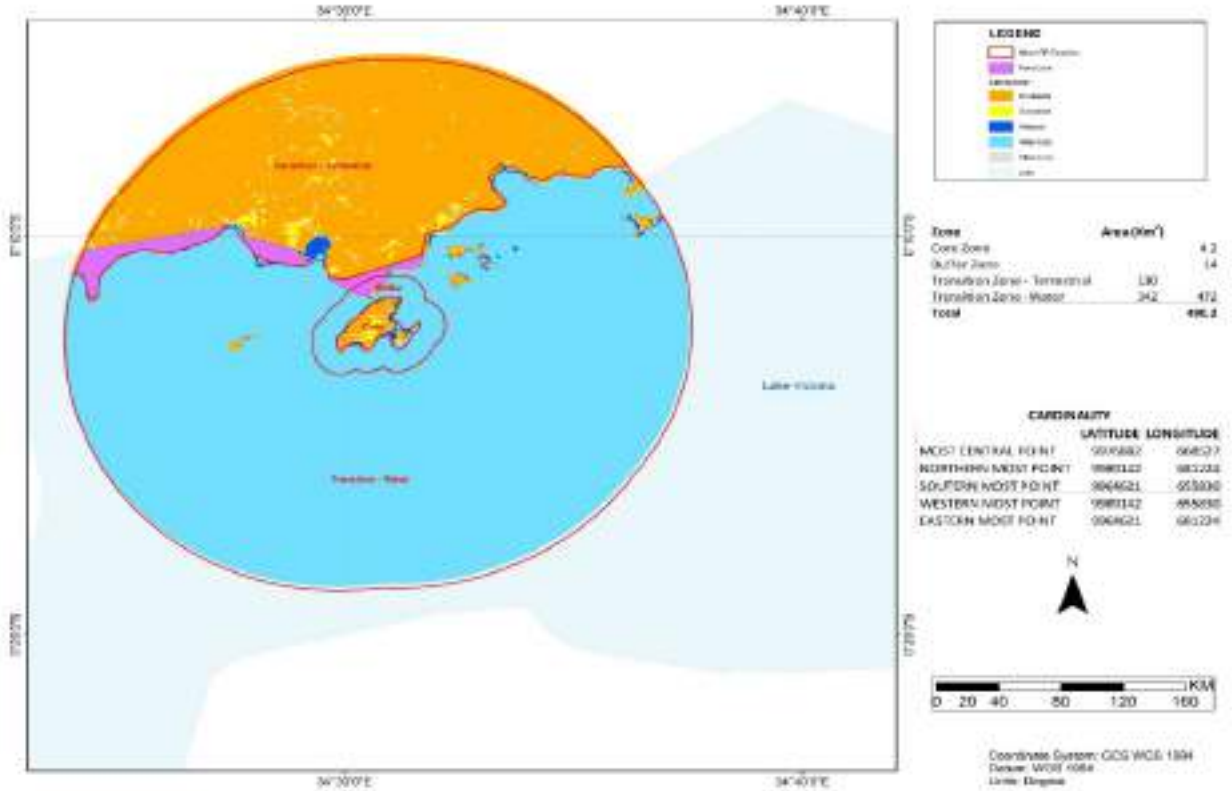


Figure 7 : Proposed Ndere Biosphere Reserve Zonation with land cover at the background

3.6.2.3. KAKAMEGA FOREST PROPOSED BIOSPHERE RESERVE

Kakamega forest which is 35 Km from Lake Victoria is known as the eastern-most remnant of the Guineo-Congolian lowland rainforest belt, which once extended from Kenya across Uganda, East and Central Africa to the West African coast. It a sanctuary for an extraordinary variety of endemic flora and fauna that include insects, reptiles and birds which are not found in other parts of the country. An estimated 10 - 20% of the animal species in the forest are unique to this forest. The forest is an important watershed for some of the rivers that flow into Lake Victoria. The forest is very useful to the people living around it, as a source of timber, fuel wood, herbal medicines, building materials, food and land for farming.

The area has a population of about 1636264

Research activities

Kakamega Forest is a research area for both in-situ and ex-situ conservation. Research is open for local and international scientists and researchers but due to Corona pandemic currently only local scientists and researchers carry out research. The institutions undertaking research include:

- Kenya Forest Service (KFS);
- Kenya Wildlife Service (KWS);
- Wildlife Research and Training Institute (WRTI)
- Kenya Forest Research Institute (KFRI);
- Kenya Meteorological Department (KMD);
- IGAD Climate Change Prediction Centre;
- Birdlife International, World Wildlife Fund (WWF);
- IUCN;
- UNDP-GEF;
- William Holden Wildlife Foundation;
- Nature Kenya; and
- National Museums of Kenya (NMK)
- Universities (Masinde Muliro University, Maseno University)
- The site also provides practical learning for middle level colleges, secondary and primary schools

The significance for biological diversity conservation

Kakamega forest is among the relic of the tropical rain forests in Kenya and is a high-class sanctuary for variety of endemic flora and fauna that include insects, reptiles and birds which are not found in other parts of the country. Kakamega Forest and the surrounding areas are recognized as national hot spots of the most unique snake species and currently about 35 different species have been recorded.

It is a home to the Elgon teak and Prunus africana, which are species of special conservation concern (locally threatened and rare)

Kakamega forest is designated as an Important Bird Area. Out of the 1,065 bird species found in Kenya, about 472 are found in Kakamega Forest. The Kakamega Forest hosts the Turner's Eremomela (Eremomela turneri) and Chapin's Flycatcher (Muscicapa lendu) which are listed as globally threatened species. In addition to 15 species regionally threatened, and 46 unique species recognized in Kenya only from this Forest. Bird species, and in particular forest specialists, are threatened by habitat destruction and forest fragmentation. Many bird species are crucial for the forest ecosystem, because most tree species depend on birds for seed dispersal. In this regard, the Black-and-white-casqued Hornbill (Bycanistes subcylindricus) is an important species for seed dispersal in Kakamega Forest.

Kakamega forest is the home to five out of the eight primate species found in Kenya. The Blue Monkey (Cercopithecus mitis stuhlmanni), the Redtail Monkey (Cercopithecus ascanius schmidti), the Black-and-White Colobus Monkey (Colobus guereza), Pottos (Perodicticus potto ibeanus) and the De Brazza's Monkey (Cercopithecus neglectus) have significant ecotourism value

Kakamega forest is endowed with a high diversity of insects. Butterflies are represented by 487 species which constitute 54% of the 900 species known to Kenya. Moths are also common species in this area, with recorded totals of 53 Hawk moths (Sphingidae), 37 Emperor Moths (Saturniidae), and 43 Tiger Moth species (Arctiinae).

Kakamega Forest and the surrounding areas are recognized as national hot spots of the most unique snake species. To date, 36 snake species have been recorded. A majority of these snakes originate from West Africa including the Forest Cobra, the Black-lipped Cobra, Jameson's Mamba, the Bush Viper, the Rhinoceros-horned Viper and the Gabon Viper. The Gold's Cobra and Kaimosi Blind Snake are prevalent in the Kakamega forest, but are believed to be in danger of extinction. Species characteristic of West African forests and reaching their eastern limit in Kakamega or the Nandi Forests are, the Gold's Tree Cobra (Pseudohaje goldii) and the Forest Night Adder (Causus lichtensteini).

The uniqueness of the Kakamega Forest lies in its rich diversity in plant species, which are not found elsewhere in Kenya. It is home to the Elgon teak and Prunus africana, which are species of special conservation concern (locally threatened and rare). These species are prone to over exploitation due to their high quality timber and medicinal value. In addition, scientific research has indicated the presence of 13 different plant communities, each representing a different succession stage. A large area of Kakamega Forest consists of middle-aged secondary forest but much of the Buyangu area and the north-eastern part of the forest are characterised by very young secondary forest.

Scenic values

Beautiful panoramic view points: Buyangu hill allows a spectacular view of the northern part of Kakamega forest, the glades and also the Lirhanda hill. Lirhanda hill is another beautiful feature of

the Kakamega forest which is found in the north of Yala River. It is the highest point in Kakamega Forest;

Isiukhu River offers beautiful view points for birds as one walks along the Isiukhu nature trail of 12.8 km. Along the trail, natural glades, secondary vegetation, old secondary forests and the Isiukhu falls can be observed. The Yala River is in the south-eastern end of the forest and has a spectacular waterfall which is about 20 metres high. The trail towards the river and falls offers visitors the opportunity to view typical primary and old secondary forest with a composition of monkeys, various bird species and several snake species like the Rhinoceros Viper (Bitis nasicornis) and the Gaboon Viper (Bitis gabonica).

The high canopy forest has a high floral diversity with dominant tree species comprising of Croton megalocarpus, Albizia gummifera, Bosquiea phoberos, Anningeria altisima, Antiaris toxicaria and Fantumia elastica. When observed from a higher point like Buyangu and Lirhanda hills, they appear as a striking green and beautiful landscape with remarkable forest structures and gaps in the forest canopy, which allow for succession and the maintenance of species diversity.

The area around Kakamega forest is one of the most densely populated rural areas in Kenya. The communities around are the local users of the forest products/resources, thus the KFE is a vital source of support to the locals. Some community groups exploit the forest as an alternative source of income through ecotourism, bee keeping and production of tree seedlings for sale.

The Luhya community has a very rich and distinct culture but this is affected by younger generations that migrate to urban areas in pursuit of better opportunities to sustain themselves and their families. The forest acts as a significant location for traditional ceremonies and worship. There are sacred sites within the forest which include: Ikavakava shrine, used for cleansing community offenders by selected traditional healers and Tiriki sacred forests, which are forest patches mainly used as circumcision sites by the Tiriki sub-tribe of the Luhya community. Some of the notable cultural events include; bull fighting, cock fighting and traditional dances. Further, the people of Ilesi and Mukhonje maintain their livelihoods through pottery till present day. Lubao town hosts dog sellers every week, making it a unique market in the region.

RESULTS: KAKAMEGA FOREST ZONATION

The total area of the Proposed Biosphere reserve is 3035Km^2 as in Figure 8-10 comprising of the following:

- Core areas is 127 Km^2, consisting of the Kakamega Forest National Reserve which is protected under the Wildlife Conservation and Management Act 2013 and natural Forest reserve managed Kenya Forest Service act.
- Buffer zone is 1043Km^2 consisting of the forests around the core zone that include North Nandi forest, South Nandi Forest, Kisere forest, Kakamega forest Plantations, Bunyala,

Malaba, Terresia forests following:

- Transition zone is 1865Km^2

Figure 8: Proposed Kakamega Forest Biosphere Reserve

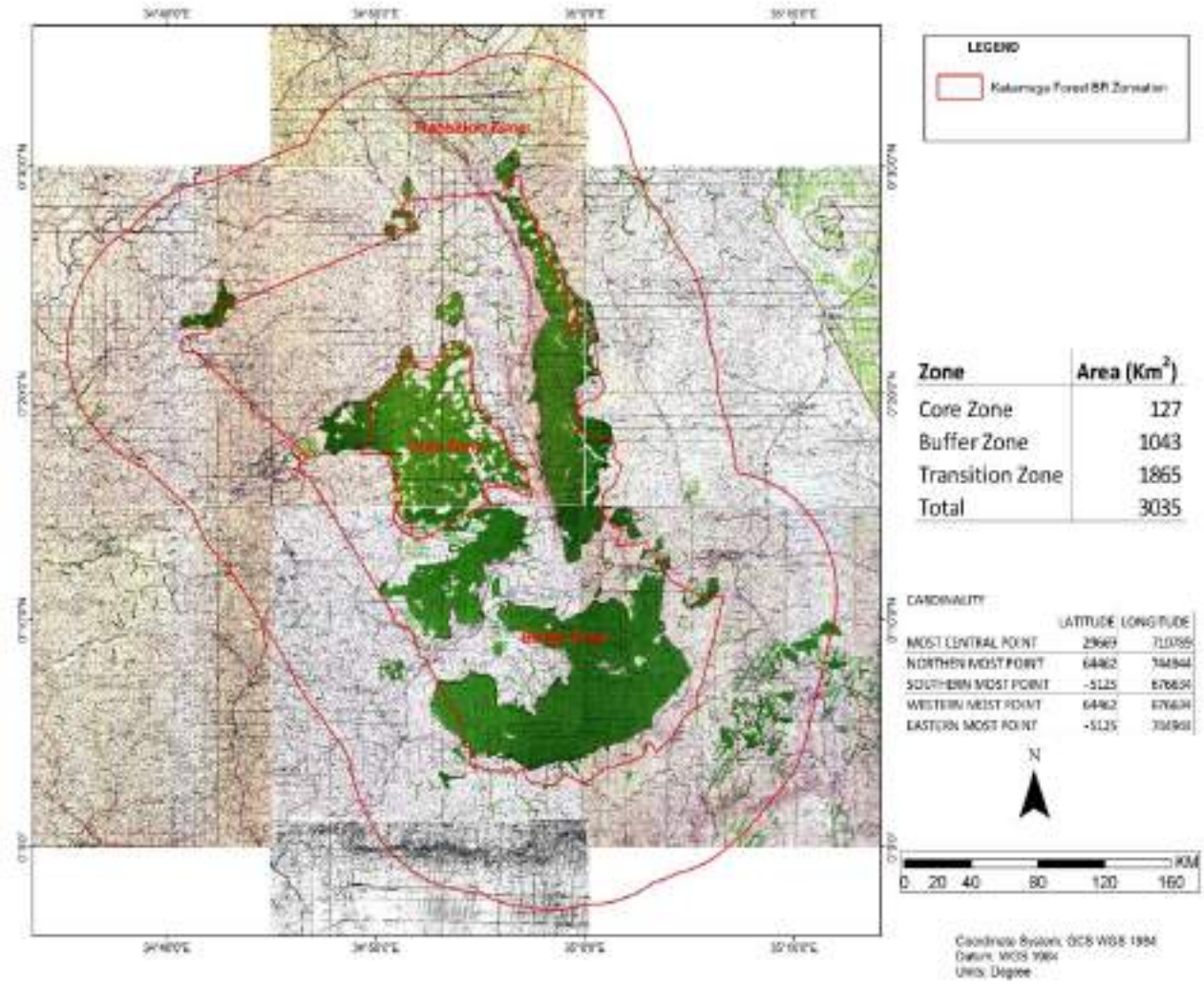


Figure 9: Proposed Kakamega Forest Biosphere Reserve on topographical sheets

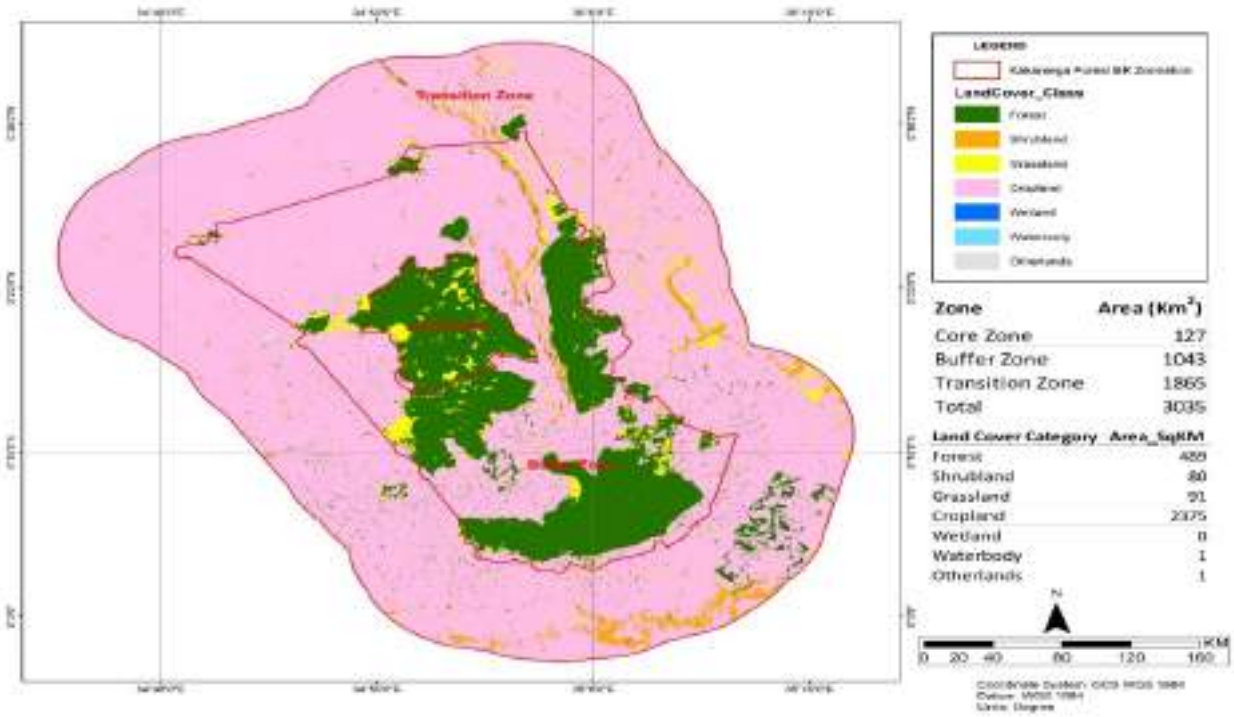


Figure10: Proposed Kakamega Forest Biosphere Reserve on land cover

Cardinal Points: Latitudes and Longitudes

	LATITUDE	LONGITUDE
MOST CENTRAL POINT	29669	710789
NORTHEN MOST POINT	64462	744944
SOUTHERN MOST POINT	-5125	676634
WESTERN MOST POINT	64462	676634
EASTERN MOST POINT	-5125	744944

DISCUSSION

The distance between Ndere Core zone and the main land has increased considering the topographical maps and the current Lake Victoria's water levels. This means that some parts of the shoreline have been submerged in water. The GIS team mapped these areas as flood zones. In both Ndere and Ruma, transition is divided into two parts name transition- terrestrial and transition-Water. The Core zone in Kakamega Forest consist of Kakamega Forest National Reserve and part of natural forest adjacent to the National Reserve. The Core Zones for Ruma and Ndere are the Ruma National Park and Ndere Island National Park respectively. The buffer zone of Kakamega Forest and Ruma included the adjacent forests. The buffer for Ndere was defined by a distance of 1Km from the Core zone. The transitions of all the three sites were defined by a distance of 10 Km from the buffer.

The inclusion of Ruma, Ndere and Kakamega forest as biosphere reserve will strengthen a good path by striking a balance between biodiversity conservation and sustainable use of natural resources. The establishment of the three sites as a BR will enhance tourism in the area raising revenue to the communities around the BR through the provision of services to the tourism sector. The attractions in this BR will include biodiversity, scenic, social and cultural. The sites are important for the local, national and regional economy because they support the tourism, hospitality and associated industries and sectors. The joint management of individual site by various government agencies mandated to conserve the wildlife protected areas, forest, private sector players and community Based Organizations (CBOs) will facilitate the coordination and integrated action on a regional scale.

CONCLUSION

Based on the zonation of the individual sites, the three functions of the Biosphere Reserve have been fulfilled. The details of tourism potential and richness of biodiversity in the annex 7.

3.6.3. Tanzania Biosphere Reserve sites

3.6.3.1. Description of the Sites

The areas where fieldwork was conducted included Kagera region (Bukoba, Rubafu, and Bukwali), the Emin-pasha Gulf (Geita and Nungwe), Mwanza Bay (Mwanza and Rushamba), Speke Gulf (Lamadi, Tairo, Guta and Kalago) and Mara-shirati Bay (Musoma and Shirati).

The assignment was carried out in five (5) zones which had been identified during the baseline study in 2018/19 biennium as Biosphere Reserves in Tanzanian's part of the Lake Victoria basin. Among these zones, two were identified as transboundary while the remaining three as national biosphere reserves as listed below:

(a) The Mara-Shirati Bay Biosphere Reserve (Trans-boundary)
(b) Speke Gulf Biosphere Reserve Zone (Annexed to Serengeti)
(c) Mwanza Gulf Biosphere Reserve Zone
(d) Emin Pasha Gulf Biosphere Reserve Zone
(e) Kagera-Rubafu Bay Biosphere Reserve (Trans-boundary)

The five sites listed above are shown in the map below

Fig. 11: Land use in L. Victoria Basin in Tanzania showing the proposed Biosphere Reserves

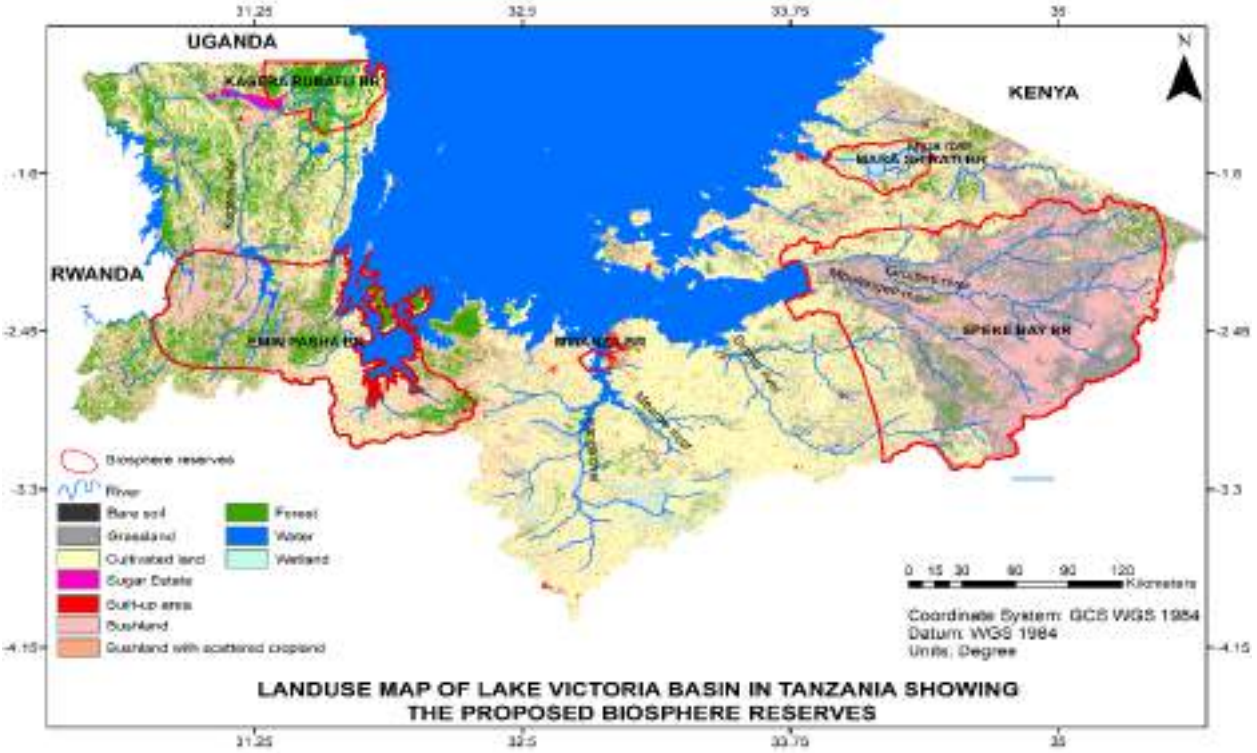


Fig. 12: Land use in L. Victoria Basin in Tanzania showing the proposed Biosphere Reserves

3.6.3.2. The Proposed Sites in Tanzania to be zoned for designation in the multi-zoned Lake Victoria Basin Ecosystem as Transboundary Biosphere Reserve

(a) The Mara-Shirati Bay Biosphere Reserve (Trans-boundary)

The Mara-Shirati Bay, located in the Mara region (refer figure 1) is important in both flora and fauna. Shirati Bay is found in Mara Region, Tanzania. It is located at an elevation of 1,133 meters above sea level. Its coordinates are 1°9'0" S and 33°58'0" E. This bay is a coastal indentation between two capes or headlands, larger than a cove but smaller than a gulf. The main human activity around this bay is fishing. However, there are other activities which includes livestock keeping, transportation, agriculture and other miscellaneous activities.

The Mara bay is an interesting area having the Mara wetland where a huge expanse of papyrus is found and used extensively by local communities for handcraft making. The wetland is linked to Lake Victoria and is fed by river Mara that starts in Kenya's Aberdare Mountains. The area consists of both riverine and lacustrine systems. The lacustrine system is an ox-bow lake (Lake Kirumi) formed by Mara River which empties its waters into Lake Victoria. Both the ox-bow lake and the river are fringed by macrophytes mainly Cyperus papyrus (Kulindwa, 2006).

The Mara River Basin in Tanzania administratively falls under Mara Province. The land in the area is government-owned and controlled. The economy of the area is hinged on small-scale farming and

fishing, with a majority of its populace relying on wetland products for economic sustenance and wellbeing (Omolo et al, 2018).

(b) **Speke Gulf Biosphere Reserve Zone**

Speke Gulf Bay is located between 2°19'60" S and 33°15'0" E South-Eastern shore of Lake Victoria in Tanzania, 15 kilometres from the Serengeti National Park and 125 kilometres North of Mwanza City (refer figure 1). Speke Bay is coastal indentation between two capes or headlands stretching out along the shores of Lake Victoria. Although the area is an attractive tourist destination, it has crucial ecological functions for nature conservation and key area for social economic activities including tilapia and Nile perch fishing. Increase of human activities has attracted human population influx there by threatening it capacity to offer coastal related ecosystem services.

(c) Mwanza Gulf Biosphere Reserve Zone

Mwanza Gulf is one of the largest gulfs at the southern end of Lake Victoria in Lake Victoria. The gulf extends 60 km southward with an average width of 5 km and a surface area of approximately 500 km2 (refer figure 1). The gulf is famous for its attractiveness and availability of fish. However, the stocks of the indigenous catfish species have decreased dramatically probably due to unsustainable fishing methods and pollution rates.

(d) Emin Pasha Gulf Biosphere Reserve Zone

Emin Pasha Gulf is a bay located at 2°31'60" S and 31°52'0" E in Geita Region, Tanzania (refer figure 1). It is found at an elevation of 1,133 meters above sea level. Like other bays around Lake Victoria Basin, majority of people engage in fishing activities. Other activities include livestock keeping, agriculture, petty business, tourism industries and a bit of transportation using water vessels.

(e) **Kagera-Rubafu Bay Biosphere Reserve (Trans-boundary)**

Rubafu bay is located at 1° 3' 2" S and 31° 49' 55" E in Kagera Region, Tanzania (refer figure 1). It is found at an elevation of 1,200 meters above sea level. Community in the area engage themselves with fishing, agriculture, livestock keeping among others. The coast of Rubafu is vegetated in the north-east and east of Rubafu village.

3.6.3.3. The Zonation of the individual sites

3.6.3..3.1. Emin Pasha Gulf Biosphere Reserve Zone

Core zone: This area includes small wetlands which are protected for fish breeding. Around the area no fishing activities are allowed to take place between January to June every year. The fishing activities are allowed to take place at the deep Lake approximately 500 m from the shore of the gulf. The gulf is surrounded by Papyrus (*cyperus Papyrus*), Bulrush (*Typha domingensis*), Phragmites (*Phragmite mauritianus*), Cyperus digitatus, Aquatic grasses and invasive plant Lantana camara.

The types of fish species found in this biosphere reserve include: *Oreochromis niloticus, Late Protopterus, Amphibious niloticus, Clarias gariepinus, Arius africanuss, Rastrineobola argentea, Brycinus sadleri, Schilbe mystus, Haplochromis nubilus, Synodontis victoriae*

There is water Pumping station at port Nungwe, which supply water to the city, villages and gold mining area (Geita Gold mining). The port also serves as a transportation point where people navigate from Nungwe village to Kagu village (see photo below).

Photo showing the pumping station at the shore of Emin Pasha gulf at Nungwe port

Rubondo Island National Park is also part of core zone. It is legally protected Island National Park. Rubondo Island National Park is one of two Tanzanian national parks located on an island in Lake Victoria (the other being Saanane Island National Park). Rubondo Island became a game reserve in 1965, to provide a sanctuary for animals. Rubondo Island was gazetted as a national park in 1977. Rubondo Island is located in the south-western corner of Lake Victoria, Tanzania. Rubondo Island is about 150 km west of Mwanza (TANAPA, 2020). The main island, Rubondo (2° 18' S, 31° 50' E) is 237 km^2 in size (see figure 3). The island protects another 11 islets, none much larger than 2 km^2. These 10 islands form the Rubondo Island National Park covering an area of 456.8 km^2. The highest point on Rubondo is the Masa Hills in the far south, at an elevation of 1,486m (350m above the level of the lake). The main island measures 28 km from north to south and is 3 to 10 km wide. Rubondo Island is on a rift in the lake. Rubondo essentially consists of a partially submerged rift of four volcanically formed hills, linked by three flatter isthmuses. The Island has no rivers and the soil is volcanic. The habitat is mixed evergreen and semideciduous forest, which covers about 80% of the island's surface area with common species including

- *Croton sylvaticus*, *Drypetes gerrardii*, and *Lecaniodiscus fraxinifolius*, and often with a dense understory of lianas, or woody vines. It also houses Acacia woodland.
- The forest is interspersed with patches of open grassland
- The eastern lakeshore is characterized by rocky areas and sandy beaches whilst the western shore supports extensive papyrus swamps, lined with date palms.

Wild chimpanzees, seven other species were introduced to the island: Roan antelope (*Hippotragus equinus*) and rhinoceros (*Diceros bicornis*) both now extinct, Suni antelope (*Neotragus moschatus*), elephants (Loxodonta africana), twelve giraffes (Giraffa camelopardalis), 20 black-and-white colobus monkeys (*Colobus guereza*), and grey parrots (*Psittacus erithacus*) confiscated from illegal trade. Common native fauna found in the Island include the nervet monkey (Chlorocebus aethiops), sitatunga (Tragelaphus scriptus), hippopotamus, genet and bushbuck (Tragelaphus scriptus).

Approximately over 200 species of indigenous and migrant birds which can be observed either breeding or pass through the Rubondo Island National Park. The Island has an abundance of herons, storks, ibises, egrets, cormorants, kingfishers and birds of prey. However, it is believed that the park has the highest density of fish eagles in the world (Stevens, 2011).

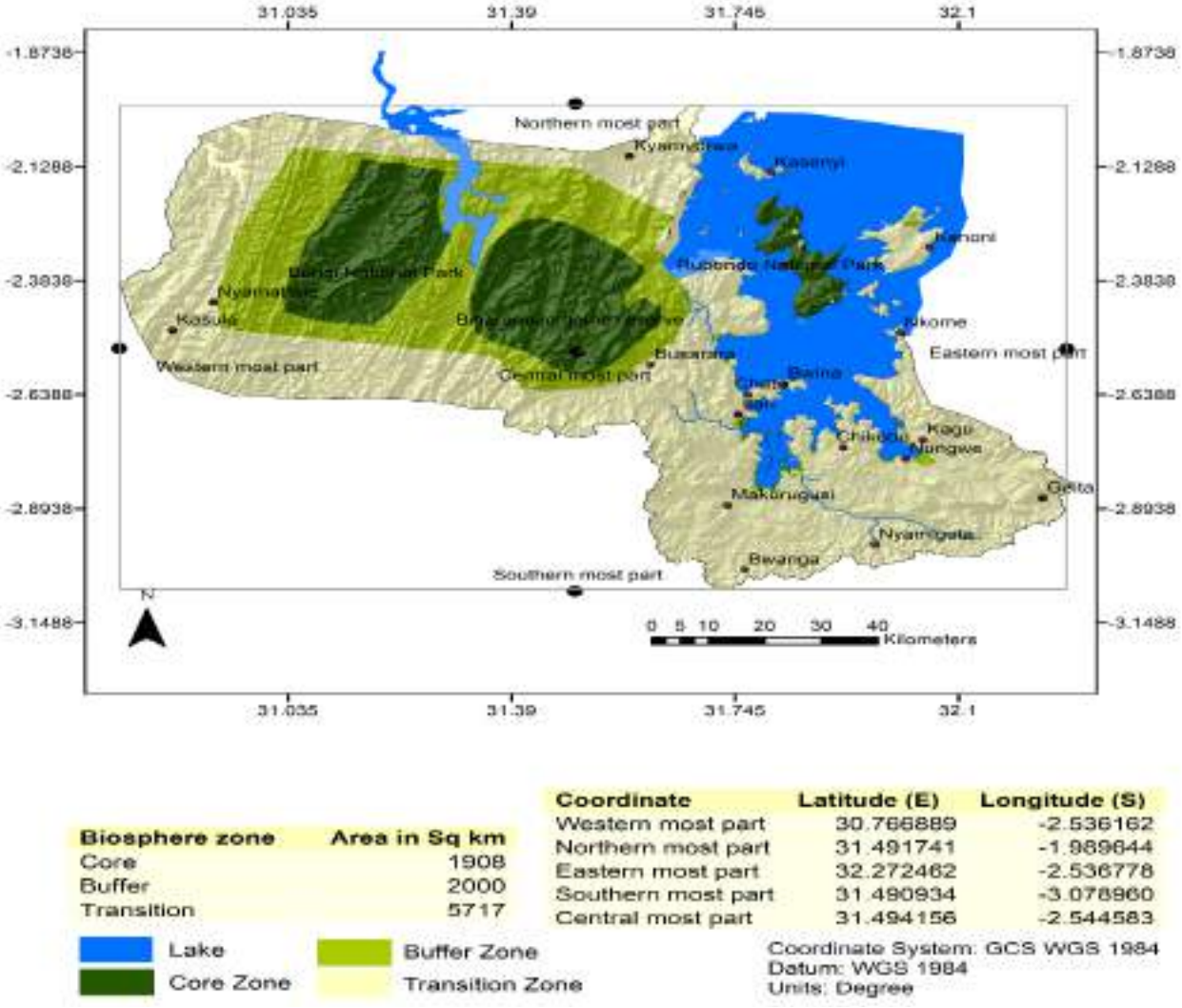
The Biharamulo Game Reserve is found in Tanzania. It was established in 1959. The Biharamulo Game Reserve coves the size of 1,300 square kilometres and shares the ecosystem with the Burigi National Park (see figure 3). In this game reserve, there are attractive Miombo woodland and savannah woodlands that are found in the northern part of the reserve area. This reserve area has common reedbucks, Steinbucks, hippopotamus, and other mammals like elephants, zebras, sables, roans, antelopes, topis, and red colobus monkeys. Common birds at this reserve area are Martial eagles, Sacred ibis, Saddles, and Billed stork (KBA, 2012).

The Burigi National Park is situated close to the border of Lake Victoria, boarder of Rwanda and is surrounded by the wondrous waters of the kagera River and Lake Burigi. One of the special features about the wild life of this park is the presence of one of the largest antelopes of the world the statuesque Cape eland. Burigi - Chato National Park is the typical grasslands of the African Savannah. It also involves the other ecosystems of Rwanda Akagera National Park and Uganda's Kikati game reserve, rangeland is to the north of the Katungo River and the lake Mburo National Park. The National Park has a wide collection of wildlife and some of them are elephant, buffaloes, antelopes, lions, leopards, zebras and giraffes. Some rare species of birds are also found in the Burigi-Chato including fish eagles, papyrus ganolek, and bizarre shoebill stork. The national park extends to the eastern side towards the Kimisi, Ibanda-Kyerwa and Rumanyika-Karagwe National Park Tanzania (TANAPA, 2022).

Buffer zone: It is the zones that includes the outer areas of Biharamulo game reserves and Burigi national park. These are areas close to the cultivated and settlement areas but they are part of the protected area. It also includes areas surrounding small wetlands in the lake shore. In this zone,

restoration of degraded wetlands can take place. The activities to be conducted for restoration of degraded wetlands include afforestation. Part of lake Burigi falls in this zone (see figure 3). The lake is 18 kilometres long and 4 kilometres wide. It has an elongated shape, the greatest distance between the two extremities being about 30 kilometres. Its shores and waters are favored by birds, such as cranes, herons, pelicans, African jacanas, egrets and waders, which find excellent feeding over the large spaces near the extremities and shore line of bays. These are covered with close-packed growths of Pistia stratiotes rigl plants. Kobus ellipsiprymnus and Hippopotamus amphibius frequent the area.

Transition zone: Most of this area is covered by human settlement. The main activities taking place in this zone includes agricultural activities. People in Nungwe village cultivate; Rice, maize, tomato and vegetable. Rice is the dominant agricultural activities in this zone especially in flood areas and along wetlands. Most of the people use animal manure and few of them use artificial fertilizers. South-west part of Burigi National Park in Kasulo village there are forest plantation privately owned mainly pines. The North side of the Reserve areas are villages of Kagera region which are mainly small-scale banana cultivators and pine plantations.



Biosphere zone	Area in Sq km
Core	1908
Buffer	2000
Transition	5717

Coordinate	Latitude (E)	Longitude (S)
Western most part	30.766889	-2.536162
Northern most part	31.491741	-1.989644
Eastern most part	32.272462	-2.536778
Southern most part	31.490934	-3.078960
Central most part	31.494156	-2.544583

Lake
Core Zone
Buffer Zone
Transition Zone

Coordinate System: GCS WGS 1984
Datum: WGS 1984
Units: Degree

Figure 13: The Zonation of Emin Pasha Gulf Biosphere Reserve

3.6.3.3.2 Mara-Shirati Bay Biosphere Reserve

Core zone: This zone includes the small wetlands in the shore of the bay characterized by vegetation which are the fish breeding sites and bird nesting. It is mainly dominated by Papyrus (*cyperus Papyrus*), Bulrush (*Typha domingensis*), Phragmites (*Phragmite mauritianus*), Fern plants, Invasive Eichornia crassipes and Lantana camara and Riverine vegetation.

The main human activities taking place at these areas is fishing. The types of fish species found in this biosphere reserve include: Nile tilapia *(Oreochromis niloticus), Late niloticus,* African lungfish *(Protopterus amphibious,) Labeo victorianus, Clarias gariepinus, Rastrineobola argentea, Brycinus sadleri, and Haplochromis nubilus.*

The inner undisturbed Mara wetland form part of the core zone as well (see figure 4). The wetland is located in the southwest portion of the Mara River Basin, running a length of approximately 55 km down to the outflow into Lake Victoria. The wetland covers an area of around 390 km^2. According to the Mara Wetlands Integrated Management Plan 2017/2018-2021/2022. It spans Butiama, Rorya, Serengeti, and Tarime districts of the Mara region. Although it has no formal protected status, the Mara Wetlands has been designated as part of the worldwide network of "Important Bird and Biodiversity Areas" (IBAs) in recognition of its global biodiversity significance. Mara Bay and Masirori Swamp IBA covers an area of 500 km^2. The wetland system includes floodplain grassland, woodland, swamp, and open water, of which just under half is permanently flooded. It is said to be one of the largest remaining tracts of papyrus swamp in sub-Saharan Africa (MNRT, 2017).

More than 20 plant families are found in the Mara wetlands, which are dominated by papyrus (Cyperus papyrus), Typha (Typha domingensis), and common reed (Phragmites australis). A wide variety of mammals is permanently or seasonally resident, including hippopotamus (Hippopotamus amphibious), sitatunga (Tragelaphus spekii), olive baboon (Papio anubis), and vervet monkey (Cercopithecus aethiops). A population of Nile crocodiles (Crocodilus niloticus) also inhabits the swamp and rivers. Some 226 bird species have been recorded, including the endangered Grey-crowned Crane (Balearica regulorum) and Grey Parrot (Psittacus erithacus) and the vulnerable Shoebill (Balaeniceps rex), Woolly necked Stork (Ciconia episcopus), Martial Eagle (Polemaetus bellicosus), and Papyrus yellow warbler (Calamonastides gracilirostris). The wetland hosts 14 species of fish, of which the catfish (Clarias sp.), African lung fish (Protopterus sp.), and Nile tilapia (Oreochromis nilotica) are important for local fisheries production (Omolo etal., 2018).

The Mara wetland, natural ecosystem plays a critical hydrological role, regulating the quality and flow of water into Lake Victoria. As well as serving as a groundwater recharge zone, swamps and flooded grasslands retain water and slow down flow, thereby helping to maintain water supplies throughout the dry season and minimize flooding in the wet season. They also provide nutrient cycling and water purification functions, trapping silts and sediments, and absorbing and processing nitrogen and phosphorus loads from surrounding (and upstream) settlements and farms. Woodlands,

grasslands, and swamp vegetation also contribute importantly to carbon sequestration and storage. Although as yet undeveloped, the wetland landscape hosts a small amount of tourism, mainly linked to birdwatching, wildlife viewing, and local cultural experiences.

Buffer zone: Secondary wetlands, the degraded wetlands play the major role to protect the primary Mara wetland as the core zone (see figure 4). It also includes the dryland areas contain a mosaic of mixed woodland and shrub land, interspersed with crops and pasture. The extent and composition of the wetland varies on a seasonal basis and over time. The flooded area expands and contracts each year in line with the two rainy seasons (September-December and March-June). Over the last 30 years, the wetland has more than doubled in size, into areas previously occupied by shrub land and grassland.

Transition zone: Most of this area is covered by human settlement and natural forest. The main activities taking place in this zone includes fishing activities in large scale. People in Sota and Shirati villages cultivate; Rice, maize and vegetable but in small scale. Livestock keeping is also taking place in this zone. Lantana camara dominate in this zone and act as a refuge of snakes, birds and insects.

The Mara Wetlands Integrated Management Plan lists 20 villages that surround the Mara Wetlands; applying population figures and growth rates specified in the 2012 Population and Housing Census, these contain around 64,000 people. Community livelihoods are based on smallholder farming and fishing, and most people also depend heavily on wetland products for their economic survival and well-being. Woodlands, wetlands, and grasslands provide a source of water, fish, fuel, construction materials, fodder, medicinal plants, honey, wild foods, and raw materials for making crafts. These goods and services are particularly important, given the high incidence of rural poverty, scarcity of potable water, and persistent food deficits within the wetland-adjacent area. In addition to yielding an affordable and accessible source of products for subsistence and income, seasonally flooded parts of the wetland provide fertile soils for crop farming and livestock pasture.

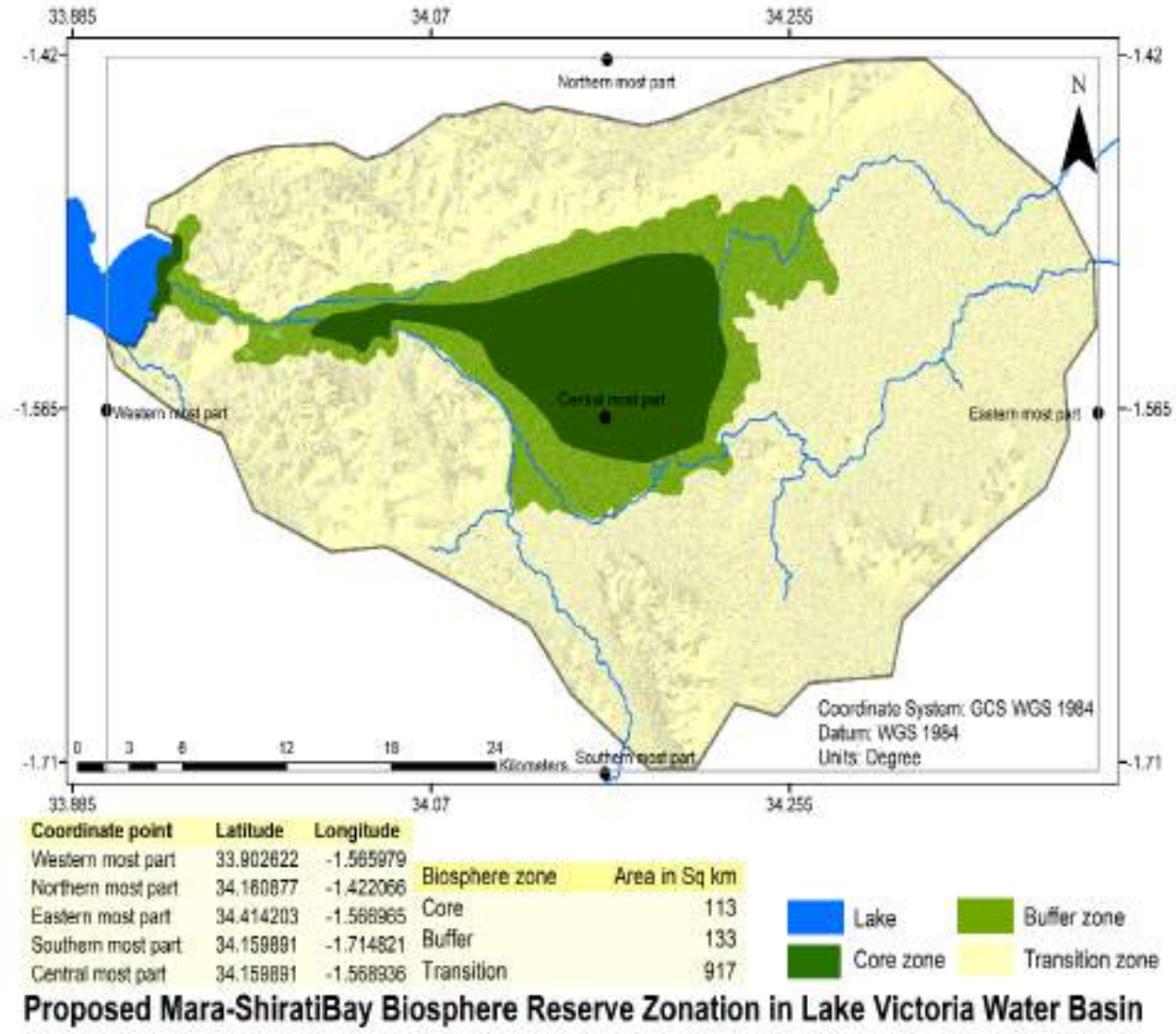


Figure 14: Proposed Mara Shirati Bay Biosphere Reserve zonation

Consultant, Dr Amina (second right, with cap|) consulting the Chairman of Shirati Community.

3.6.3.3.3. Kagera-Rubafu Bay Biosphere Reserve

Core zone: The zone contains the Rubafu wetland which is covered by grass land where Dosiye (National bird of Uganda) live and obtain their food. Three fish breeding sites are protected in this zone; Mashanga-chiziba near Uganda, Mwiga and Kibale. Fishing activities also takes place in this zone with fish species like *Oreochromis niloticus, Labeo victorianus, Late niloticus, Protopterus amphibious,s Clarias gariepinus, Rastrineobola argentea, Brycinus sadleri, and Haplochromis nubilus.*

Minziro nature forest reserve also forms the core zone, legally protected. Minziro Nature Forest Reserve (MNFR), which covers 25,717 ha and has a boundary length of 80 km, is the largest forested area in northwestern Tanzania. MNFR is located in Missenyi District in Kagera Region, approximately 20 km from Lake Victoria. The northern boundary lies along the Tanzania-Uganda border, the southern and eastern boundary along the Kagera River and to the west lies a tarmac road to Uganda. Minziro plays an important role in the Kagera River floodplain ecosystem (Platts, 2017). The area is generally flat, with an altitude ranging from 1,125 – 1,140 m a.s.l. One small rocky outcrop, Kere Hill, lies at 1,180 m. The mean annual rainfall is approximately 800 mm per year, with

the long rains falling in mid-March to May and the short rains in October to November. Temperatures range between 26.9°C in February and 16.3°C in July. Approximately 37,500 people (9,000 households) live in eight villages adjacent to MNFR. MNFR and the adjacent villages, the Minziro swamp forest landscape has been designated as part of the worldwide network of "Important Bird and Biodiversity Areas". Together with the Sango Bay-Musambwa Island-Kagera Wetland Ramsar Site in south-western Uganda, the areas form an important transboundary conservation site. Minziro was first designated a Forest Reserve in 1947 and re-gazetted in 2016 as MNFR (MNRT, 2017a).

Three quarters of the MNFR area can be classified as Baikiaea-Podocarpus seasonal swamp forest. The remainder consists of extensive grasslands, flooded Acacia woodlands and stands of Papyrus (Cyperus papyrus) along the Kagera River. The grasslands provide an important wintering habitat for birds. Common tree and shrub species in the Minziro nature forest reserve include *Baikiaea insignis*, Afrocarpus dawei, Warburgia ugandensis, Syzygium guineense, Mimusops bagshwawei, Beilschmiedia ugandensis, Manilkara obovata, Syzygium cordatum, Maesopsis eminii, Sapium ellipticum and Gardenia imperialis. Coffea canephora, commonly known as robusta coffee, occurs naturally in Minziro.

Minziro nature forest reserve supports a wealth of biodiversity and a number of site endemic species. 250 bird species from Minziro, of which 56 are restricted to the Guinea-Congo biome and unknown elsewhere else in Tanzania. 96 of the bird species are forest dependent specialists. Bird species recorded in Minziro include: Blue Swallow (Vulnerable), Forest Francolin (Least Concern), Great Blue Turaco, Bluebreasted Kingfisher, Blue-breasted Bee-eater, Western Nicator, Isabelline Shrike and Western Oriole. An impressive 600 butterfly species have been recorded in the forest and are abundant from June – September. Primate species that are found in the reserve include the Red-Tailed Monkey, the Grey-cheeked mangabey and Thomas's dwarf galago. The Western Tree Hyrax has also been sighted (Platts, 2017).

The forests of Minziro are threatened by over-harvesting of forest products including fuelwood, timber (including for Podocarpus and Maesopsis eminii), construction materials, medicinal plants and bushmeat. Livestock grazing is also a key threat to the reserve, including burning for pasture. Conversion of forest to cropland is also a threat to the forest. Two mammals which are Thomas' galago (Galagoides thomasi) and Grey-cheeked mangabey (Lophocebus albigena) are not found elsewhere in the country. Minziro is the only locality in Tanzania where these primates have been recorded. Other rare fauna is a Viper snake (Rhinoceros Viper). The reserve also contains significant number of Guinea-Congo biome restricted bird species. Of 278 species of birds found in Guinea-Congo biome, 58 occur in Tanzania. Out of 245 bird species recorded in the reserve, 58 bird species are not found outside Kagera Region in Tanzania, but more interesting, 56 of these are only found in Minziro nature forest reserve. The richness of flora and fauna of Minziro nature forest reserve makes it one a potential site for tourism in Kagera Region (TFS, 2022).

MNFR adjoins the Sango Bay landscape in southwestern Uganda. Together, the two sites form a cross-border biodiversity conservation area of immense regional and global significance. The importance taking a concerted, coordinated approach to conserving this valuable transboundary ecosystem cannot be stressed too highly (MNRT, 2017a).

Buffer Zone: The degraded wetlandof the Rubafu bay cover the part of this zone. These seasonally flooded wetlands have a potential for re afforestation. There are no agricultural activities taking place in this zone however they are prone to encroachment if they are not conserved. The degraded and encroached areas of the Minziro Nature Forest Reserve are included in this zone for which they can be rehabilitated and form a buffer to the core forest areas. The wetlands on the eastern side of the MNFR also form part of this zone which is dominated by grassland.

Transition Zone: This zone is surrounded by human settlement, banana, cassava and coffee canephora (wild coffee). Moreover, this zone is covered by forest plantation mainly pines privately owned. In general, people's livelihoods in the forest-adjacent area are based on smallholder farming, and almost all of the local population depend heavily on natural resources and ecosystem services for their economic survival and well-being. Forests, wetlands, and grasslands provide a source of water, fish, fuel, construction materials, grass for grazing and mulching, medicinal plants, honey, wild foods, and raw materials for crafts.

Photo showing the Rubafu bay grasslands and cultivated area which forms Transition zone

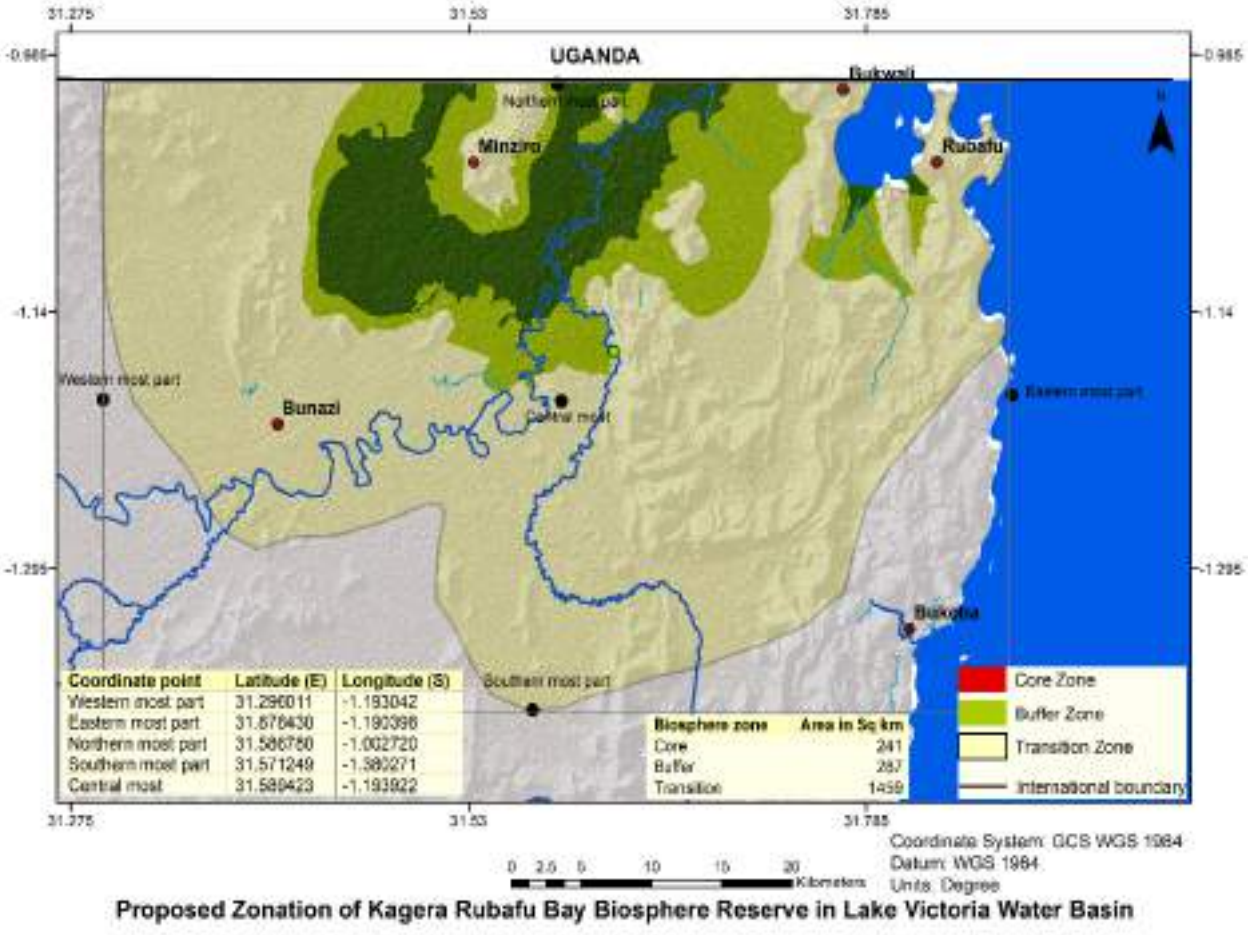


Figure 15: Proposed Kagera Rubafu Bay Biosphere Reserve zonation

3.6.3.3..4 Speke Gulf Biosphere Reserve Zone

Core zone: This zone comprises of small wetlands in the shore of the gulf and is dominated by Papyrus (*cyperus Papyrus*), Typha (*Typha domingensis*), Cyperus digitatus Phragmites (*Phragmite mauritianus*), Aquatic acacia, Eichornia crassipes and Lantana camara. The giant bird-Wooly necked stork (Ciconia episcopus) is also found in this area.

The main activities taking place in this zone is, fishing mainly *Oreochromis niloticus, Late niloticus, Protopterus amphibious*, *Clarias gariepinus, Arius africanus, Rastrineobola argentea, Brycinus sadleri, Schilbe mystus, Haplochromis nubilus, Synodontis Victoria and, Labeo victorianus*

Core area also includes the undisturbed inner part of the Serengeti National Park and the small wetlands found within the park (see figure 6). The Speke Gulf Biosphere Reserve receives water from Grumeti and Mbalanget River which originate from the national park. These Rivers may be the source of non-point pollution on this gulf including siltation or sedimentation.

Serengeti is one of Africa's most complex and least disturbed ecosystems, alternating between dusty summer drought to green winter and spring lushness. Its centre is savanna with scattered acacia; in

the south are wide open shortgrass plains; in the west and north are thorn wood long grasslands, along the rivers, gallery forest and in the hilly western corridor extensive woods and black clay pans.

Short grass is the major vegetation on the open plains which become almost desert during severe drought and are prone to wildfires, which the short grass can tolerate. This is the major wet season habitat of the migrating ungulates. Dominant species are couchgrass *Digitaria macroblephara*, *Sporobolus marginatus* and *S. kentrophyllus* indicators of overgrazed and saline soils. The invasive poisonous Mexican poppy *Argemone mexicana* may be starting to spread from Ngorongoro (IUCN, 2002). In wetter areas there are sedges such as *Kyllinga nervosa*. There is extensive acacia woodland savanna in the centre stretching east from Ikoma and some gallery forest along the rivers. Lowland woodlands include *Commiphora africana*, whistling thorn *Acacia drepanolobium*, *A. gerrardii* and *Balanites aegyptiaca.* Upland woodlands are of red thorn *Acacia lahai* and gum acacia *A. seyal* (IUCN, 2017).

The Serengeti is home to the world's largest populations of Wildebeest, Zebra, Cape Eland, Lion, Cheetah, Hyena and Gazelles. The great wildebeest migration of over 1.3 million accompanied by large numbers of zebra, and smaller numbers of Grant's & Thomson's gazelle, eland and impala with an annual pattern seeking fresh grazing and water. Serengeti has the highest concentration of carnivores especially all the big African cats such as Lions, Leopards, Cheetah and Spotted Hyena. Serengeti has more than 28 species of herbivores including buffalos, wildebeest, zebras, elands, hippos and waterbucks. Serengeti is one of the last remaining sanctuaries for critically endangered Black rhino (Diceros bicornis michaeli) as well as endangered African hunting dog. With more than 530 species recorded one quarter being those migrating from other parts of the world, the park forms an ecological important bird area. Some of the species commonly seen are European and Abdim's storks, Eurasian Roller, Barn Swallows, Fish & Martial Eagles among others (TANAPA, 2020).

Buffer zone: The degraded wetland areas in the shore of the gulf which are potential for rehabilitation and acts as buffer to the adjacent settlement areas. It also includes area surrounding the Serengeti National Park that are prone to encroachment and some are degraded with potential for re-afforestation. The area is part of the Serengeti national park which has potential for research and tourism (see figure 6).

Transition zone:
The areas around the shore are dominated by small scale agriculture mainly rice, vegetables, maize among others, fishing activities and general trade. Serengeti is home to many cultures from the famous tribes of Maasai, Sukuma, Kurya and Ikoma. The main activities of the communities surrounding the National Park is livestock keeping, which pose threat to the park due to encroachment and overgrazing.

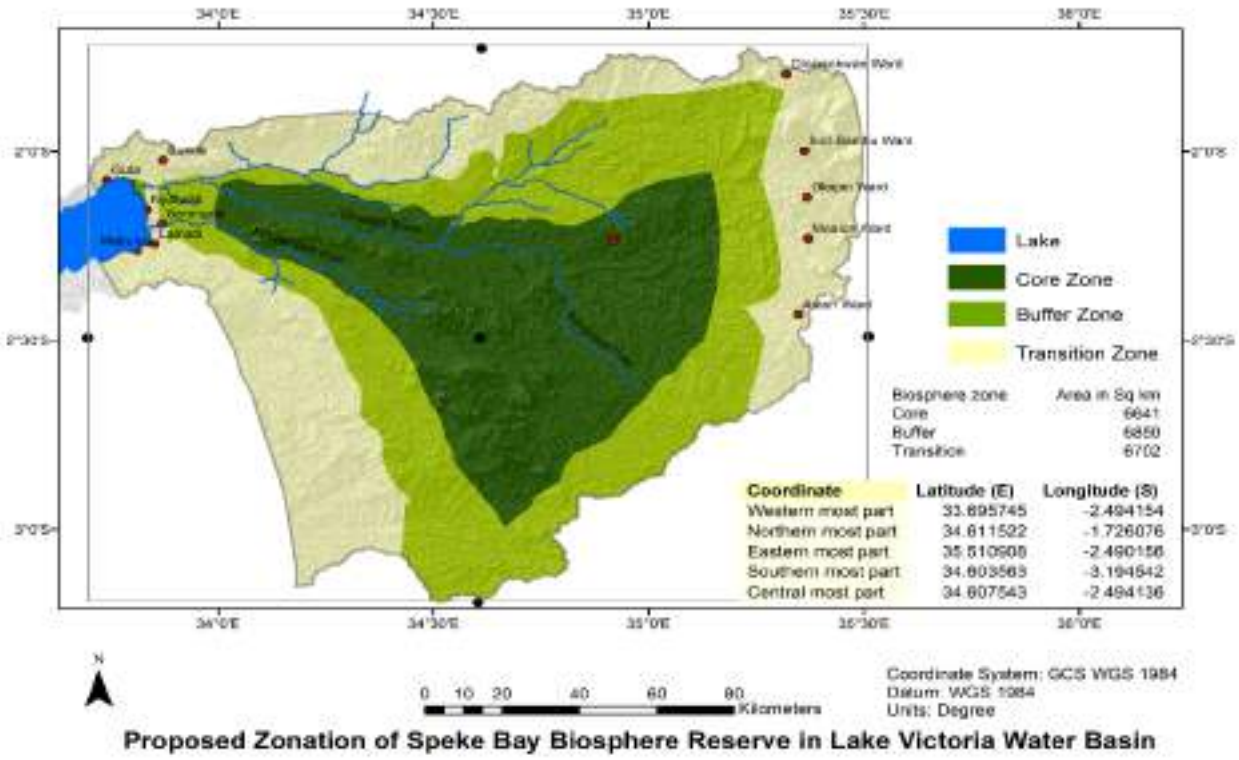


Figure 16: Proposed Speke Gulf Biosphere Reserve zonation

The Consultant, Dr Amina (seated, left, second right, right picture) with residents of Speke Gulf

3.6.3.3.5 Mwanza Gulf Biosphere Reserve Zone

Core zone: This area is mainly the small wetlands along the gulf. It is dominated by Papyrus (cyperus Papyrus) , Bulrush (Typha domingensis), Phragmites (Phragmite mauritianus), Cyperus digitatus, Eichornia crassipes, Flooded acacia woodlands and grassland. The giant bird-Wooly necked stork (Ciconia episcopus) is also present in this area.

The dominant activities surrounding this zone are fishing activities. The fish species found in this zone includes: *Oreochromis niloticus, Late niloticus, Protopterus amphibious and Rastrineobola argentea.* Fishing activities are prohibited in this area for 6 months every year starting January to June.

Buffer zone: The degraded wetlands area surrounding the core area. It has similar plant species as the core area only that it is not dense as in core area (see figure 7).

Transition zone: This zone is totally dominated by human settlement. In this zone most of the dominant activities are agriculture activities and human settlement. People in Rushamba village similar to other villages along the gulf cultivate maize, cassava and sweet potatoes in small scale farms. This zone is also dominated by Lantana camara and natural forest in the hills.

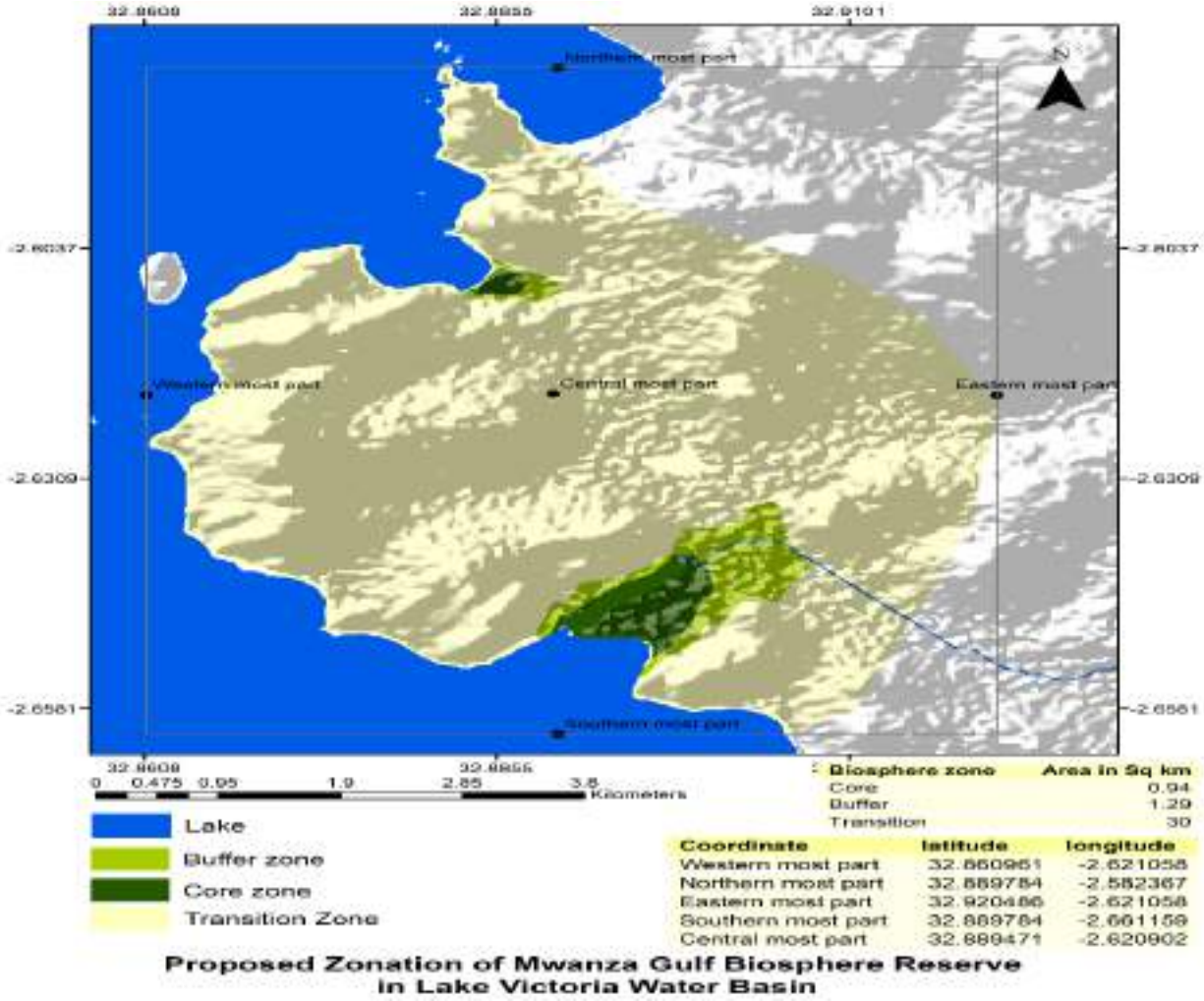


Figure 17: Proposed Zonation of Mwanza Gulf Biosphere Resrve.

Settlements on the hills overlooking Lake Victoria, part of the Transitional Zone in Mwanza

3.6.4. Rwanda: Biosphere Reserve Sites as part of the Transboundary Biosphere Reserve.

1.0. Methodology

During this project observation method has adopted as main and important method to use during surveying activities.

The following steps have used by Consultant during preparation for the planning process:

- Reconnaissance,
- Carry out field inspection, verify information and validation ,
- Gather all existing information on ground
- Providing details topographic map

GIS model has used during this services and active involvement of all stakeholders in the formulation of development policies and strategies and in the analysis, planning and details topographic map.

1.1 Site Surveys:

1. Details topographic survey on site,
2. Historical background on interested site,

1.2 Data Sources:

- Topographic data from topographic survey,
- National Land Use & Development Master Plan (NLUDMP) 2022-2050,
- Capturing of Aerial photography
- Rwanda Basemap

1.3 Softwares Used:

- ArcG I S Pro for analyzing and demonstrating the site plans of different purpose requirement and also to make buffer zone map, providing current ortho image through ArcGIS Online;
- Auto CAD2018&CAVADIS16 has used in the topographic surveying reporting to make details topographic map and mapping of existing features;
- Terravision 3D 3.0 for 3D visualization and exporting Topographic details;
- ERDAS IMAGINE 9.2.2 for image visualization and interpretation, classification also change detection;
- Excel used in data management and in the reporting;
- Microsoft word has used in writing and combining the layout from other softwares.

2.0. Details of instrument used on field

The survey operations have conducted in the WGS 84 Spheroid, Projected Coordinate System, based on the geodetic parameters presented below. All co-ordinates quoted within this document are with reference to it.

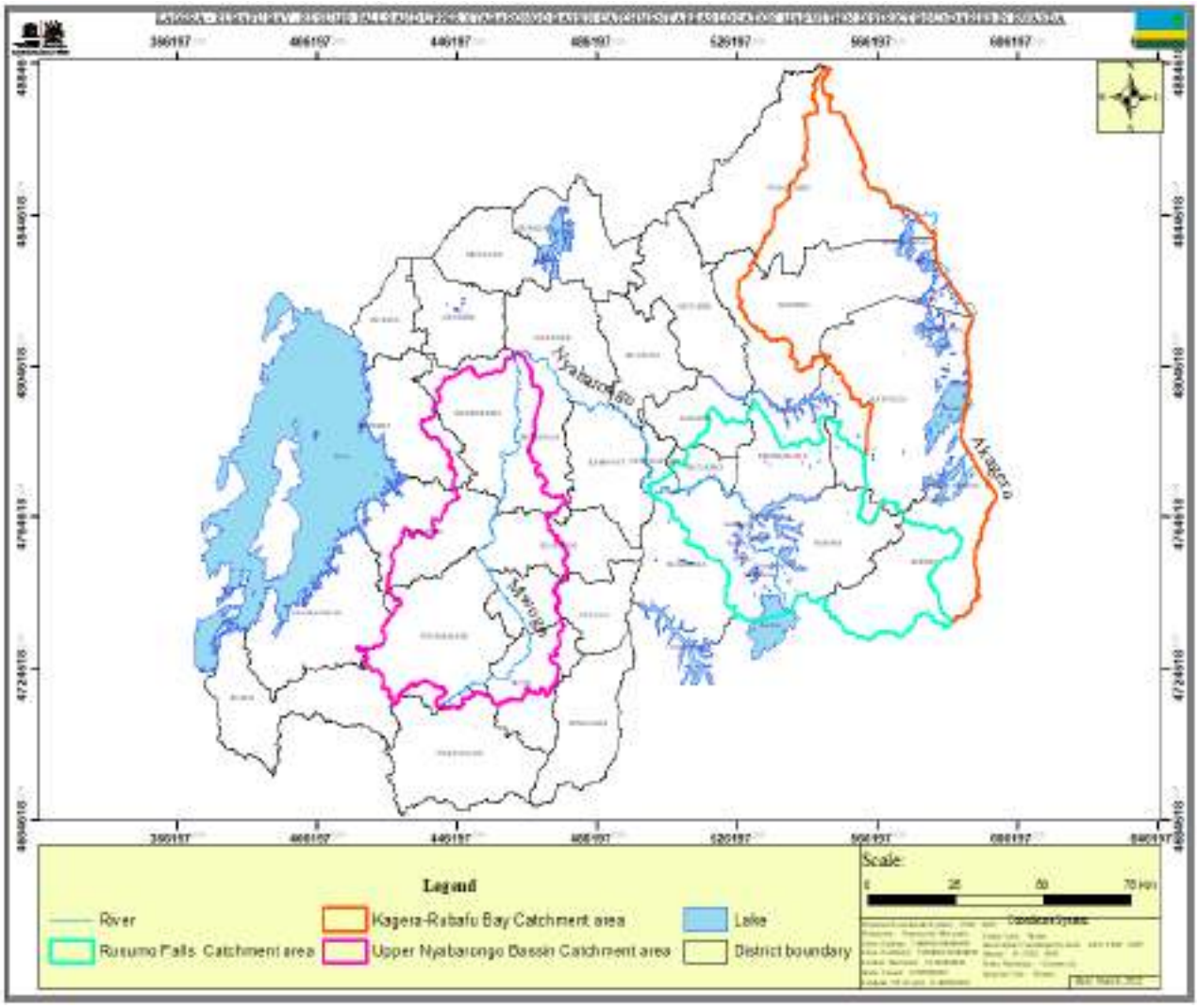
Grid projection	ITRF_2005
False Easting	500000m
False Northing	5000000m
Central Meridian	30^0 E
Scale Factor	0.9999
Latitude of Origin	0^0 Equator
Linear Unit	Meter
Spheroid	**WGS 84 (Datum)**
Semi major Axis (a)	6378137m
Semi minor Axis (b)	6356752.314140356m
Inverse Flattening (1/f)	298.257222101

2.1. Survey Computations

For modern survey techniques these are electronically recorded and computed producing coordinates in a format that can be plotted in any GIS environment and CAD software. Collected data has computed through Rwandageonet with CORS System under user name of **Eng.JeanPierre** and made it post processing.

2.2 Location of targeted Sites

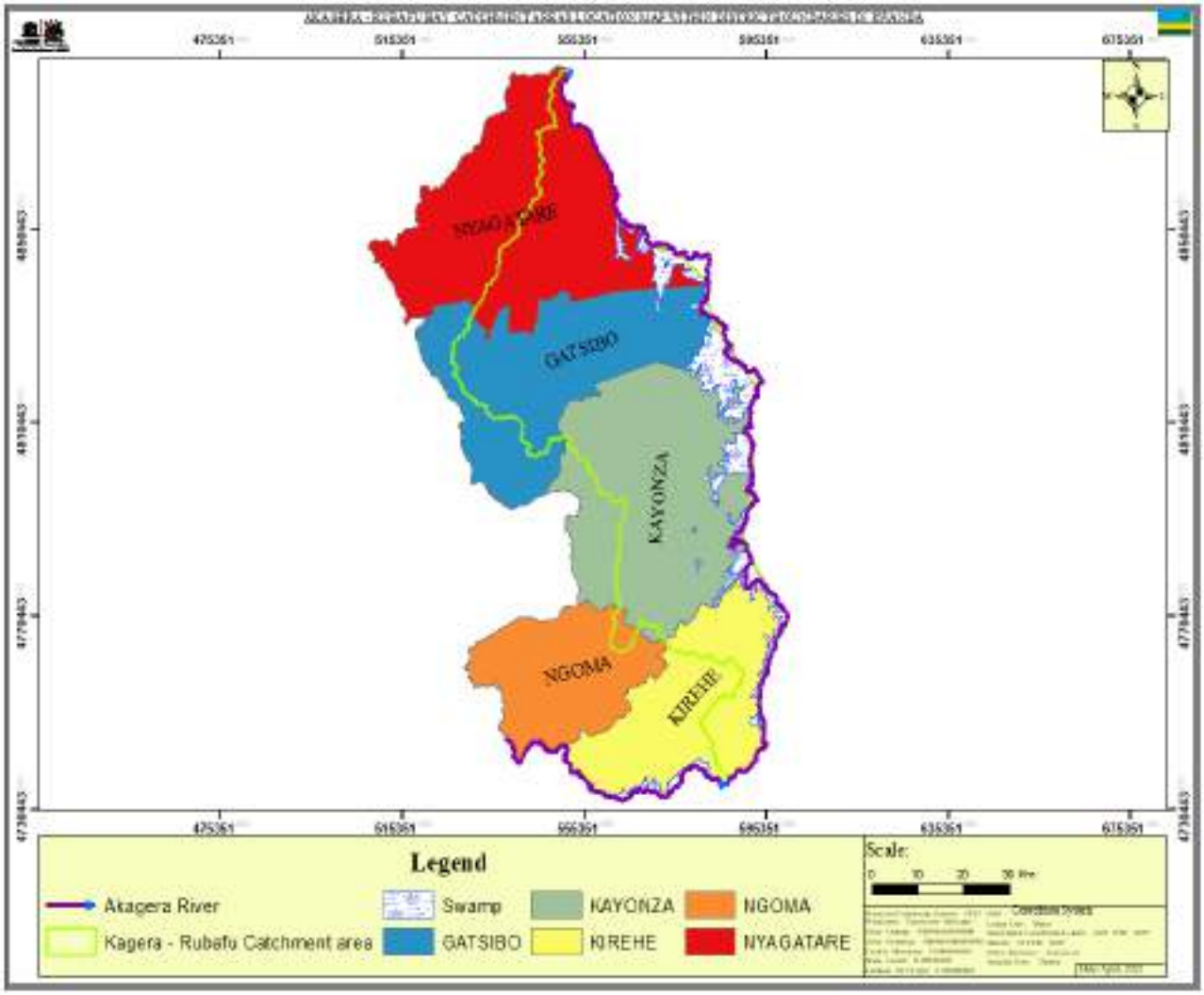
As it shown in the following map, targeted site is locating in some districts of Kigali City, Eastern Province, Western Province and Southern Province about 18 Districts as Nyarugenge District, Gasabo District, Kicukiro District, Rwamagana District, Kayonza District, Kirehe District, Ngomba District, Nyagatare District , Bugesera District, Gatsibo District, Nyanza District, Huye District, Nyamagabe District, Ruhango District, Muhanga District, Karongi District, Rutsiro District and Ngororero District and developed along Mwogo River, Upper Nyabarongo Bassin along Nyabarongo River for one hand and Akagera river to the other hand.



Map 9: Location map of targeted sites

3.6.4.1. Akagera - Rubafu Bay Biosphere Reserve

The Akagera River is spreading over Burundi, Rwanda, Tanzania and Uganda with catchment area of 4,294 km^2 on side of Rwanda along Lower Akagera River passing to the Kirehe, Ngoma, Kayonza, Gatsibo and Nyagatare Districts in Eastern Province of Rwanda also crossing Akagera National Park to Uganda as it shown in the following map.



Map 10: Catchment area of Akagera – Rubafu Bay

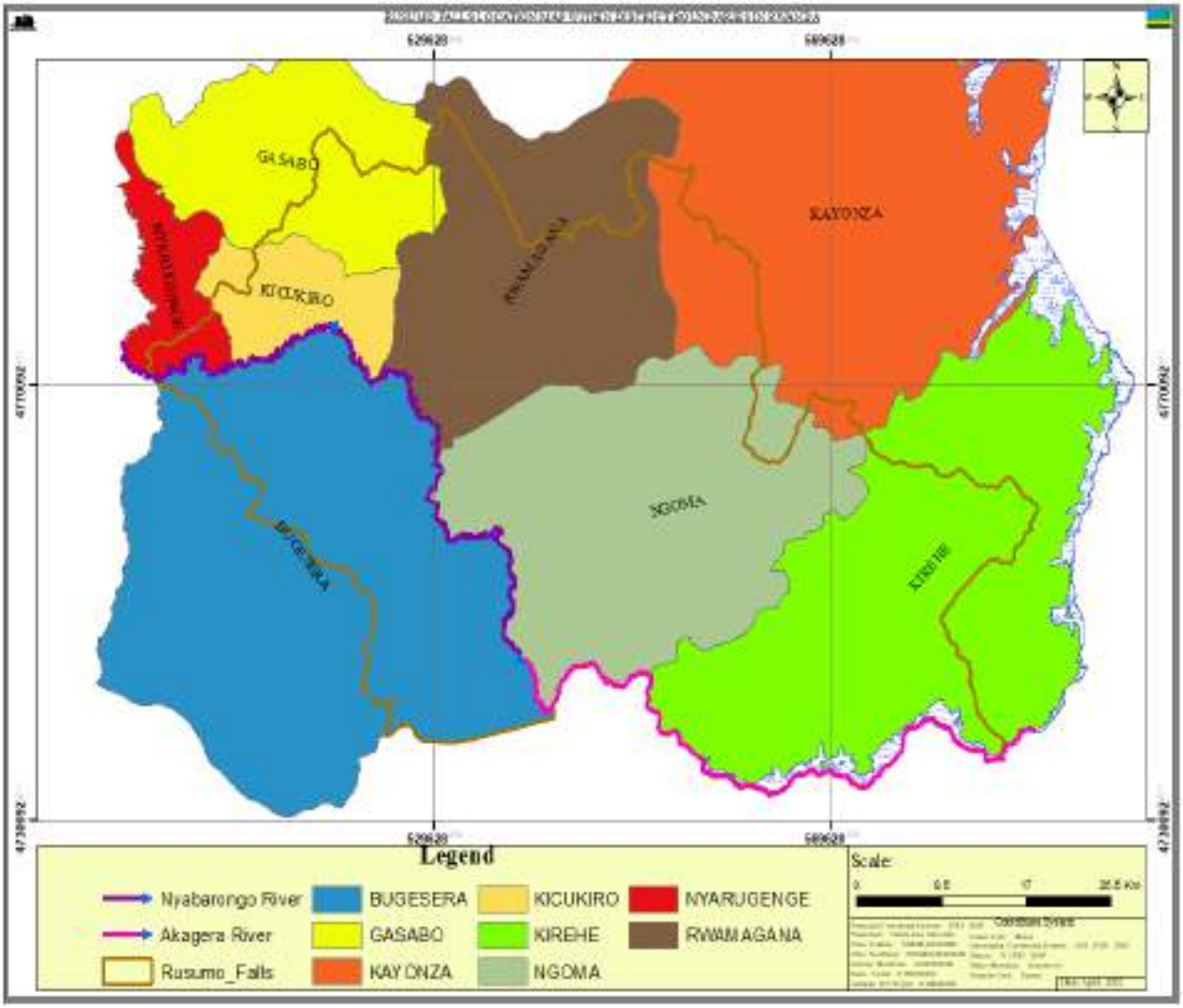
As it has shown in the figure 2, Akagera – Rubafu Bay passing along Kirehe, Ngoma, Kayonza, Gatsibo and Nyagatare Districts with maximum height of 1850m and 1300m of minimum height at average height of 1516.98m from Mean Sea Level.

The following map showing Akagera –Rubafu bay side of Rwanda on Ortho Image within the boundaries of the district it is passing through.

Figure 20: Ortho image of Akagera – Rubafu Bay

3.6.4.2. Rusumo Falls Biosphere Reserve

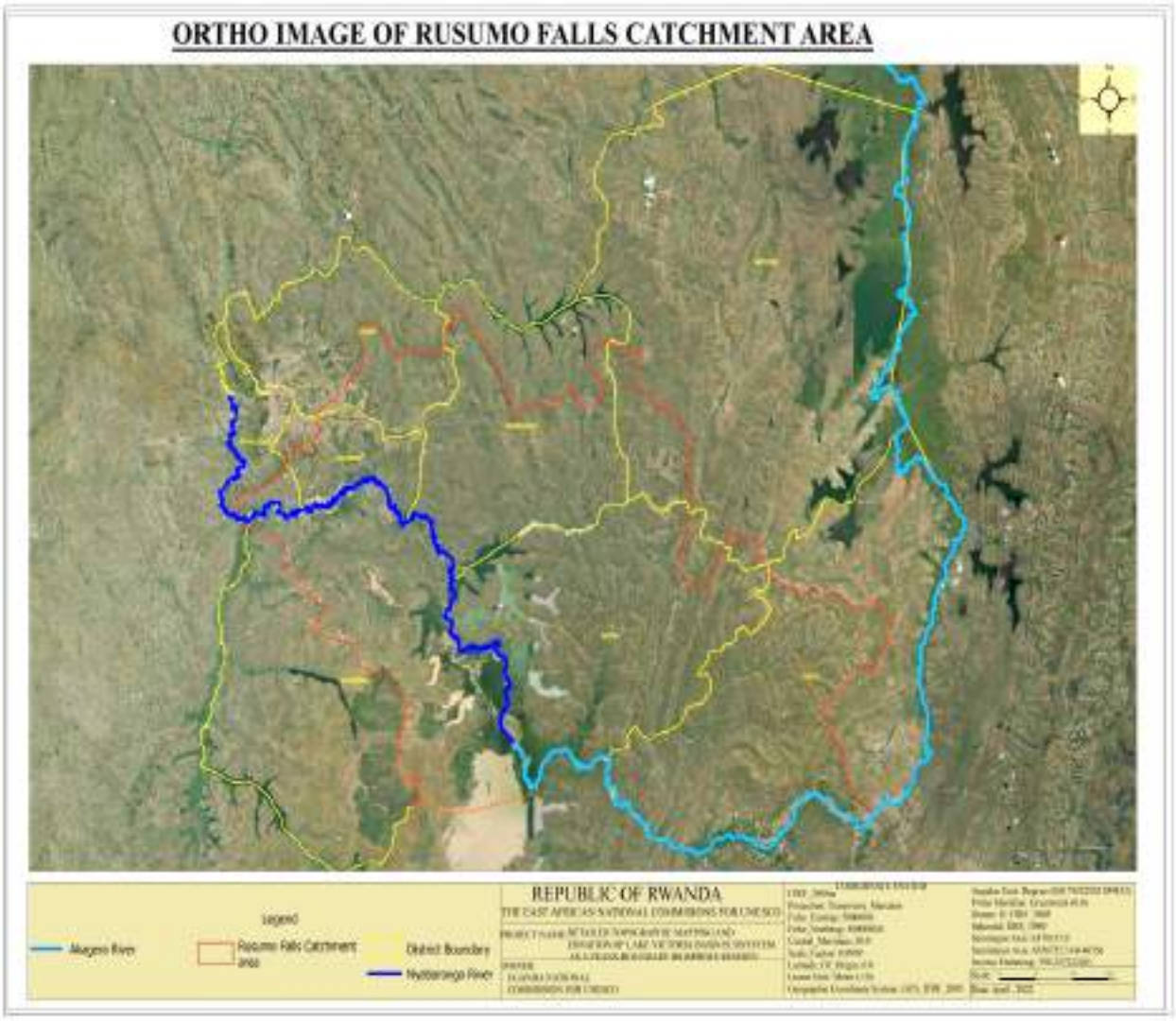
Rusumo falls located at two head-streams of Ruvubu from Burundi and Nyabarongo in Rwanda converge close to Rwanda/Tanzania border, from where River Akagera flows North into the border with Uganda and having catchment area of 3056 km^2.



Map 11: Catchment area of Rusumo Falls

As it has shown in the figure 4, Rusumo Falls passing along Bugesera, Gasabo, Kayonza, Kicukiro and Kirehe, Ngoma, Nyarugenge and Rwamagana Districts with maximum height of 1850m and 1350m of minimum height at average height of 1516.35m from Mean Sea Level.

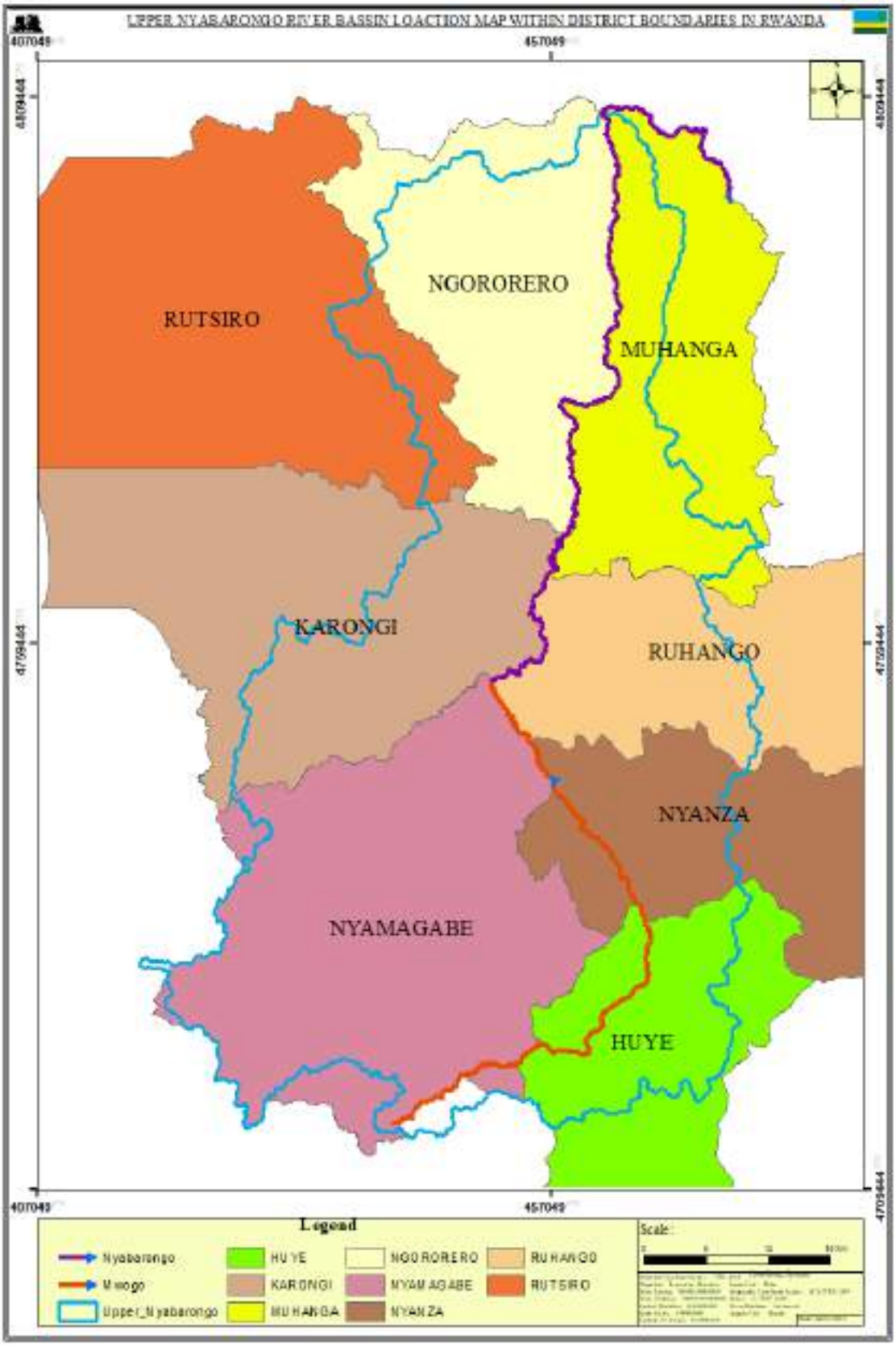
The following map showing Rusumo Falls side of Rwanda on Ortho Image within the boundaries of the district it is passing through.



Map 12: Ortho image of Rusumo Falls

3.6.4.3. Upper Nyabarongo river bassin Biosphere Reserve

Upper Nyabarongo river basin specifically cover Upper Nyabarongo region starting from Mwogo River continue to the part of Nyabarongo with Catchment area of 3348 km^2.



Map 13: Location map of Upper Nyabarongo river bassin

As it has shown in the figure 6, Upper Nyabarongo River Bassin passing along Ngororero, Muhanga, Rutsiro, Karongi, Ruhango Nyanza, Nyamagabe and Huye Districts with maximum height of 2700m and 1450m of minimum height at average height of 1983.77m from Mean Sea Level. The following map showing Upper Nyabarongo river bassin side of Rwanda on Ortho Image within the boundaries of the district it is passing through.

Figure 20: Ortho image of Upper Nyabarongo river basin

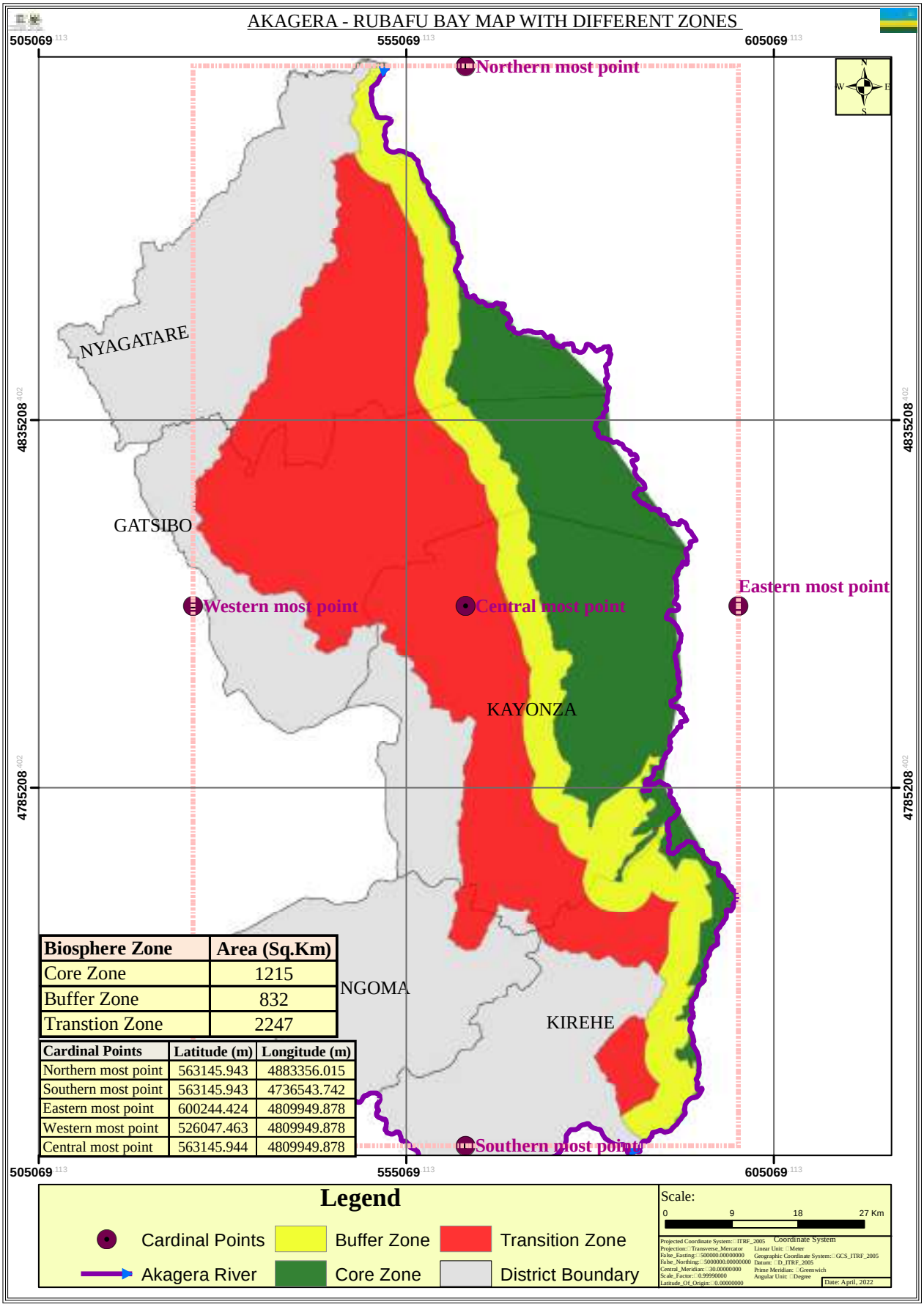
3.6.4.4. Detailed Topographic Survey

3.6.4.4.1. Akagera - Rubafu Bay Biosphere Reserve

As it is shown in contour map in Annex 1 maximum height of 1850m and 1300m of minimum height at average height of 1516.98m from Mean Sea Level. Surveying activities from the field has shown that in that region there are 3 Cultural Sites, 129 Education facilities, 68 Health facilities, 11 Religious facilities, 4 sites for Sport facilities, 8 sites for tourism facilities, 22 trade centers, 5 Electric substations and 3 Electric Station including Rusumo falls hydro power plant those infrastructures have been presented in Annex 2. Annex 3 and Annex 4 of this report shows well Akagera-Rubafu Bay Biosphere reserve zones with Cardinal points as stated in the following tables:

Biosphere Zone	Area (Sq.Km)	
Core Zone	1215	
Buffer Zone	832	
Transition Zone	2247	
Cardinal Points	**Latitude (m)**	**Longitude (m)**
Northern most point	563145.943	4883356.015
Southern most point	563145.943	4736543.742
Eastern most point	600244.424	4809949.878
Western most point	526047.463	4809949.878
Central most point	563145.944	4809949.878

And different land use land cover within said site.

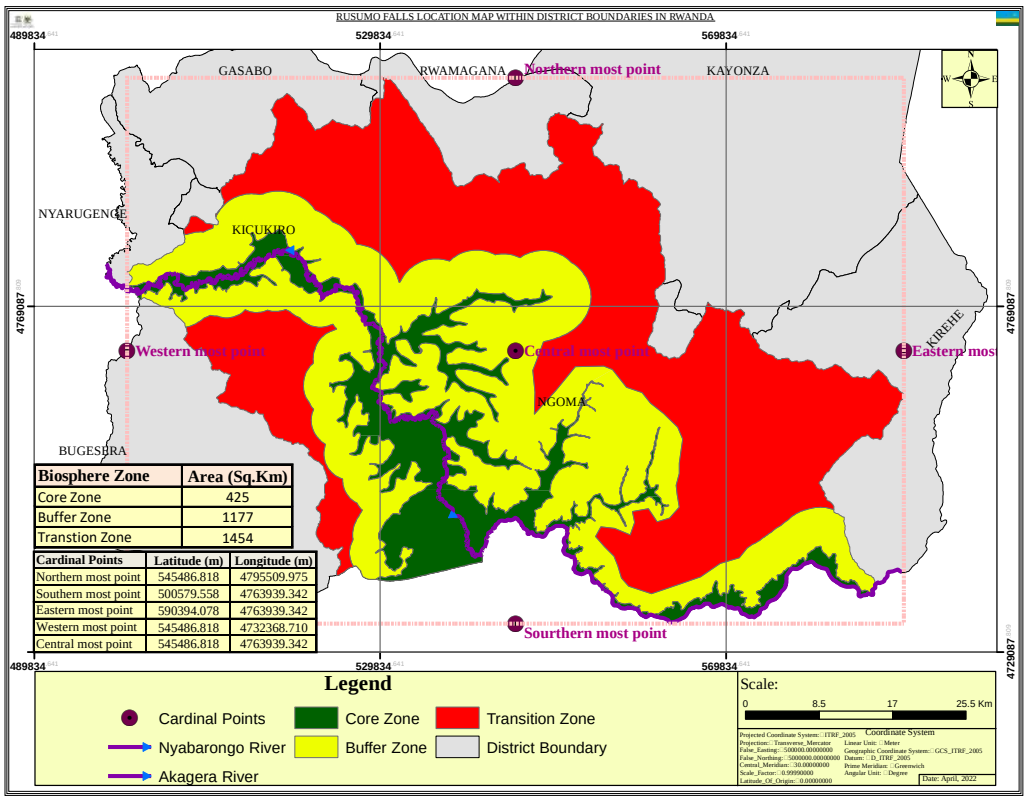

AKAGERA - RUBAFU BAY MAP WITH DIFFERENT ZONES
505069
555069
605069
4835208
4785208
Northern most point
Western most point
Central most point
Eastern most point
Southern most point
NYAGATARE
GATSIBO
KAYONZA
NGOMA
KIREHE
Biosphere Zone | Area (Sq.Km)
Core Zone | 1215
Buffer Zone | 832
Transtion Zone | 2247
Cardinal Points | Latitude (m) | Longitude (m)
Northern most point | 563145.943 | 4883356.015
Southern most point | 563145.943 | 4736543.742
Eastern most point | 600244.424 | 4809949.878
Western most point | 526047.463 | 4809949.878
Central most point | 563145.944 | 4809949.878
Legend
Cardinal Points
Buffer Zone
Transition Zone
Akagera River
Core Zone
District Boundary
Scale:
0 9 18 27 Km
Coordinate System
Date: April, 2022

3.6.4.4.2. Rusumo Falls Biosphere reserve

From Annex 6 showing contour map, Rusumo Falls Biosphere reserve has maximum height of 1850m and 1350m of minimum height at average height of 1516.35m from Mean Sea Level. Reference to Annex 7, within different zones there are 2 Cultural sites, 391 Educations Facilities, 21 religious facilities, 31 trade centers, 25 tourism sites and 5 Electric stations. Also Annex 8 shows land use, land cover within Rusumo Falls Biosphere reserve and Annex 9 presents Rusumo falls biosphere reserve different zone with Cardinal points as the following tables expressed:

Biosphere Zone	Area (Sq.Km)
Core Zone	425
Buffer Zone	1177
Transition Zone	1454

Cardinal Points	Latitude (m)	Longitude (m)
Northern most point	545486.818	4795509.975
Southern most point	500579.558	4763939.342
Eastern most point	590394.078	4763939.342
Western most point	545486.818	4732368.710
Central most point	545486.818	4763939.342

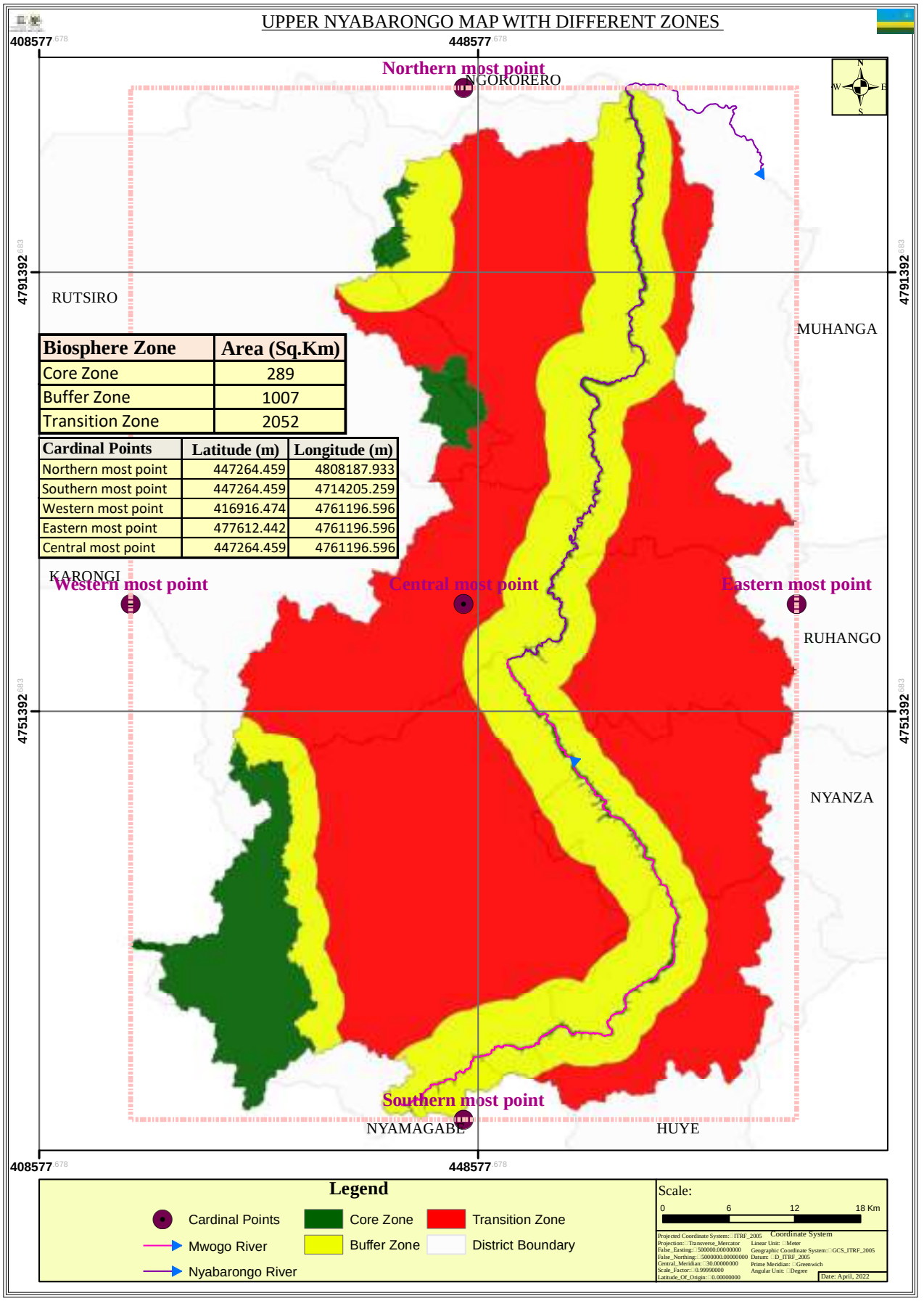


3.6.4.4.3. Upper Nyabarongo River bassin Biosphere reserve

An inland headwater catchment of the Nyabarongo River and its tributaries springing from Nyungwe forest. The outflow is monitored at the confluence of the Nyabarongo with the Mukungwa River. Annex 11 shows that maximum height of 2700m and 1450m of minimum height at average height of 1983.77m from Mean Sea Level. From Annex 12, in different zones of Upper Nyabarongo River bassin biosphere reserve there are 3 Cultural sites, 552 Educations Facilities, 148 Health facilities, 38 religious facilities, 70 trade centers, 22 tourism sites, 4 Electric Substations and 20 Electric stations. Also Annex 13 shows land use land cover, fauna and vegetation included and Annex 14 presents Upper Nyabarongo River bassin biosphere reserve different zone with Cardinal points as the following tables shown:

Biosphere Zone	**Area (Sq.Km)**
Core Zone	289
Buffer Zone	1007
Transition Zone	2052

Cardinal Points	**Latitude (m)**	**Longitude (m)**
Northern most point	447264.459	4808187.933
Southern most point	447264.459	4714205.259
Western most point	416916.474	4761196.596
Eastern most point	477612.442	4761196.596
Central most point	447264.459	4761196.596


UPPER NYABARONGO MAP WITH DIFFERENT ZONES
408577.678
448577.678
Northern most point
NGORORERO
4791392.683
RUTSIRO
MUHANGA
Biosphere Zone | Area (Sq.Km)
Core Zone | 289
Buffer Zone | 1007
Transition Zone | 2052
Cardinal Points | Latitude (m) | Longitude (m)
Northern most point | 447264.459 | 4808187.933
Southern most point | 447264.459 | 4714205.259
Western most point | 416916.474 | 4761196.596
Eastern most point | 477612.442 | 4761196.596
Central most point | 447264.459 | 4761196.596
KARONGI
Western most point
Central most point
Eastern most point
RUHANGO
4751392.683
NYANZA
Southern most point
NYAMAGABE
HUYE
Legend
Cardinal Points
Mwogo River
Nyabarongo River
Core Zone
Buffer Zone
Transition Zone
District Boundary
Scale:
0 6 12 18 Km
Coordinate System
Projected Coordinate System:: ITRF_2005
Projection:: Transverse_Mercator
False_Easting:: 500000.00000000
False_Northing:: 5000000.00000000
Central_Meridian:: 30.00000000
Scale_Factor:: 0.99990000
Latitude_Of_Origin:: 0.00000000
Linear Unit:: Meter
Geographic Coordinate System:: GCS_ITRF_2005
Datum:: D_ITRF_2005
Prime Meridian:: Greenwich
Angular Unit:: Degree
Date: April, 2022

3.6.4.5. Biodiversity

3.6.4.5.1. Fauna in the targeted sites

Generally said sites have presented with the following fauna:

a) Mammals: Buffalo, lion, leopard, elephants, giraffe, hippopotamus, monkeys, gorillas, zebra, impala, antelope, hyena, boar, rhinoceros, hares, gazelles, rats, bats, etc.
b) Reptiles: crocodiles, lizards, gecko, snakes;
c) Amphibians: Various species of frogs, various species of toads;
d) Birds: eagles, crowned cranes, doves, owls, sparrows, falcons, cattle egret, raven, partridge, nightingale, hamerkop, black kite, square-tailed nightjar, white-rumped swift, speckled mousebird, herons, francolin;
e) Fish: Tilapia, clarias, catfish, apoclomis, limnotrisamiodon.

3.6.4.5.2. Flora in the targeted sites

The Floral biodiversity found in surveyed sites are listed as follows:

a) **Medicinal plants**: Erythrinaabyssinica Lamex. DC., Hygrophiliaauricurata (Schum) Heine, Cissampelosmucronata A. Rich, Acacia hockii De Wild, Bidens pilosa L., Chenopodiumuganda (Allen) Allen, Draceanasteudneri Engl., Crassocephalumvitellinum (Benth.) S. Moore, Lantana trifolial. Leucasmartinicensis, Conyzaaegyptiaca (L.) Ait., Crassocephalummulticorymbosum (Klatt) S. Moore, Leucasmartinicensis, Acanthus pubescens (Thomson ex Oliv) Engl, Vernoniaamygdalina Del., Urticadioica, Euphorbia tirucali L., Tetradeniariparia, Ocimumurticifolium Roth., Plectranthus barbatusAndr., Leonotisnepetifolia R. Br., Coleus kilimandschari Gurke, PhytolaccadodecandraL'herit, etc.

b) **Vegetable plants**: amaranths, Gynandropsisgynandra (L.) Briq., etc.

c) **Other plants**: eucalyptus, grevillea, cypress, pines, calliandra, callitris, maesopsis, markhamiaplaticalyx, Senna, Senacia, Ficus, Cedrela, etc.

3.6.4.5.3. Conclusion and recommendations

During this assignment stakeholders have been involved and some issues were raised like Water Pollution affects fish catches associated with erosion and floods that destroyed fish ponds, Soil erosion, heavy rain, Climate change, Water hyacinth, sedimentation during periods of heavy rains, Wetlands droughts, peat fire outbreak and encroachment, Prolonged dry period/drought, illegal hunting, Deforestation, Illegal grazing, quarrying activities, high demand for cooking fuel, encroachment by development projects, population increase, demand for construction materials,

use of artisanal practices/technology in mining, insufficient skills for miners, Climate change and variability, Population increase/imbalance between population and natural resources that continue to pollute Victoria Lake.

From the raised issues by different stakeholders, in Rwanda there is:

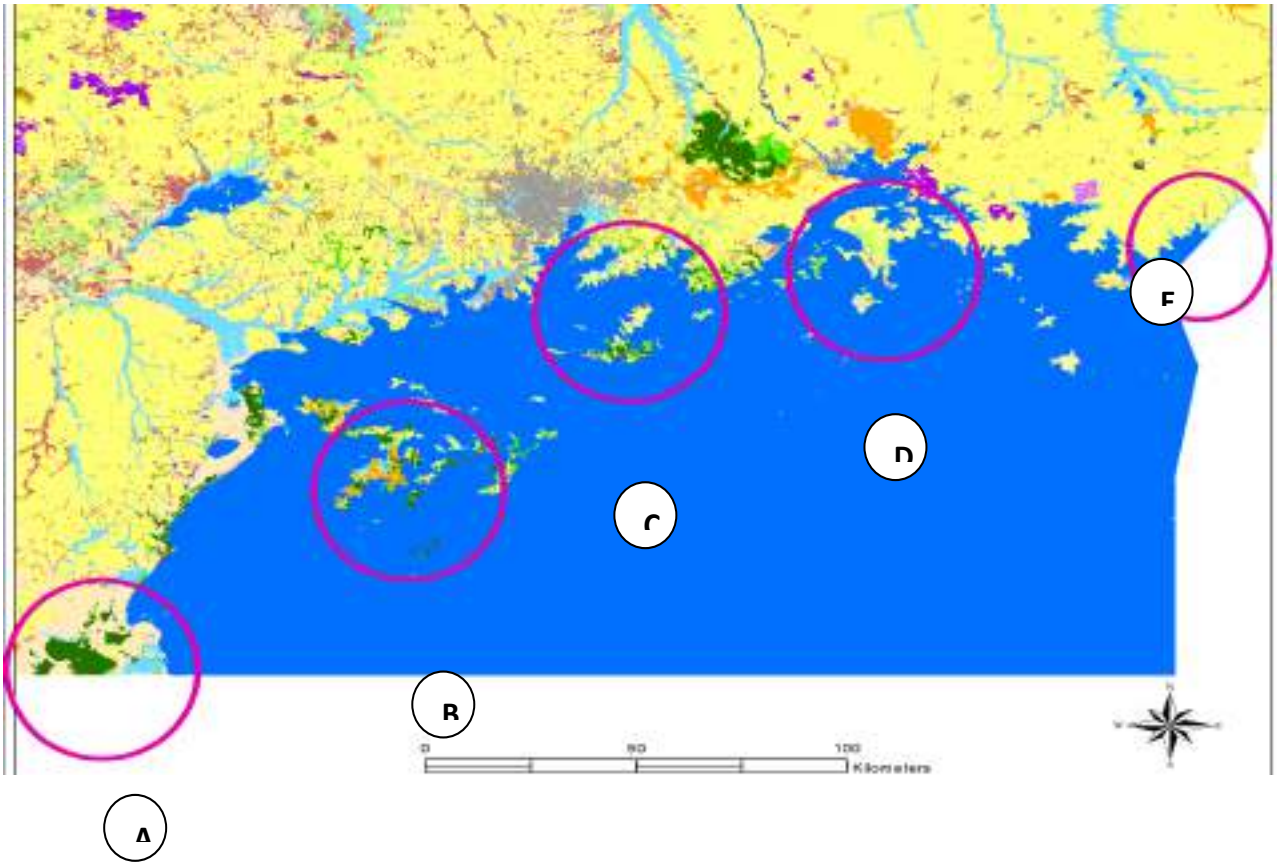
1. Existence of policy and legal framework, institutional framework and Environmental awareness is increasing;
2. Laws enforcement
3. Government provides basic needs to affected families (food, water, shelter, medical assistance),
4. Relocation of people from high risk zones, rehabilitation/restoration of damaged infrastructures
5. Alternative renewable energy sources such as Hydropower electricity, solar energy, LPG, biogas
6. Strengthening agro forestry, increase budget/funding in afforestation, strengthen capacities of stakeholders in sustainable forest management, rational harvesting, enforce harvest permitting,
7. Enforcement of wetland protection regulations/measures, establish and respect buffer zones, remove illegal activities

3.6.5. Uganda: Sites for Biosphere Reserves as part of the Lake Victoria Transboundary Biosphere Reserve

The field mapping covered the five zones of Sango Bay, Sesse Islands, Murchison Bay, Napoleon Gulf and Macdonald Berkeley Bay. Ground truth data were collected for validation and editing of the zone maps, topography and vegetation cover maps, this was done by traversing all the zones while capturing relevant information on vegetation, drainage, topography and zonation information as presented in the results chapter.

Data from literature about each of the five zones are presented below:

i. The Sango Bay (Trans-boundary) **9584 km^2**.
ii. The Sesse Islands: 80 islands and measuring **4842 km^2**.
iii. Murchison Bay: **991 km^2**
iv. Napoleon Gulf
v. Macdonald Berkely Bays (Trans-boundary): 5125 km^2.



Map 14: Overview of the Lake Victoria basin zones in Uganda

3.6.5.1. The Sango Bay (Trans-boundary) 9584 km2

The Sango Bay Forest Reserve is located in Southern Uganda near Lake Victoria and consists of Kaiso, Malabigambo, Namalala, Tero West, Tero East, Kigona River and Kigona forest blocks. The Kaiso and Malabigambo blocks are contiguous with the Minziro forest blocks in Bukoba District, Tanzania. Sango Bay Biosphere Reserve (SBBR) has high conservation value of species that are endemic, rare and globally threatened (Nature Conservation Master Plan 2002). It is one of the catchment areas of Lake Victoria. it covers an area of 3000km2 comprising of wetlands, grasslands, agricultural land, as well as forests such as Namalala, and Minziro forests (Fuller, et al.; 1997), forming a continuum of landscapes.

The continuum of various vegetation types provides a high diversity of habitats and high species diversity (Odum, 1971). The biodiversity of Sango Bay has long been recognized as quite high (Friedman and William, 1969; Howard, 1991; and Chapman et al.; 1998). About 1000 plant species of which 170 are tree species (40% of Uganda's total), 431 species of birds (36% of the county's total), 87 mammals out of which 16 species of diurnal forest primates (50% of the country's total) 279 species of butterflies and many aquatic species have been documented (Howard, 1991,; Howard and Davenport, 1996), 31species of amphibians, 44 species of fish and 67 dragon flies (IUCN, 1996). This, notwithstanding, more incentives are still needed to capture more information about species not yet documented, some of which are endemic to the ecosystem.

SBBR was selected for nature reserve establishment in Uganda (Uganda Nature Conservation Master Plan 2002). The reserve is a habitat for rare, endemic, endangered and globally threatened species of high conservation importance. It supports 14 species found in no other Ugandan forests including; 8 of butterflies (Belenois uszi, Mylothis kiwuensis, Ypthima granulosa, Bebearia phantasiella, Eagris nottoana, Gorgyra bibulous, Andronymus helles), 2 birds (African Pygmy Goose and Papyrus Canary), 3 trees (Euphorbia grantii, Heisteria parvifolia, Pseudagrostistachys ugandensis) and 1 moth (Temnora rattrayi). Albertine rift endemics (birds-White-collard Olive back, Butterflies- Mylothris kiwuensis) It represents the largest block of swamp forest, type Y2 (Langdale-Brown et al., 1964).

Of the 65 forests investigated for biodiversity, the Sango Bay blocks rank fourteenth in overall importance, with a score of 13.7. They are thirteenth in terms of species diversity, and rank fifteenth in terms of the rarity value of the species represented; presumably because many of its unique combination of species are shared with some high altitude forests, others with the medium altitude forests along the Albertine rift, and others with the lowland forests such as the lake shore forests of Jubiya and Mujuzi. The forest supports 14 species found in no other Uganda forests (including 8 butterflies (, 2 birds, 3 trees and 1 moth). One bird species and one butterfly species are endemic to the Albertine region and the forest ranks 4th in moth diversity. It presents the largest block of swamp forest, type Y2 (Langdale Brown et al., 1964) in the protected area system, a vegetation association that does not occur in any of the country's National Parks or Wildlife Reserves.

Sango Bay is an internationally recognized Important Bird Area (IBA) and is a landscape for ecotourism investments in the region with globally threatened species of African Pygmy Goose Papyrus Canary.

The island is a recognized ramsar site and its classification as one of the 6 IBAs (Important Bird Area) in Uganda was based on a tenet that it contains congregations of breeding birds in globally significant numbers especially the Grey Headed Gull, the Long Tailed Cormorant, Greater Cormorant, and the Little Egret. The Island is known to have the largest breeding colony of the Grey headed Gull in Africa. Tourism is picking up in the area with a few visitors arriving on the island for bird watching. Female tourists are also welcome since they do not have to stay for an overnight. It should be noted that women can be allowed on the island as long as they do not spend more than 24 hours as provided by the history of the island.

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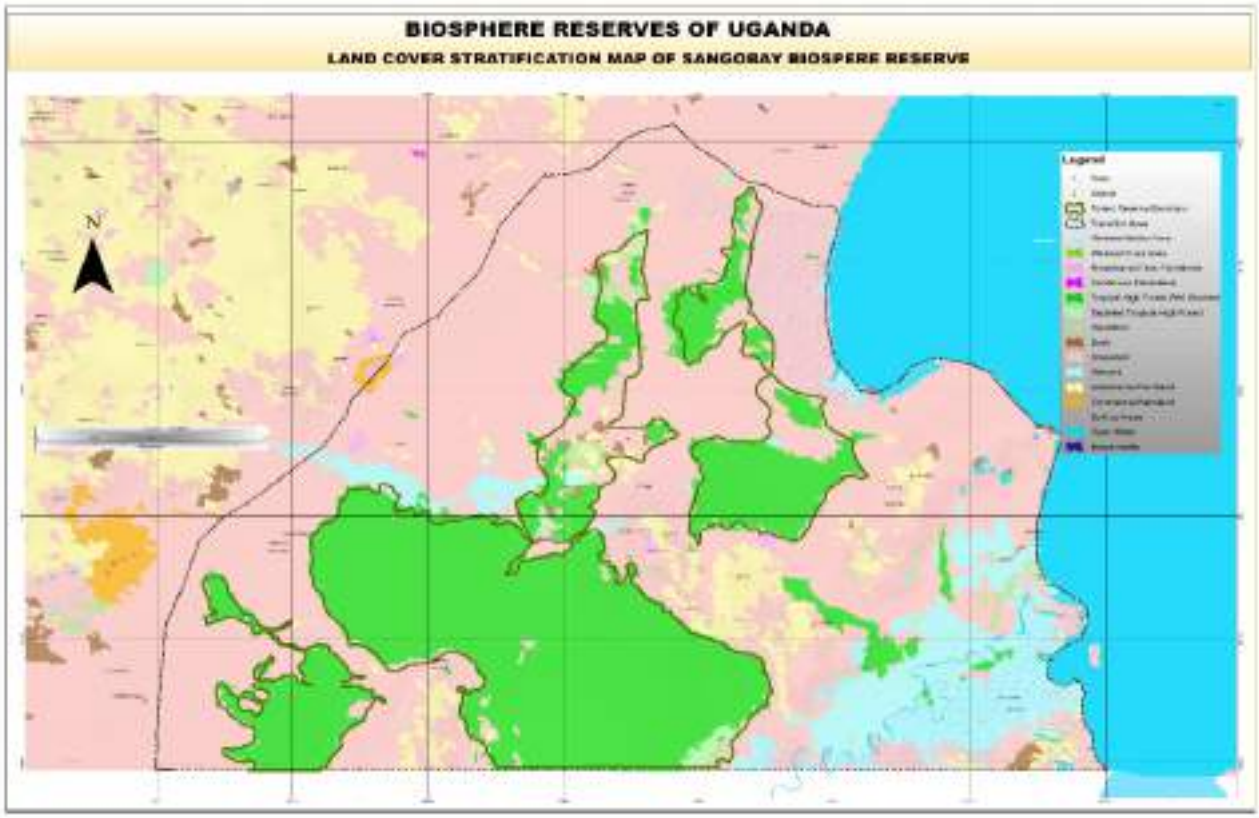
Sango bay forest reserves provide scenic beauty from the natural landscapes provides. Aestheti values and tourism is estimated at a value transfer of US D 8.9 Million per year. The Minziro area also hosts historic sites that are central tourist attractions with cultural significance. The ecosystem contributes to the livelihoods of communities through income, food and nutrition security and supporting different sub-sectors such as livestock farming and through purification of water and air. The benefits provide incentives that can strengthen conservation efforts.

The results from ecosystem valuation of Sango Bay –Minziro Ecosystem should be used as tourist attraction due to the wonderful attraction sites, the wetland system is known for interesting activities such as game viewing, primate viewing, bird watching and nature walks. Tourism is also developed within Musambwa Island but also the site contains a number of Stone Age artefacts known as Sangoan Industry and is said to date to 200,000 years ago.



Map 15: Land Use Cover Map of Sango Bay

3.6.5.2. The Sesse Islands: 80 islands and measuring 4842 km2.

This includes a group of about 80 islands and measuring 4842 km^2. The Zone forms an important breeding grounds for fish and other biodiversity. Parts of the area have already been demarcated where persons shall not fish for any species except with permission for sports, in the areas set out as Lacustrine Protected Areas. The islands are becoming increasingly subjected to deforestation and over fishing. They are ideal for development of tourism and conservation area. The majority of the population are traditional fishermen. The islands have received little scientific attention which is key for promoting tourism and scientific research.

The islands occupy the northwestern corner of Lake Victoria. The largest island is called Bugala and koome Islands. The islands lie in two main groups. The south west can be referred to as the Bugala Group, named after Bugala Island which is the largest in that group of islands. The northeastern group can be referred to as the Koome Group, named after Koome Island, the largest in that group. The two groups are separated by the Koome Channel. Other islands in the Bugala Group include: Bubeke, Bubembe, Bufumira, Bugaba, Bukasa, Buyova, Funve and Serinya. The main islands in the Koome Group include: Damba, Koome and Luwaji.

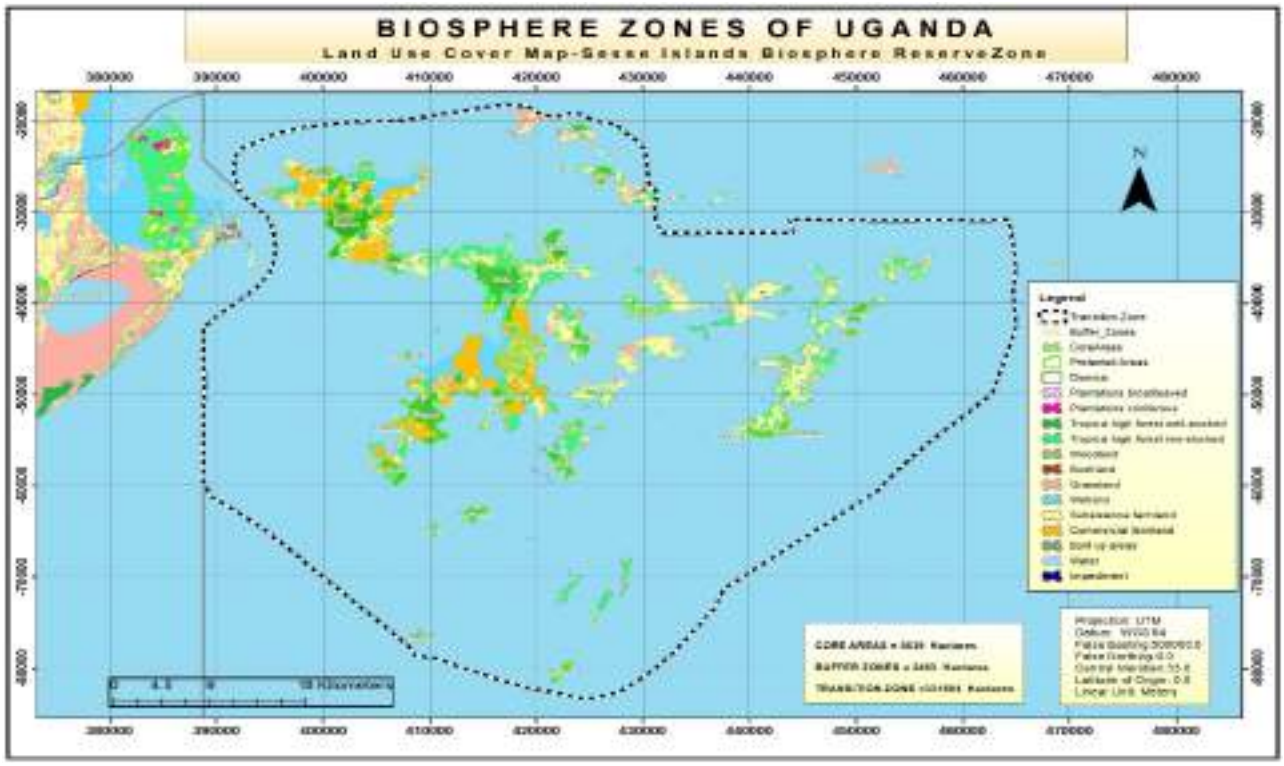
The Sesse Islands are inhabited by the Bantu speaking Bassese tribe, closely related to the Baganda and the Basoga, and speaking a similar, though distinct language. Prior to the arrival of Europeans, the islands were one of the most important spiritual centers of the region. About 43 (50%) of the islands are inhabited. The islands vary in size from less than 10,000 square metres (2.5 acres), to over 40 kilometres (25 mi) in length for the largest island, Bugala Island.

The islands are also home to a variety of animals including primates, which are not easily accessible on the mainland. The most common large terrestrial mammal is the Vervet monkey, which is often seen in the vicinity of Lutoboka and Kalangala. Bushbuck and black-and-white colobus are also present, but seldom observed. Since Buggala was separated from the mainland, one endemic creek rat and three endemic butterfly species have evolved on the island. Water and forest birds are prolific. There's a variety of hornbills, barbets, turacos, robin-chats, flycatchers and weavers. Particularly common are the jewel-like pygmy kingfisher, the brown-throated wattle-eye and the paradise flycatcher. African fish eagles and palm-nut vultures are often seen near the lake, while immense breeding colonies of little egret and great cormorant occur on Lutoboka and other bays.

This has led to the evolution of a nascent but growing tourism industry on the islands. Infrastructure is still rudimentary but is slowly improving.

The principal industry in the Ssese Islands is fishing for the huge Nile Perch, with much of the catch being exported. Overfishing is a huge concern on these and other islands in Lake Victoria. Other industries include agriculture, forestry and tourism. Livestock farming is practiced on the islands. It is estimated that 3,000 cattle, 250,000 poultry (chicken and ducks), 1,235 goats and 7,000 pigs are kept on the islands.

BIDCO, a private palm oil processor based in Jinja District, on the mainland, owns a 15,000 acres (6,100 ha) palm oil plantation on the islands. In addition, outgrower farmers grow palm oil on contract with BIDCO and sell their produce to the processor. In 2010, the palm oil plant began generating 1.5MW of electricity through the burning of bagasse and some of the oil. The power supplies the oil processing plant and the excess is sold to Kalangala, the largest town on the islands.

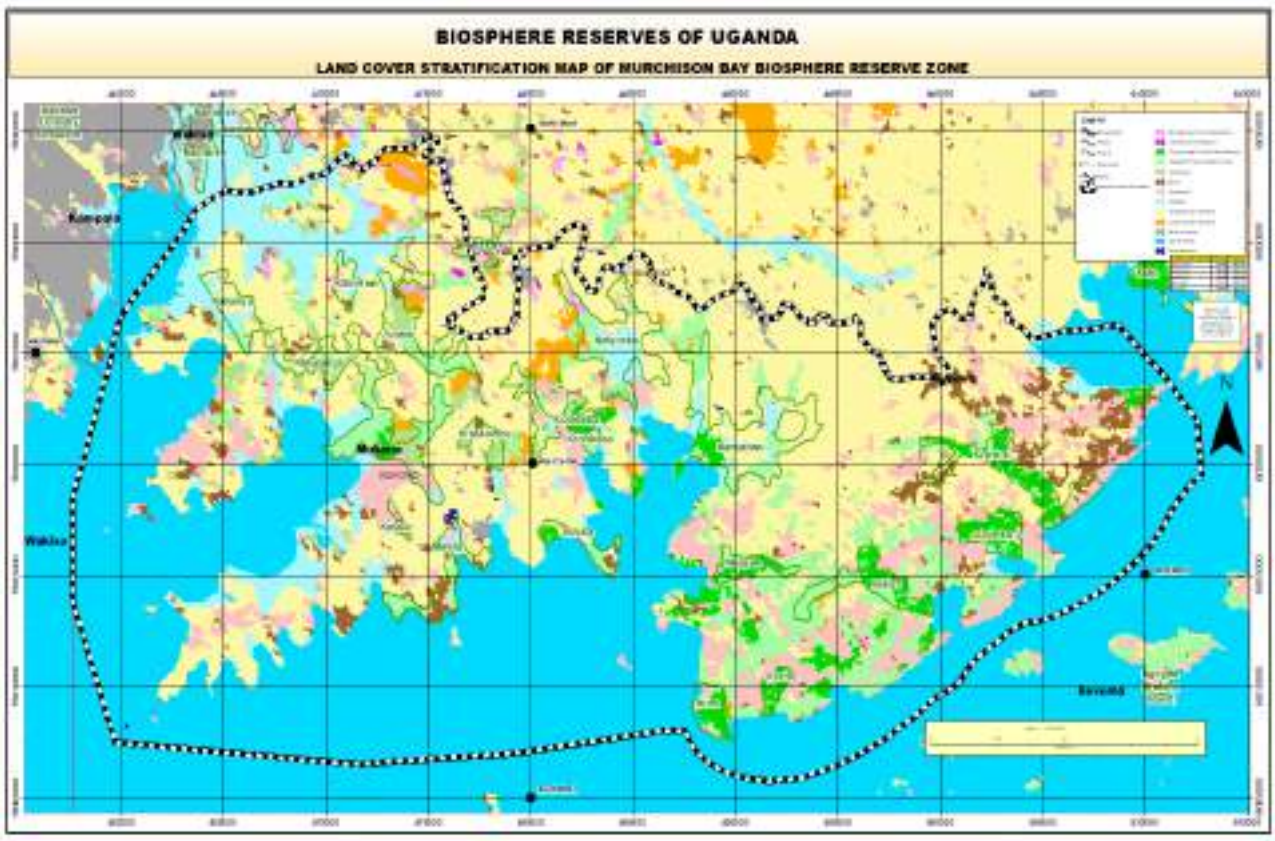


Map 16: Land Use Cover Map of Sesse Islands

3.6.5.3. Murchison Bay: 991 km2

The Zone, covering an area of 991 km^2, is important for fish breeding and a source of water for Kampala City, and its environs. The bay has tended to be polluted through domestic wastes, sewerage, and industrial wastes. The Nakivubo Channel is the main conduit of these pollutants. The Murchison Bay is an extension of Lake Victoria situated in the south-east of Kampala which lies between latitudes 00˚10'00"N - 00˚30'00"N and longitudes 32˚35'00'E - 32˚50'00"E with average elevation of 1224 m above sea level. The largest catchment drainage inlet being the Nakivubo channel which passes through Kampala City, The bay is heavily in fringed with Papyrus, Typha, and Phragmites and other aquatic macrophytes but has in the recent past been heavily invaded by the water hyacinth. The Nakivubo channel runs from the central populated Kampala district passing through slums, industrial settlements and markets before discharging its water to the Lake Victoria at Murchison Bay. The water in the channel is a mixture of secondary effluents from NWSC, sewage treatment at Bugolobi within Kampala city and heavily polluted untreated wastewater from other parts of the city. The Murchison bay area is inhabited by the Bantu speaking Buganda tribe, with an integration of many other tribes living within Kampala city speaking Luganda. The main economic activities taking place within Murchison bay include small and large scale businesses with micro

subsistence farming. Over utilization of land resources have caused numerous forms of degradation such as loss of biodiversity, deforestation, land and water degradation (Diyer et al., 2013). The disturbance of the land through these human activities has wide ranging and long-term consequences that affect important ecosystem processes and services (Wu, 2008). Huge proportions of land being degraded, reduction in food production and it is now a threat to livelihood (Maitima et al., 2010). Rapid urbanization, predominantly along Murchison bay, is one of the critical issues and visible anthropogenic force that has brought so much changes in urban landscape and land cover pattern around the wetlands and remnant forests in Murchison bay Biosphere reserve.



Map 17: Land Use Map of Murchison Bay

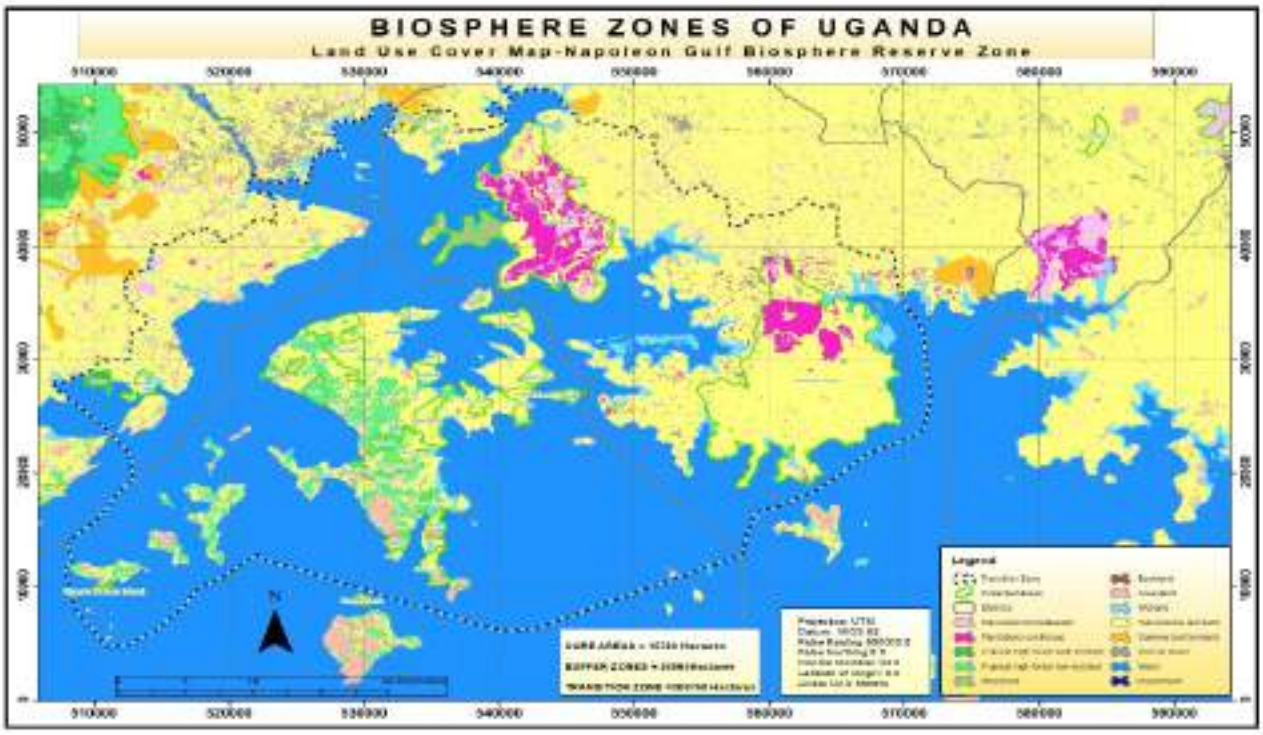
3.6.5.4. Napoleon Gulf

Napoleon Gulf is a bay located in Jinja district, Eastern region, Uganda (0º25'0.01" N, 33º15'00" E). It has an estimated terrain elevation of 1,134 m above sea level. The Gulf is characterized by a vast wetland system. River Nile, the only outflow of Lake Victoria exits the lake through this Zone in the North. The bay receives heavy organic loads from Jinja Municipality and Kakira Sugar Cane Industry. The Zone will include Buvuma Island, Lingira Island, and Igwe Island, and covers Hannington Bay as well. The Napoleon gulf is inhabited by the Bantu speaking Basoga tribe, closely related to the Baganda and the Bagwere, and speaking a similar, though distinct language. It is a shallow protected bay with heavy littoral vegetation composed mainly of Papyrus, Typha, and Phragmites. It is an important breeding and nursery ground for commercial speces and has some

surviving representatives of endangered species. The headquarter laboratory of the Uganda Freshwater Fisheries Research Institute is stationed on the shores of this Zone.

The economic activities of the people living around napoleon gulf includes Cage fishing, commercial sugarcane plantations and subsistence farming. The culture of cage fishing is a fast growing industry in Uganda due to low fish production and the need for increased food security and employment. Common species in napoleon gulf include planktonic species (eg. *Aulacoseira, Stephanodiscus, Cyclotella* and *Nitzschia* species) with complete absence of some species (eg. A. *nyassensis, N. fonticola, Cyclotella krammeri* and *Cylotella meduanae Stephanonodiscus minutulus*, *Fragilaria* and *Nitzschia* species and dominance of *Poaceae phytoliths.*

Despite the ecosystem hosting species of global conservation concern and contributing to the livelihoods of the local communities. These ecosystems face multiple impacts on drainage of the swamp for agriculture, water offtake for irrigation upriver, intensification of fertilizer and biocide inputs, and unsustainable exploitation of papyrus, agricultural expansion and intensification, climate change and climate variability, invasive species and pollution (BirdLife International, 2020).



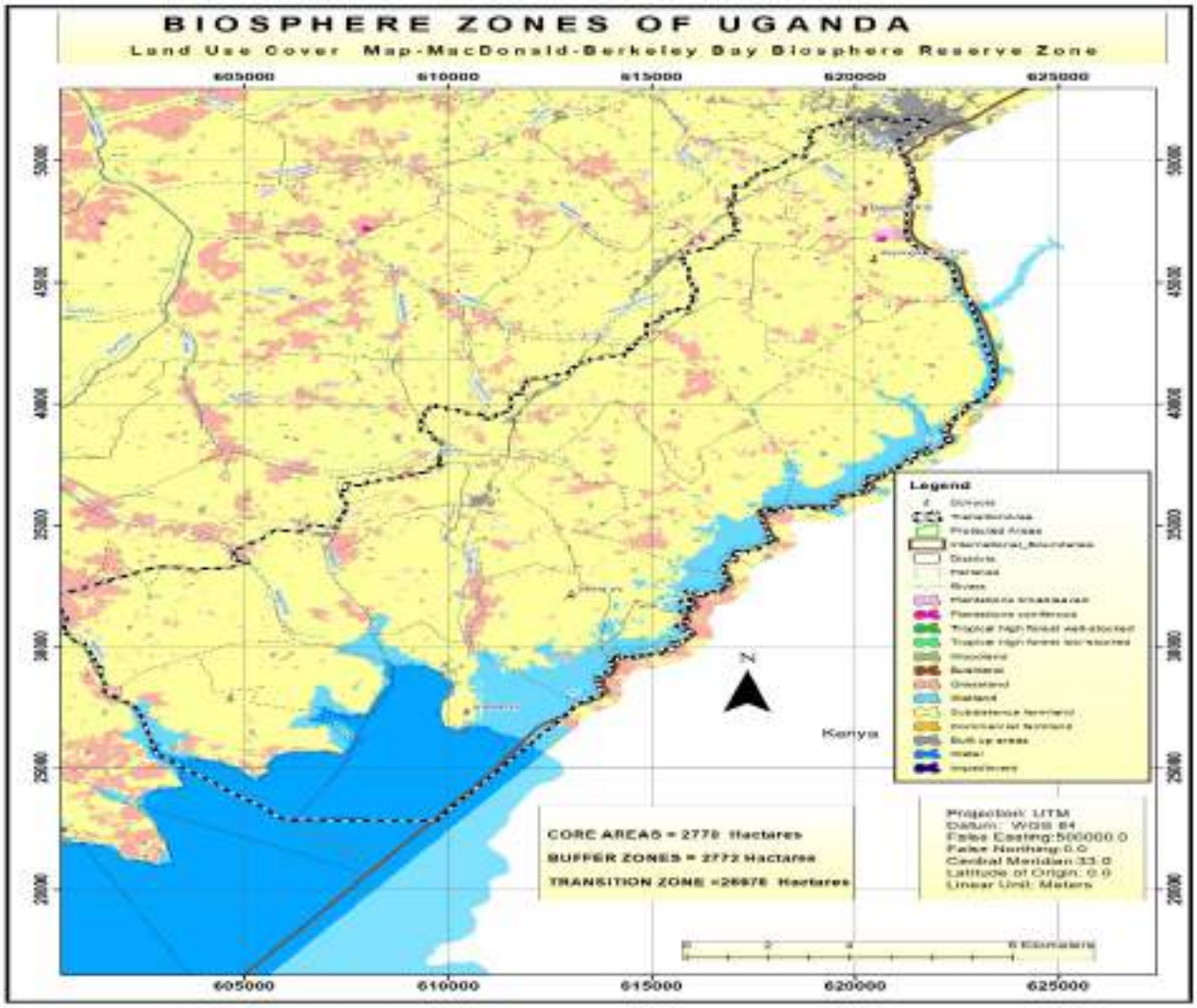
Map 18: Land Use Cover Map of Sesse Islands

3.6.5.5. Macdonald Berkely Bays (Trans-boundary): 5125 km2.

This is a cross-border Zone between Uganda and Kenya to the East that measures 5125 km2 . Both Sio and Nzoia Rivers feed into this Zone bringing along heavy agricultural residues in form of organic matter and pesticides from sugar cane, coffee, tea, and horticulture farms upstream. The catchment is also heavily grazed. The littoral areas are well fringed with macrophytes mainly

Papyrus, Typha, and Phragmites, and the bay has a variety of habitats, biodiversity, and a range of economic activities which makes it an ideal status for an integrated study.

The Zone is important as breeding and nursery grounds of many Lake Victoria endemic and anadromous species. The surviving populations of Labeo are found here and a resurgence of Synodontis, Mormyrids, Haplochromis spp. Atlestes, Schilbe, and Barbus seems to be occurring. The Zone is, therefore, ideal for an integrated study involving catchment, wetlands, riverine, and open shallow waters of the lake.



Map 19: Land Use Cover Map of MacDonald-Berkely Bay

3.6.5.6. Zonation and Topographic Maps of the Biosphere Reserves Selected in Lake Victoria Basin Ecosystem

The Sango Bay (Trans-boundary) zones and topographic maps

The Sango Bay wetland landscape is located west of Lake Victoria and encompasses the Sango Bay Musambwa Island-Kagera Wetland System in Uganda and the Minziro Forest Reserve in Tanzania.

The Sango Bay-Minziro wetlands lie between latitude 0.51 - 1.30 °S and longitude 31.38 - 31.88 °E and has an area of approximately 3000 square kilometres.

The forest reserves that form part of the sangobay ecosystem are in a very stable condition. The area is surrounded by pasture lands with less subsistence agriculture. The terrain is generally flat apart from few hills like Kanabulemu. The hills offer very good viewing points for the sangobay landscape, providing very good view of the Kagera River as it flows through a wetland before pouring into Lake Victoria.

The Sango Bay ecosystem consists of Central Forest Reserves such as Kaiso, Malabigambo, Namalala, Tero West, Tero East, Kigona River and Kigona forest blocks. The Kaiso and Malabigambo blocks are contiguous with the Minziro forest blocks in Bukoba District, Tanzania. The forest ecosystem stretches from the Tanzania-Uganda border in Rakai District in the South to Masaka District boundary in the north, and westwards from the Lake Victoria shores to close to the main Kyotera Mutukula road. There are three human settlements in the reserve namely; Minziro, Kanabulemu and Gwanda-Kasensero. The former two are enclaves in the forest reserve while Gwanda-Kasensero is partly surrounded by the forest.

The Bukoola swamp, defines the northern edge of Malabigambo block, passes through Tero West block and forms the border between Tero East and Namalala block. A mixture of *Cyperus papyrus* and *Phoenix reclinata* dominates this system. *Acacia kirkii* woodland is a distinctive vegetation type along the riverbanks mainly the Bukoola River. Some streams as well as some parts of the shores of Lake Victoria are surrounded by *Cyperus papyrus. The* reed**,** *Phragmites mauritianus* is found mainly in small patches around the Kagera River, the surrounding plain and along the lakeshore. The lake shore, which forms a natural boundary in the east of the reserve is predominantly of bare rock with woodlands and degraded forests, especially near fishing villages.

The southern parts of Tero West block, bordering with Malabigambo are dominated by *Phoenix reclinata*. This area has remained waterlogged after the 1997/98 El Nino rains that submerged the area from Bukoola River to Katera.

As a result, the original old trees have died, giving way to other water tolerant herbs and shrubs including regenerating *Phoenix reclinata.* The current vegetation status of the area is predominantly grassland, tropical forests, swampy forests, wetlands both permanently and seasonally wet areas and open water bodies.

Pictorial of the Sango bay ecosystem, forest, grasslands, wetlands and human footprints

The Sangobay Biosphere Reserve comprises a proposed core zone of 26,935 hectares which includes tropical high forests and wetlands with a buffer zone of 115,784 hectares an expanse of grasslands, wetlands and forests, and a transition zone of 67,946 hectares predominantly grasslands, settlements and subsistence farmlands, the core zones comprises fully protected forests and wetlands with seasonally wet tropical forests, a buffer with degraded forests, wetlands and grasslands with a transition zone predominantly grasslands subsistence farmlands and human settlements.

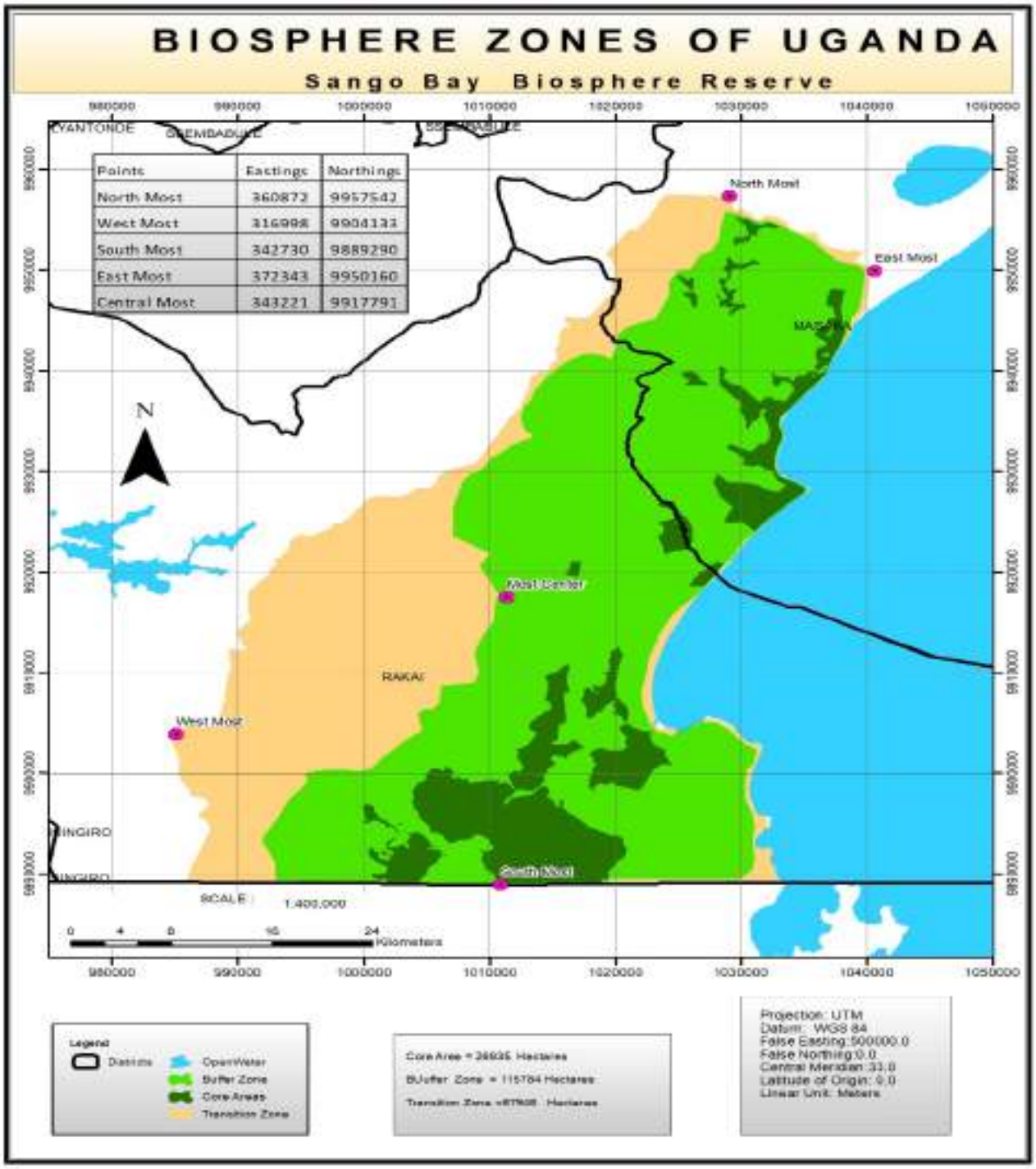


Figure 20: Zones of the Sango bay Biosphere Reserve

The topography is generally flat bordered by gently sloping areas to the north of the ecosystem and a flat plain transiting towards Lake Victoria between 1100m-1500m above sea level. The Sango Bay wetlands are of high bio-geographic importance because they are a home to rare and endemic forest swamp tree species, over 300 species of birds, endangered mammals and various amphibians, fish and reptiles. The area plays an important role in supporting ecosystem processes and regulating the dynamics of the hydrological system, reducing peak flow and contamination.

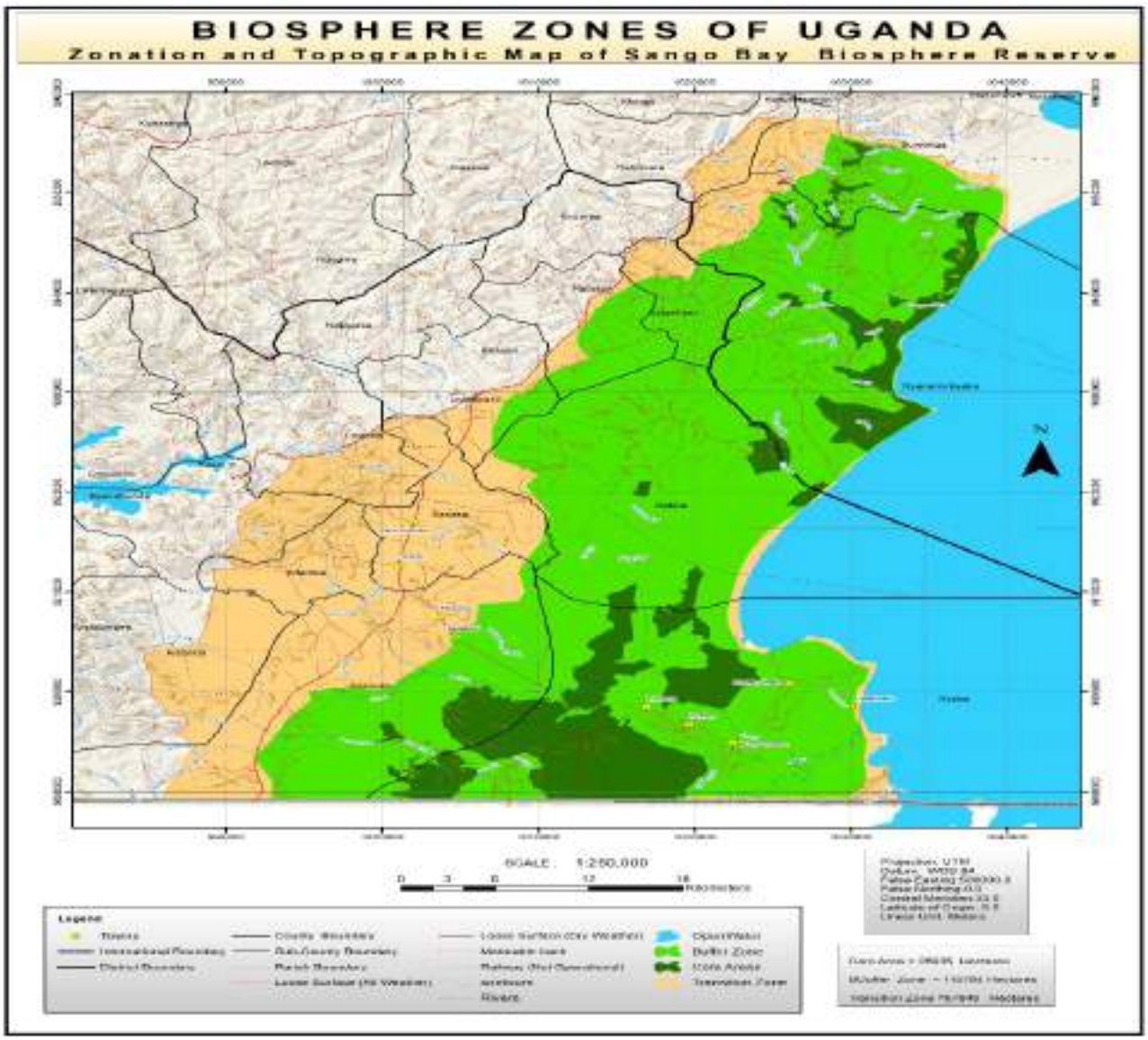


Figure 21: Zonation and topographic map of the sangobay Biosphere reserve

The Sesse Islands: 80 islands and measuring 4842 km2.

The biggest island in this exotic archipelago of islands is by far the island of Kalangala. The island clusters can be divided into two groups. The southwest group named Bugala group and the Northeast group named Komme group isolated from one another by the Komme Channel. The islands of Sesse are dominated by tropical forests vegetation surrounded by the open water body of Lake Victoria.

Buggala Island, is very rich in biodiversity, the islands are filled with birds and it's common to see vervet monkeys, reptiles, hippos, and butterflies. Many species of monkeys reside in the islands. Besides, the island includes a number of sitatunga antelopes. The islands are also filled with many bird species. Sesse islands consists of a mosaic of natural forests rich in species biodiversity with patches of grasslands and open water bodies with establishments of palm oil plantations.

The natural wealth of the archipelago contributes to ecotourism and continuously contributing in a new and growing tourism sector. Ssese Islands are home to many animal species (including primates) that are not easily spotted in the mainland with diverse and beautiful landscapes.

Photos of Tropical Forests, Open water, Grassland's and palm oil plantations in Sesse islands

The area comprises a proposed core zone of 5,538 hectares with a buffer zone of 12,981 hectares and a transition zone of 19,671 hectares, the core zones comprises the tropical forests, a buffer with degraded forests and grassland with a transition zone predominantly subsistence agriculture and other land uses.

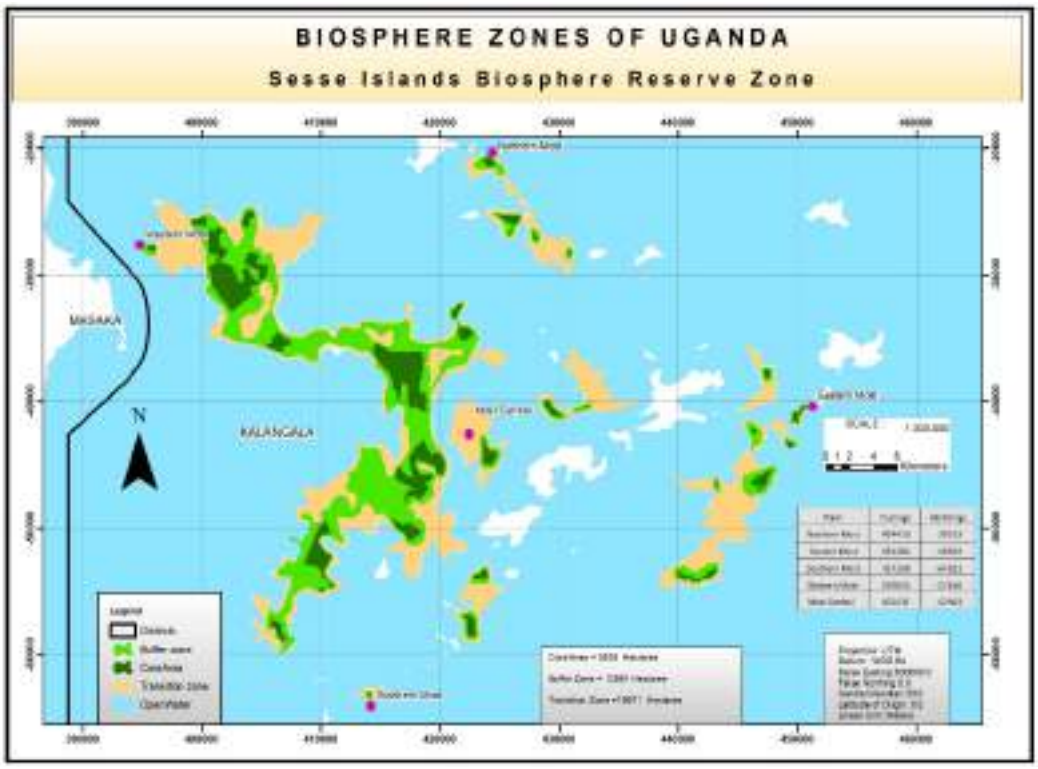


Figure 21: Zones of the Sesse Island Biosphere Reserve

The Topography of Sesse islands comprises of gently sloping islands surrounded by water bodies with elevation between 1100m-1300m above sea level.

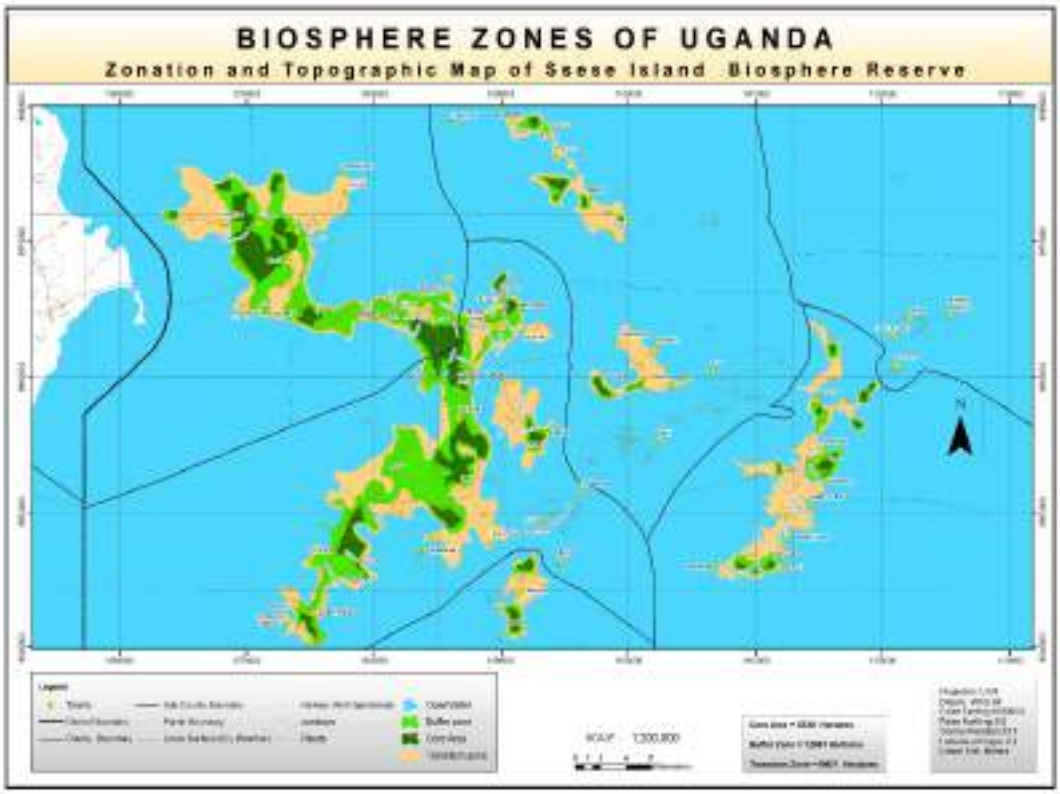


Figure 22: Topographic map and zones of Sesse islands

2.1.2 Murchison Bay: 991 km2

Murchison bay forms part of Kampala's ecosystem, defined first and foremost by Lake Victoria and its catchment areas. Together with its location on the equatorial highlands, these have defined the region's climate and carved out its topography. Murchison's Bay in particular contributes to the topography and morphology of Kampala city; the inland rivers, water-bodies and wetlands; the sensitive geo-hydrology, aquifers and the multitude of water sources throughout the area makes it very important for international recognition and protection. The wetlands serve a series of sensitive ecological functions, primarily water and waste filtration. They have been systematically filled in the City Centre and Inner-city Suburbs, infiltrated and polluted by residential and industrial activities. Kampala, once the "Garden City of Africa" has been degraded intensively with land use changes. Its natural flora and the extensive forests around the present day city have been devastated and the process is ongoing with new development continuously encroaching on the remaining protected forests.

Murchison Bay is a very important feature of the ecosystem besides being central to the development and health of above one million people in its catchment area (Kiggundu et al., 2018). It is a source of basic amenities such as food, water, employment, transport and recreation to the people in the catchment (Kiggundu et al., 2018).

Photos of Murchison Bay, Wetlands, Forest's and Nakivubo Channel

According to Kinuthia-Njenga (2008) and Muhati et al (2008), the dramatic environmental changes experienced by the Lake Victoria over the past are as a result of land use and land cover changes, poor agricultural developments, industrialization destruction of critical wetlands.

Murchison bay zone comprises a proposed core zone of 8,343 hectares with a buffer zone of 31,152 hectares and a transition zone of 38,684 hectares, the core zones comprises the tropical forests, a buffer with degraded forests and grassland with a transition zone predominantly subsistence agriculture and other land uses.

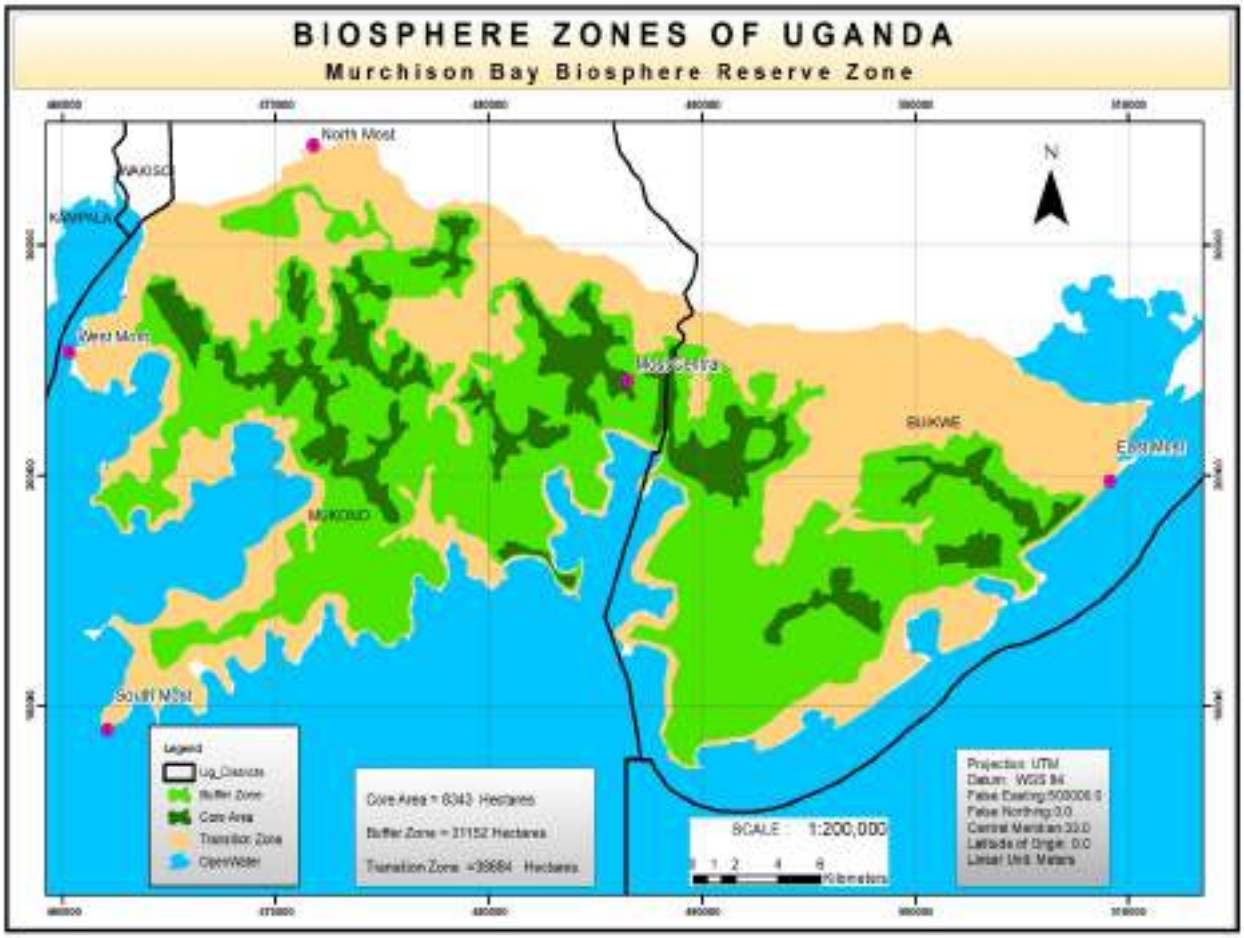


Figure 23: Murchison Bay Biosphere Reserve

Murchison bay topography has an average elevation of 1224 m above sea level. It's considered one of the watershed for Lake Victoria basin that drains through the Nakivubo Channel to the Murchison Bay. The Nakivubo channel runs from the central Kampala district passing through densely populated slums, industrial settlements and markets before discharging its water to the Lake Victoria at the Murchison Bay. The watershed covers the Nakawa, Makindye, Rubaga and Central divisions within the capital city of Uganda

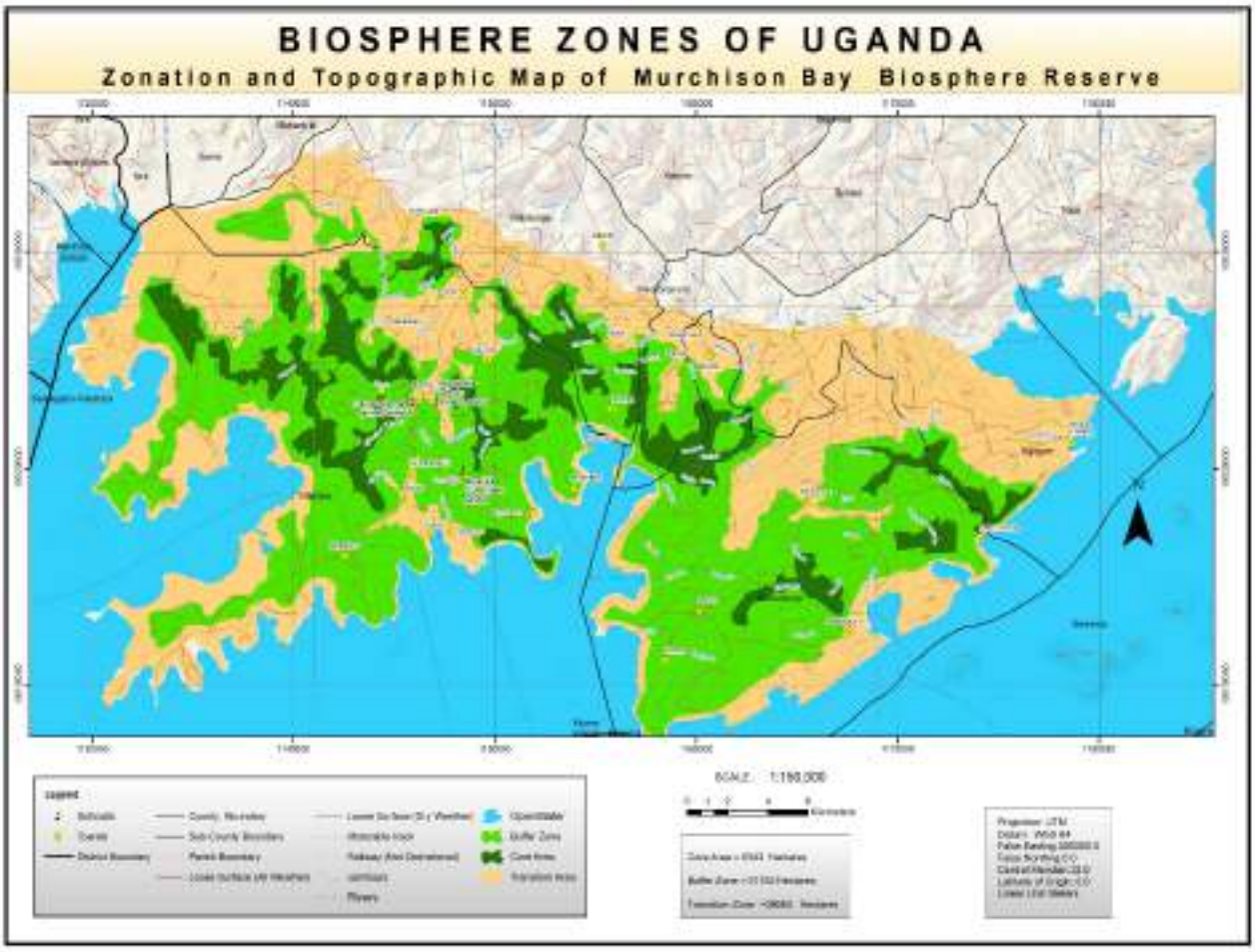


Figure 24: Topographic map and zones of Murchison Bay Biosphere Reserve

3.6.5.4. Napoleon Gulf

The Gulf is characterized by a vast wetland system dominated by papyrus. The zone borders jinja town which is highly urbanized and impacts greatly on the water due to industrial developments in the area. River Nile, the only outflow of Lake Victoria exits the lake through this Zone in the North. The bay receives heavy organic loads from Jinja Municipality and Kakira Sugar Cane Industry. The elevation of this area to international protection will minimize the impact from the surrounding industries and urbanization. Napoleon Gulf has protected areas such as South Busoga and Bukaleba CFRs on the main land, and a number of CFRs on Buvuma Island. Bukaleba is mainly a plantation of pine, Eucalyptus and Maesopsis species with a woodland at the peninsular with low populations of Buffalos. South Busoga is planted in the northern part of the reserve but the southern part is settled and cultivated by communities.

The zone is highly degraded characterized by presence of important bird species such as the cranes, commercial and subsistence Agriculture characterizes this zone with plantation woodlots of Pinus spp and Eucalyptus.

Pictorial of Napoleon Gulf Biosphere Reserve, Biodiversity, forest plantations and wetland

The area covers a core zone of 23,283 hectares with a buffer zone of 12,494 hectares and a transition area of 24,356 hectares, the core zones comprises the tropical forests, a buffer with degraded forests and grassland with a transition zone predominantly open water and other land.

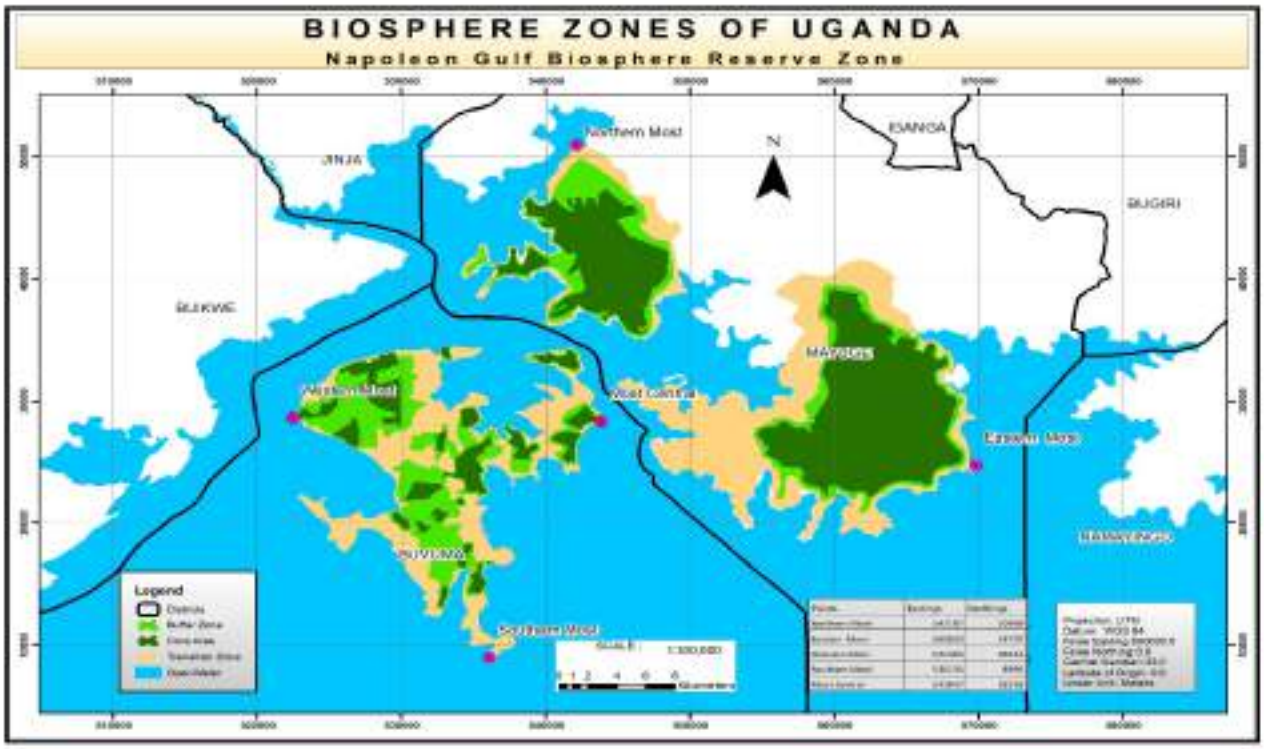


Figure 25: Zonation map of Napoleon gulf biosphere reserve

The Topography of Napoleon gulf Biosphere reserve comprises of gently sloping areas with an elevation between 1150m-1500m above sea level and a series of degraded and cultivated wetlands. The stream in this area drain into Lake Victoria and this include Nakizi, Nakote, Bukabale, Namugombe, Wamfu, Bukamuli, Namwangwe, Isongero, Namwema, Bajo, Nakaga, Mubeya, Kurira and Namudunga.

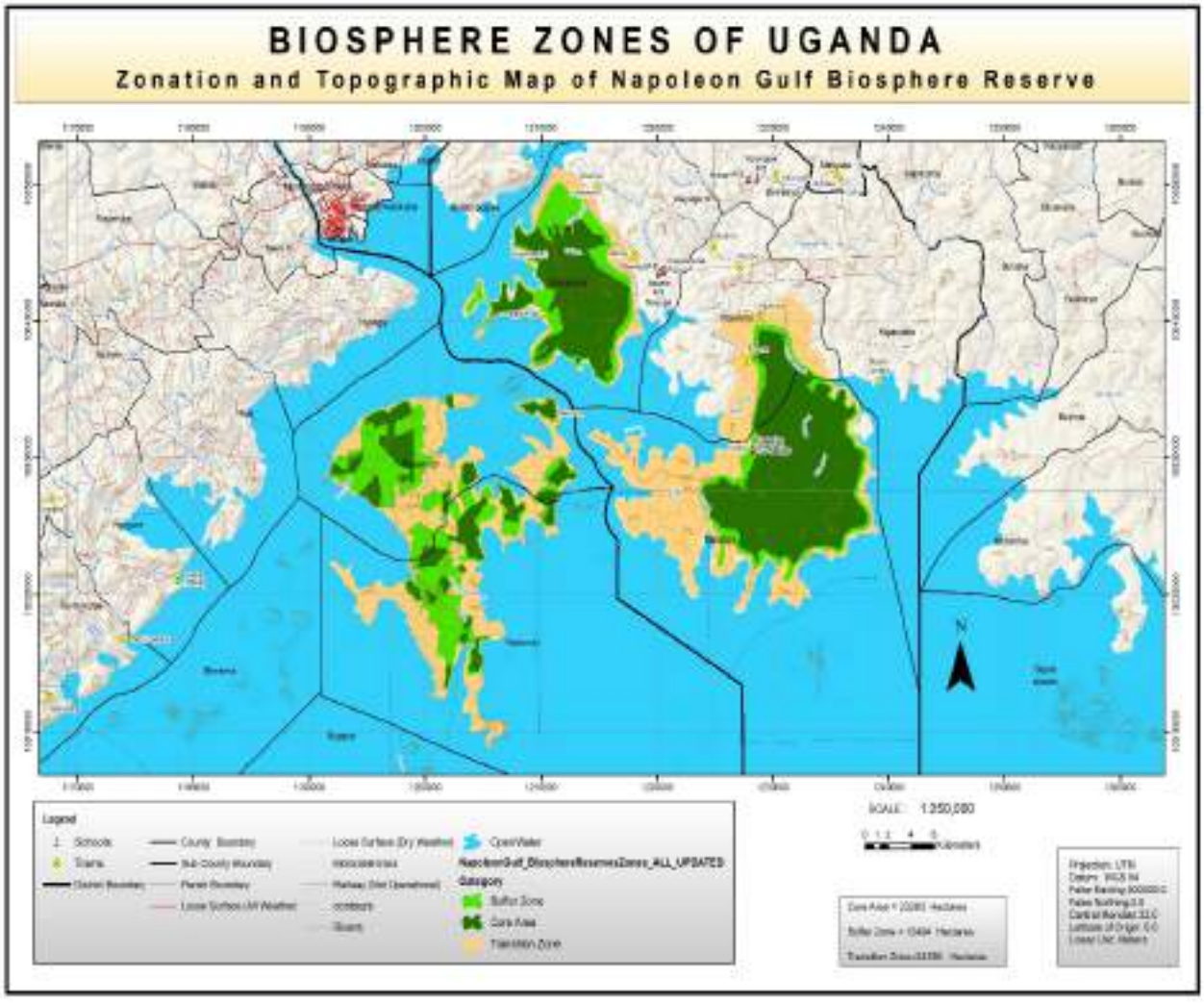


Figure 26: Topographic map and zones of Napoleon Gulf Biosphere Reserve

2.1.3 Macdonald Berkely Bays (Trans-boundary): 5125 km2.

This cross border ecosystem connects to Sio and Nzoia Rivers which feed into this Zone bringing along heavy agricultural residues in form of organic matter and pesticides from sugar cane, coffee, tea, and horticulture farms upstream. The littoral areas are well fringed with macrophytes mainly Papyrus, Typha, and Phragmites, and the bay has a variety of habitats, biodiversity, and a range of economic activities. A number of wetlands drains into Macdonald Berkley Bay. This drainage system starts in Busia town as a small valley with a stream. The upstream part is all cultivated, the midstream is a wet grassland and the downstream part is a permanently wet papyrus swamp. There is no forest reserve in the neighborhood of this wetland so no zonation was done in this area.

Due to the ecological function of this wetland it should protected at least as a Ramsar Site or a Biosphere reserve.

Overview of Photos of Macdonald Berkely Bays Wetlands

The area covers a core zone of 1,965 hectares with a buffer zone of 6,317 hectares and a transition area of 20,492 hectares, the core zones comprises the wetland areas along the border, a buffer with degraded wetland areas and a transition zone predominantly subsistence areas within communities.

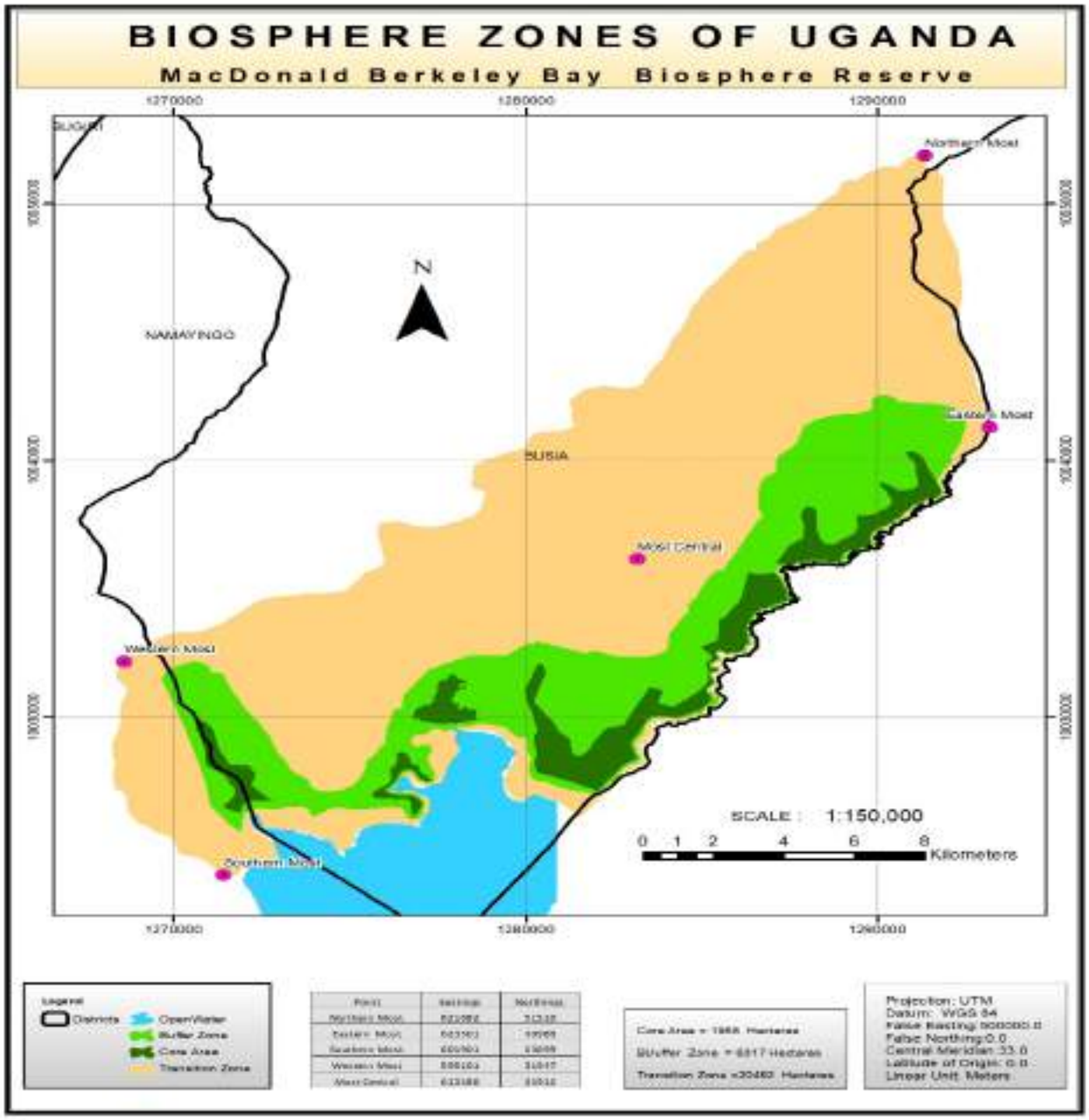


Figure 27: Zonation of Macdonald Berkely Bays Biosphere Reserve

The Topography of Macdonald Berkely Bays wetland systems comprises of gently sloping area at the border edge between Uganda and Kenya along river Sio which flows along the border with an elevation between 1100m-1200m above sea level with a close network with the mount Elgon ecosystem which is the major catchment for most of the rivers and streams that feed into the wetlands of eastern Uganda and western Kenya.

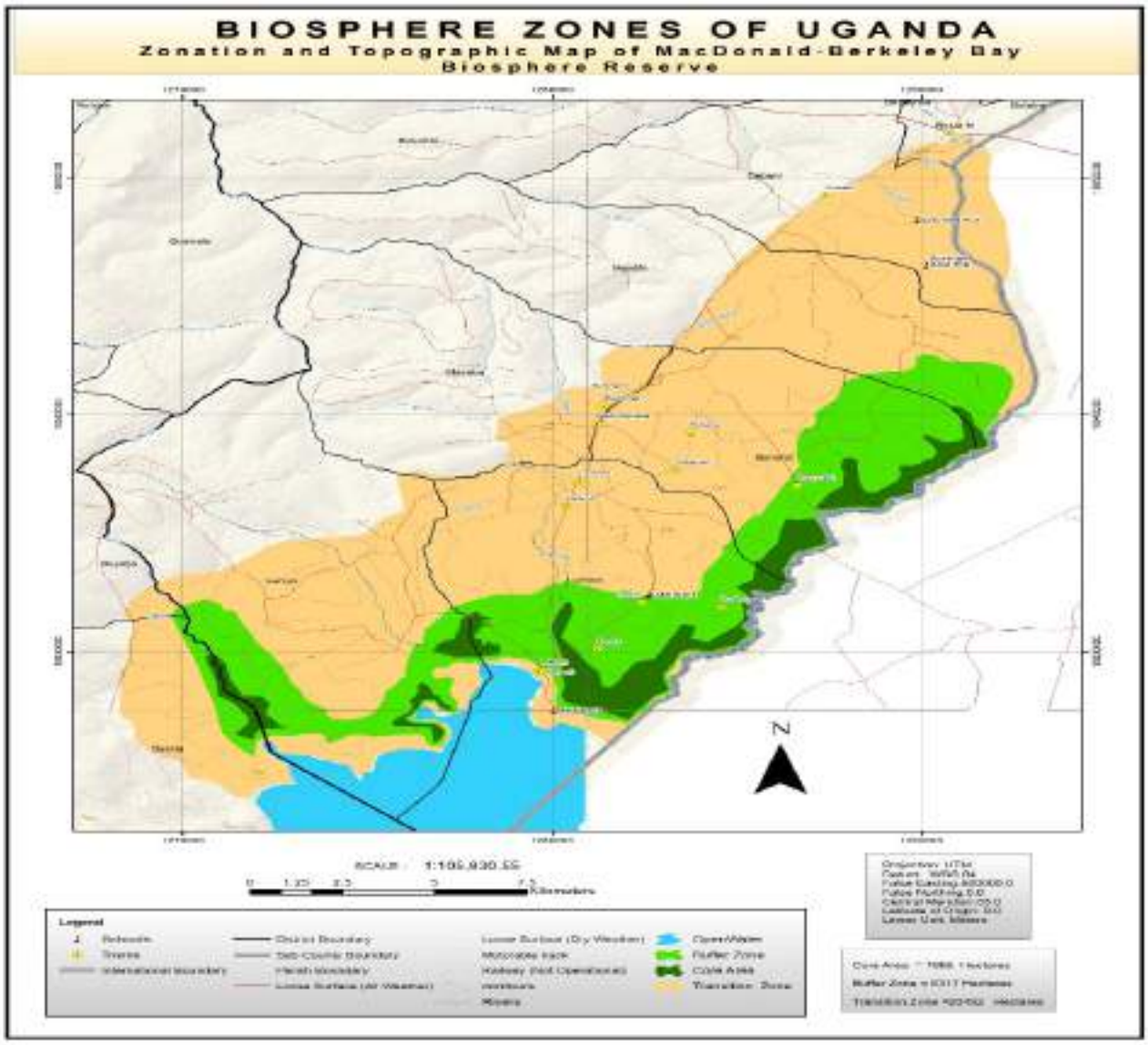


Figure 28: Zonation of MacDonald-Berkely Bay Biosphere Reserve.

3.7.0. CHALLENGES, CONCLUSIONS AND RECCOMENDATIONS

3.7.1. Challenges.

- The lake's dynamically fragile ecosystems continue to be degraded with pressure from human activities and the need to sustain the ever increasing population. The Lake Victoria basin has experienced huge ecological changes over the past eight decades. With the continuously increasing urban developments the need to strengthen protection is key.
- Unsustainable agricultural practices, over-fishing, pollution, commercial farming, rampant conversion and destruction of wetlands in ecosystems such as Lake Victoria and surroundings. For instance, in parts of the Murchison Bay catchment of the Lake Victoria, different studies (Akurut et al., 2014; Banadda et al., 2009; Haande et al., 2011; JTR, 2015; Mbabazi et al., 2010) have reported the rising levels of pollution and its increasing impact as a result of expansion of Kampala city, wetland area transformations, poor agricultural practices and deforestation.

- The high level of ecosystem fragmentation and degradation hinders zonation, many sensitive ecosystems have been destroyed, evidences of deforestation of forests, wetland destruction in urban areas and overgrazing on some landscapes.

3.7.2. Conclusions

This study has generated zonation and topographic maps required as a necessity to promote the nomination of Lake Victoria Basin Ecosystem (LVBE) for consideration by UNESCO for designation as a Biosphere Reserve. The ecosystems have been zoned following guidelines documented in the baseline report. It has also been observed that there is large area of valuable diverse ecosystems and habitats that qualify for buffer and transition zones and smaller areas that qualify for Core Zones, the ecosystem fragmentation and current land use cover played a very important key role in zonation of the Biosphere Reserve.

The degraded forests that protect the lake shores requires restoration with afforestation programs in the transition and buffer areas. The size of the basin is adequate to guarantee the three functions of BRs (conservation, development and logistic support) and the functionality of Core and Buffer Zones.

3.7.4. Recommendation's

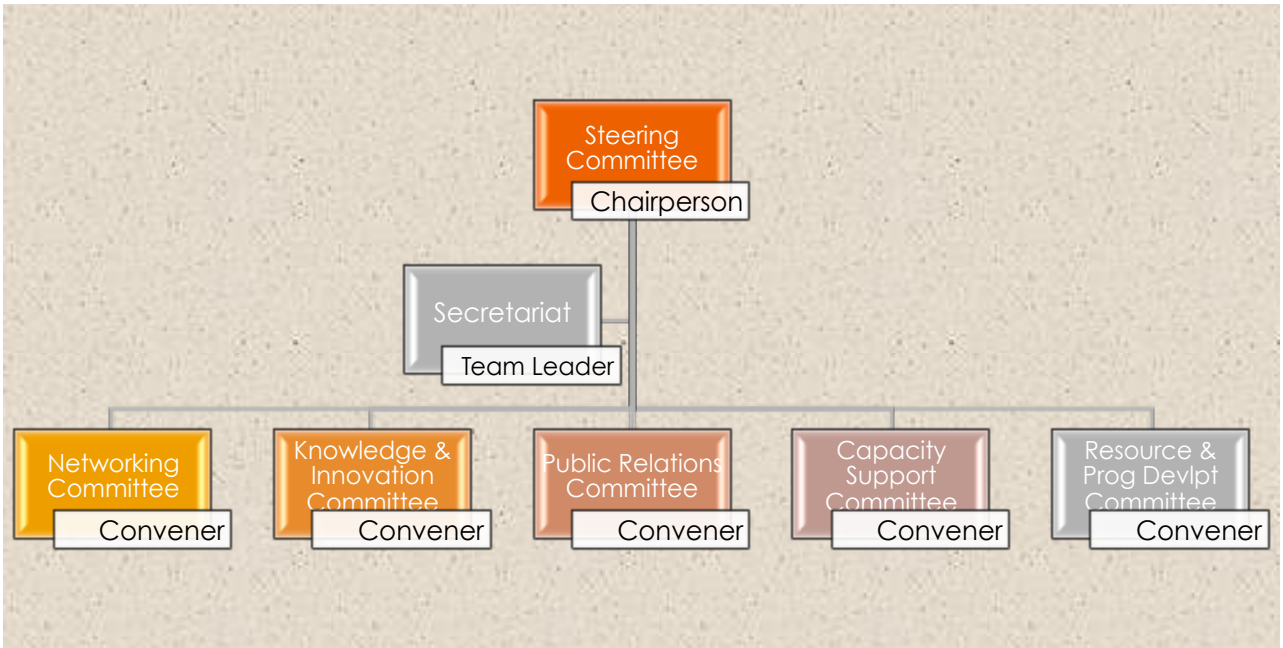
- The GIS experts recommend that the (16) zones of the ecosystem that have been identified and zoned with topographic details be designated as biosphere reserves per the requirements of biosphere reserves, due to their role in conservation.
- The areas carry many of the endemic birds, trees and fish species, but faces heavy intensive fishing pressure and deforestation with unique variety of habitats including riverine habitats, forests, wetlands, sheltered littoral zones, variety of substrates such as muddy, sandy, and rocky bottoms which requires sensitive protection both locally and internationally.
- The ecological sites zoned need urgent designation and provision of livelihoods to reduce dependence of communities on this ecosystem for sustainable protection and conservation of the ecosystem.

4.0. PARTNERS

These include: The Lake Victoria Basin Commission ("LVBC"), a specialized institution of the East African Community (EAC), the Lake Victoria Fisheries Organization (LVFO), the Kagera Basin Organization in Rwanda, the Nile Basin Initiative, the Government Ministries responsible for Tourism, Wildlife and Antiquities, Water and Environment, Fisheries and Aquatic Resources, Community and Social Development and Local Governments, Government Agencies, various United Nations Agencies, Civil Society Organizations and the Private Sector will all be partners in the project supporting the AU Agenda 2063 and its Ten-Year Implementation Plan (2013-2023)(02008).

4.1. Proposed Organogram for the LVBE Management

The organogram below was presented by the Lake Victoria Lead Partners as the propose coordination and cooperation structure for the Transboundary Biosphere Reserve.



4. 2. Further Presentation by the Partners

4.2.1. Prersentation by the Lake Victoria Basin Commission (LVBC)

The LVBC was established under the EAC Treaty of 1999, article 114, 2b (vi). The 2003 protocol provides legal and institutional framework for development intervention in transboundary LVB.

The presentation gave background to the LVBC, the projects being undertaken., the challenges and its unique position as the organ of the EAC for implementation of activities in the LVBE and the readiness of LVBC to take up and support the nomination of the LVBE TBR.
The detailed presentation is in Annex 6.

5.0. Validation of the Reports from the Mapping and Zonation

The purpose of the meeting was to receive progress reports, share information on successes and challenges and propose a way forward in supporting the nomination of the Lake Victoria Basin Ecosystem for designation as a Trans-boundary Biosphere Reserve. The specific objectives were to;

i. Receive from the Consultants, the drafts of the detailed topographic maps and proposed zonation of LVBE as a TBR;
ii. Share ideas on the proposals for establishing a comprehensive mechanism for coordination of stakeholders including legal, policy and institutional frameworks.
iii. Share a draft Reference/Training Manual for building the capacity of the stakeholders associated with the Lake Victoria ecosystem to ensure effective and sustainable management.
iv. Learn from Stakeholders about any existing Action Plans with view to planning for each of the sites zoned/to be zoned as BR;

5.1. **Opening Remarks buy Secretary General**

On behalf of the Uganda National Commission for UNESCO (UNATCOM), the East African National Commissions for UNESCO (EANATCOMs) and on her own behalf, the Secretary General who presided over the meeting welcomed participants to the hybrid (online and Physical) workshop organized for stakeholders' consultation and validation of reports. She informed members about UNESCO's founding in 1945 soon after the Second World War, the mandate to build peace in the minds through its four fields of competence namely Education, Sciences, Culture and Communication & Information, five Programmes of Education, Natural Sciences, Social and Human Sciences, Culture and; Communication and Information and that the project on Lake Victoria nomination as a Transboundary Biosphere Reserve is an intervention under the Natural Sciences Sector especially its Strategic Objective of promoting (international) scientific cooperation on critical challenges to sustainable development through generation and sharing of knowledge on natural resources, and capacity development through scientific collaboration for the protection and sustainable management of terrestrial ecosystems, biodiversity and freshwater security. She mentioned the participation of the National Committees of the Intergovernmental Scientific Committees namely the Intergovernmental Hydrological Programme (IHP), the Man and the Biosphere Programme (MAB) and the International Geoscience Programme (IGCP) in the meeting.

She informed members that the project was in its second phase. The first phase of 2018-2019 biennium conducted a baseline survey that recommended topographic mapping and zonation, a requirement for designation of all Biosphere Reserves that this second phase thus undertook, executed by experts in Geographic Information System (GIS) identified by each of the 5 Members States' National Commissions.

5.2. OVERVIEW AND OBJECTIVES OF THE WORKSHOP

An overview about the project was presented by Dr. Dominic Venture Mundrugo Ogo Lali, the Assistant Secretary General said that the lake is one of the largest lakes in Africa with a Basin Ecosystem covering the 5 EAC Countries, the largest tropical lake in the world, and the 2nd largest freshwater lake in the world with surf area 26,560 Sq. Miles (68,800 Sq. Km). He further highlighted the problems affecting Lake Victoria as follows;

i. Depletion of natural resources due to population pressure,
ii. Expansion in human activities-over-exploitation, unsustainable agricultural practices, over-fishing (intensive, non-selective), pollution, rampant conversion and destruction of wetlands, invasive exotic species.
iii. Drastic decline of biodiversity in general and fisheries in particular.
iv. Destruction of the native and endemic components of the lake.
v. Extreme change in the drainage basin vegetation,
vi. Pollution due to industrialization and agricultural development.
vii. Currently the basin is experiencing severe threats contributing to losses amounting to millions of dollars annually.

He linked the intervention to the EAC Environment Agenda which is "A Healthy Natural Environment for Present and Future Generations" and Articles 111, 112 and 114 of the EAC Treaty which provide for co-operation in environment and natural resources. He informed the meeting that EAC had already designated Lake Victoria and its Basin as an area of common economic interest and a regional economic growth zone to be developed by the Member States, and the five Partner States of the EAC namely, Kenya, Rwanda, Burundi, Uganda and Tanzania agreed on co-operation in efficient natural resources management.

He continued to mention that the Partner States share many terrestrial and aquatic ecosystems which are primary assets and a store of wealth - wildlife, flora and fauna, which if well managed, could contribute to poverty alleviation. He emphasized that the LVB is a Transboundary entity and needs a framework, which transcends national boundaries, for joint management as a shared resource.

On the basis of the above, He said that a number of options were considered: Heritage facility, Wetlands Facility (Ramsar sites), Geopark Facility or Biosphere Reserve. Analysing UNESCO's frameworks for peace building and the presence of settlements in the Lake Basin Ecosystem, the only appropriate scheme is the one that ensures sustainable development approach in line with the SDGs. Such a scheme in this case is the UNESCO Biosphere Reserves (BR) Scheme. Since the Lake is a shared resource across the borders of 5 Riparian States, this scheme by nomenclature: TRANSBOUNDARY BIOSPHERE RESERVE.

Regarding the tasks undertaken in the project in the previous biennium (2018-2019), sixteen (16) zones were identified by consultants and provisionally selected as follows: Burundi (1), Kenya (3), Ruanda (2), Tanzania (5), and Uganda (5). Ten (10) of the zoned sites are national while six (6)

zones are transboundary to 3 countries with each zoned site shared by two (2) countries. In Kenya the MAB Committee nominated alternative sites. He also noted that there has also been work on possible management structure and roles (appropriate Organogram), Dr Dominic then informed the meeting that each of the 5 Members States National Commissions designated a consultant to undertake detailed topographic mapping of the sites indicated above. He further said that work had also been on-going in developing of a specific training manual for biosphere reserve stakeholders which could not be prepared in the past participation project.

5.3. PRESENTATION ON THE MAPPING AND ZONATION BY MEMBER STATES' GIS EXPERTS

This session was chaired by the Dr. James Njogu, Deputy Secretary General, KNATCOM who represented the Secretary General, KNATCOM. He a few remarks on behalf of the SG, KNATCOM. He welcomed all members and noted that KNATCOM was delighted to take part in the regional meeting to discuss the nomination of Lake Victoria Ecosystem as a UNESCO Transboundary Biosphere Reserve joining the work of Mt. Elgon that has been in the process of Nomination. He noted that the nomination is very important since Lake Victoria spans a number of countries particularly the Eastern African Region. He further appreciated LVBC for the role they are playing, appreciated all the East African NATCOMs for taking part in the work being carried out and specifically appreciated Uganda National Commission for UNESCO for spearheading the process of nominating Lake Victoria as a transboundary Biosphere Reserve.

5.3.1. Presentations on the mapping and zonation by Member States

5.3.1.1. Kenya

The presentation was made by Mr. Peter Hongo, GIS Expert from Kenya, who informed the meeting that only three sites were identified in Kenya i.e., Kakamega, Ndere and Ruma proposed Biosphere Reserves. The presentation concentrated on the background Information about Lake Victoria and its nomination as a transboundary Biosphere Reserve, zonation and mapping, description of the identified sites, benefits of the identified sites to the communities, research currently undertaken by local scientists and researchers within the identified sites as well as the exceptional values i.e., scenic, cultural, social and biodiversity of the identified sites.

The presentation also outlined the challenges faced during the zonation and mapping as follows;

1. Geospatial data
    - Putting together diverse data due to disparity in coverage
    - Difference in data compatibility
    - Inconsistent data quality
    - Data Confidentiality
    - Different data coordinate system such as Cassin

5.3.1.2. Tanzania

The presentation was made by Ms. Amina. A. Hamad, GIS Expert, Tanzania and it focused on the background information about Lake Victoria and its importance, mapping and zonation of sites.

The presenter emphasized that the objective was to develop detailed topographic maps with clearly marked zonation for the Lake Victoria Basin Ecosystem based on the UNESCO Biosphere Reserve Principles in consultation with the residents and other stakeholders.

Five (5) zones which have been identified as Biosphere Reserves in Tanzanian basin was mapped.

- The Mara-Shirati Bay Biosphere Reserve (Trans-boundary)
- Speke Gulf Biosphere Reserve Zone
- Mwanza Gulf Biosphere Reserve Zone (4610 km2)
- Emin Pasha Gulf Biosphere Reserve Zone (9795 km2)
- Kagera-Rubafu Bay Biosphere Reserve (Trans-boundary) (9584 km2)

5.3.3. Rwanda

The presentation was made by Eng. Surv. Jean Pierre Habiyaremye, GIS Expert, Rwanda and the presentation also looked at the background information about Lake Victoria and its benefits to the communities.

3 sites were identified by Rwanda for mapping and zonation and these were; Upper Nyabarogo, Rusumo Falls and Kagera-Rubafu Bay.

It was noted that work was not complete and this was attributed to delay of transfer of funds from Uganda to Rwanda. GIS Expert was urged and requested to do the work by all means possible as the issue of funds transfer is being sorted. It was agreed upon that in five days, Rwanda NATCOM and GIS Expert will do the work and the report will be submitted to UNATCOM in five working days.

5.3.4. Uganda

The presentation was made by Mr. John Diisi, GIS Expert Uganda.
Five areas in Uganda were Selected:

- The Sango Bay (Trans-boundary) 9584 km2.
- The Sesse Islands: 80 islands and measuring 4842 km2.
- Murchison Bay: 991 km2
- Napoleon Gulf
- Macdonald Berkely Bays (Trans-boundary): 5125 km2.

The presentation highlighted the Methodology of mapping as follows;

- Land cover to identify different land cover types
- Rivers for drainage
- Contours, digital elevation Model for terrain

- Lake Victoria catchment boundary (Lake Victoria. Water management Zone)
- Administrative units (Districts and Sub-Counties)
- Forest Reserve boundaries
- Roads
- Selecting which areas to demarcate into Core, Buffer and Transitional Zones
- Ground Truthing the selected Biosphere Reserves

The presentation also showed the results of mapping using pictures and also highlighted the challenges faced;

- Continuous degradation in water and on land
- Population pressure on Natural Resources
- Inadequate law enforcement due to human and material resources
- Very few pristine ecosystems in the selected Biosphere Reserves

5.3.5. Burundi

The presentation was made by Mr. Tatien Masharabu, GIS Expert, Burundi. The presentation focused on the methodology of mapping, the work so far done and challenges faced such as limited allocation, delay in transferring funds

More work to be done;

- Field work to conduct data
- Stakeholders' consultation engagement
- No harmonized format of zonation map

It was observed that Burundi still has a lot of work to do in terms of mapping and zoning. The GIS Expert was requested and urged to do field work and provide the detailed map and zonation before the 31st March 2022

5.4.0. SESSION THREE:

5.4.1. PRESENTATION OF THE RESOURCE MANUAL FOR TRAINING COMMUNITIES IN THE LAKE VICTORIA BASIN ECOSYSTEM.

This was presented by Mr. Cale Santus from National Curriculum Development Centre; he took members through the Lake Victoria Basic view using google Earth https://earth.google.com/web/@0.35409582,32.62737341,1214.88405556a,1101.21975612d,35y,0h,0t,0r

The presentation focused on the concept of a Resource book and it was defined as a book developed to respond to a particular need.

Any Resource book much have a title and the Title suggested; Lake Victoria Basin - As A Transboundary Biosphere Reserve: Resource Book for Community Sensitization.

The presentation also looked at the need for sensitization, the characteristics of the Target audience, the users of the resources book, purpose of the Biosphere Reserve Resource book, considerations in the development of the Resource book, and components of the resource book.

The progress so far done regarding the resource book development as presented;

- Development of the Ugandan RB
- Book structure developed for the whole basin
- Populating the book structure in progress
- A number of text resources secured

What next;

- Through the NATCOMS, writeups about the identified BR sites be shared for inclusion and, the roles of other stakeholders be forwarded for integration
- Draft material be shared for confirmation and input of different stakeholders
- Piloting of material
- Inputting observations from the pilot
- Final material

6.0. DISSEMINATION OF THE ZONED TOPOGRAPHIC MAPS FOR CONSENSUS-BUILDING.

6.1. Welcome Remarks from Secretary General, UNATCOM, Ms. Rosie Agoi

The Secretary General welcomed the Chief Guest, the Right Hon First Deputy Prime Minister, informing her about UNESCO and the National Commission establishment, mandates and strategic operations. She told the Chief Guest that in undertaking this regional project, the East African National Commissions for UNESCO (EANATCOMs) led by the Uganda National Commission (UNATCOM) are also exercising UNESCO's roles of laboratory of ideas and foresight, standard-setting, capacity-building and catalyst of sustainable on the region-wide issues affecting our major freshwater lake, Victoria (Nyanza in Kenya, Nalubaale in Uganda). It is in the same spirit that the workshop was focused on consensus building. On behalf of the colleagues in the other four NATCOMs, she invited the Chief Guest to contribute ideas towards the work being undertaken to help in the realization of the objectives of the project. She thanked the Chief Guest, the various participants and colleagues, the Secretaries General of the NATCOMs of Burundi, Kenya, United Republic of Tanzania and Rwanda for the collaboration and supporting the project which was initially conceived by Uganda for the Region. She then invited the Chief Guest to address the participants and officially open the dissemination and consensus building workshop. You are most welcome.

6.2. OFFICIAL OPENING BY THE CHIEF GUEST, FIRST DEPUTY PRIME MINISTER AND MINISTER FOR EAST AFRICAN COMMUNITY AFFAIRS, RT. HON. REBECCA KADAGA

The Rt. Hon. Rebecca Kadaga, the first Deputy Prime Minister and Minister for East African Community Affairs who officiated at the opening session on behalf of her Ministry, the East African Community Ministers in the Region and on her own behalf welcomed all participants to the hybrid (online and Physical) workshop which was held to disseminate and build consensus on the proposed nomination of Lake Victoria Basin Ecosystem as a Transboundary Biosphere Reserve.

She was glad to know that the National Commissions for UNESCO (NATCOMs) as the interface of UNESCO with the Member States were the ones behind the important project that is meant to contribute to further integration of the people of East Africa through joint management of shared natural resources, which is both in line with the objectives of UNESCO and the East African Community and the Continental African Union Vision of building the Africa we want. The intervention falls within UNESCO's Strategy for Priority Africa that support the AU Agenda 2063 and its Ten-Year Implementation Plan (2013-2023), and the EAC Environment Agenda.

The Rt. Hon. Rebecca Kadaga noted that Lake Victoria Basin (LVB) has an important ecosystem that stretches across the five East African Community (EAC) countries, and these riparian member states have already designated the basin as "an economic growth zone" that must be developed in a sustainable way (EAC 1993). She further said that besides Lake Victoria as a water body, the lake

basin has about fifty (50) satellite lakes, at least fifteen (15) major rivers that flow inti it, and 13,000 wetlands varying in sizes located along the main lake shores with some wetlands located in flood plains.

The Deputy Prime Minister and Minister for East African Community Affairs also informed the meeting that the fisheries resource supports the livelihood of over 3.5 million people and generate income. The Wetlands support a high diversity of plants, animals, and soil types and are used for crop production, livestock husbandry and sewage treatment. They also serve as water reservoirs and assist in maintaining water regimes, climate patterns, and soil conservation, besides buffering inputs from the basin into lakes and rivers as they strip silt, nutrient, pollutants, and toxins. However, the Lake has been facing major threats that include: declining water levels due to reduced rainfall and increased evaporation, declining number of fish species diversity due to over-exploitation of the fish stocks, pollution, climate change and the effects of introduction of exotic fish species especially the Nile perch. Similarly, the rivers that are associated with the lake face catchment degradation, wastewater discharges, over-exploitation, drought and floods. Among the major threats to the land-based and water-based biodiversity in the Lake Victoria Basin is the increasing human population and demands it puts on the natural resources.

The Rt Hon. Rebecca Kadaga further noted that all the above problems call for a special management system that can help to protect the lake and balance the needs of the population and the needs for development and this calls for the interests of Local communities and other key actors providing them knowledge on with how they will utilize the biosphere reserve concept in their everyday lives, how they will benefit, and how they will eventually contribute to the goals of the Man and the Biosphere Programme and UNESCO is most well come.

In conclusion, the Rt. Hon. Rebecca Kadaga appreciated National Commissions for UNESCO for the cooperation and contribution to the fulfilment of the dream of the EAC. She appreciated Uganda National Commission for UNESCO in a special way for providing leadership. She pledged the full support of the Government of Republic of Uganda and she promised that the Ministry of EAC Affairs will work together with the Lake Victoria Basin Commission, the Ministries responsible for Water, Environment and Tourism and the National Commissions for UNESCO in the region to realize the objectives of the project. She officially declared the hybrid meeting open.

6.3. PRESENTATION ON THE MAPPING AND ZONATION

6.3.1.PRESENTATION OF THE NOMINATION PROCESS: INGREDIENTS, GAPS AND WAYFORWARD BY DR. DOMINIC MUNDRUGO OGO LALI (See Annex I)

The presentation looked at what a Transboundary Biosphere Reserves (TBR) is, the Ingredients/Elements of Nomination of TB: The Basics and Considerations, the Current Available information, Resources & Gaps and how to fill the Gaps for nomination.

Defining a TBR as an official recognition of political will of two or more States to cooperate on conservation and sustainable use of shared ecosystems through a coordinated management. LVTBR has 5 States as parties to the TBR (Penta-state TBR). As a TBR represents commitment of States to apply the Seville Strategy for BRs and its objectives, it provides general framework for action (National or Transboundary). A lot of requirements are involved and hence a nomination form has been designed to complement the national ones for each BR in-country.

In terms of basics, the considerations preceding nomination should include

a) Local support & vision of the local communities resident in the area and other key actors.
b) Location: Here three points are important

i) BRs/TBRs should consist of areas that are subject to special recognition and some form(s) of legal protection. The areas devoted to strict conservation objectives should not dominate the site /territory. The strict conservation areas should only form the Core but the adjoining areas called Buffer and then Transitional zones should differ and extend beyond those of regular protected areas and should all be suitable to allow for implementation of all three functions of biosphere reserves.

ii) A BR/TBR must be 'representative of a biogeographic region. The criterion of representativity is to ensure that the WNBR represents all biogeographic regions of the world. This is the first starting point for consideration.

iii) BRs/TBRs need to be important sites or sites of biodiversity significance at least in the Core area(s) as the second starting point and one of the key factors for designated by UNESCO. When the core area has significant biodiversity, the other zones that are "ordinary" make a positive difference that demonstrates a learning site for sustainable development and a model for other places, with great impact potential.

c) **Governance:** The BR/TBR governance structure should be effective, efficient and, wherever possible, flexible, democratic and inclusive of the various stakeholders (communities, entrepreneurs, governmental authorities, non-governmental organizations (NGOs), universities, schools, etc.). The structure should guarantee involvement in decision-making processes.

d) Funding: Is important for effective implementation of sustainable development. Diversity of financial sources ensure a reliable core budget over the long term, and be identified prior to the nomination process.

e) Activities (Management Plan): BRs/TBRs focus on balancing nature conservation with sustainable development for and with communities. Action Plan must enable the BR/TBR to fulfil the three basic, equal and mutually complementary functions: **Conservation, Development and Logistical Support**.

There is a TBR nomination form based on the Pamplona recommendations and only focuses on the transboundary aspects of the proposed BR/TBR. The form consists of parts that capture the required information.

6.3.2. RESOURCES, GAPS AND WAY FORWARD

Gaps to be filled and way forward were identified as follows;

Gap 1: Cooperation Agreement for the TBR: Not in place.
Way Forward: To be done in the Framework of EAC/LVBC.

Gap 2: **The official agreement between governmental authorities:** The various Agencies controlling sectors of the Lake (NEMA, UWA/RWA/URTWA, KWS, LVFO, NFA, NWSC, KBO, NBO etc)-T**o enter into cooperation agreements/MoU.**
Way Forward: *To be followed up by EAC/LVBC.*

Gap **3: A common workplan (**by the host countries): Not in place.
Way Forward: The EAC and LVBC existing W/Plans be put together for starting up the TBR.

Gap 3: A common workplan (by the host countries): Not in place. Way Forward: The EAC and LVBC existing W/Plans be put together for starting up the TBR.

Gap 4: Governance-All Stakeholders to resolve/build consensus on the Draft proposal by the Lake Victoria Lead Partners Team.

Gap 5: Management Plan-Consensus needed by all S/holders on existing Plan at EAC (Environment, Fisheries Sectors), LVBC (LVEMP), NBO, KBO-Need to share these plans.

Gap 6: Funding-Gov'tal/PSOs/CSOs/Partners-Identify Projects. Consensus needed on possible funding mechanisms
The TBR nomination process can be implemented in either of two ways:
a) A TBR established as two or more separate BRs in individual countries, before being designated as a TBR.
b) A TBR established jointly by the countries concerned in one step when concomitantly designating the national BRs.
The Planned Strategy for this project is to use the second approach through the EAC/LVBC and the existing cooperation of EANATCOMs. This requires addressing Gaps 1-6 above working Together.

6.4. PRESENTATION OF THE COMBINED TRANSBOUNDARY BIOSPHERE RESERVE MAP WITH SITE-SPECIFIC ZONATIONS BY MS. AMINA A HAMAD, GIS SPECIALISTS, TANZANIA.

The Geographical Information System expert from Tanzania, Ms. Amina A. Hamad who compiled all the data from the shapefiles of the counterparts in the partner States of Burundi, Kenya, Rwanda and Uganda presented the compiled zonation map of all the

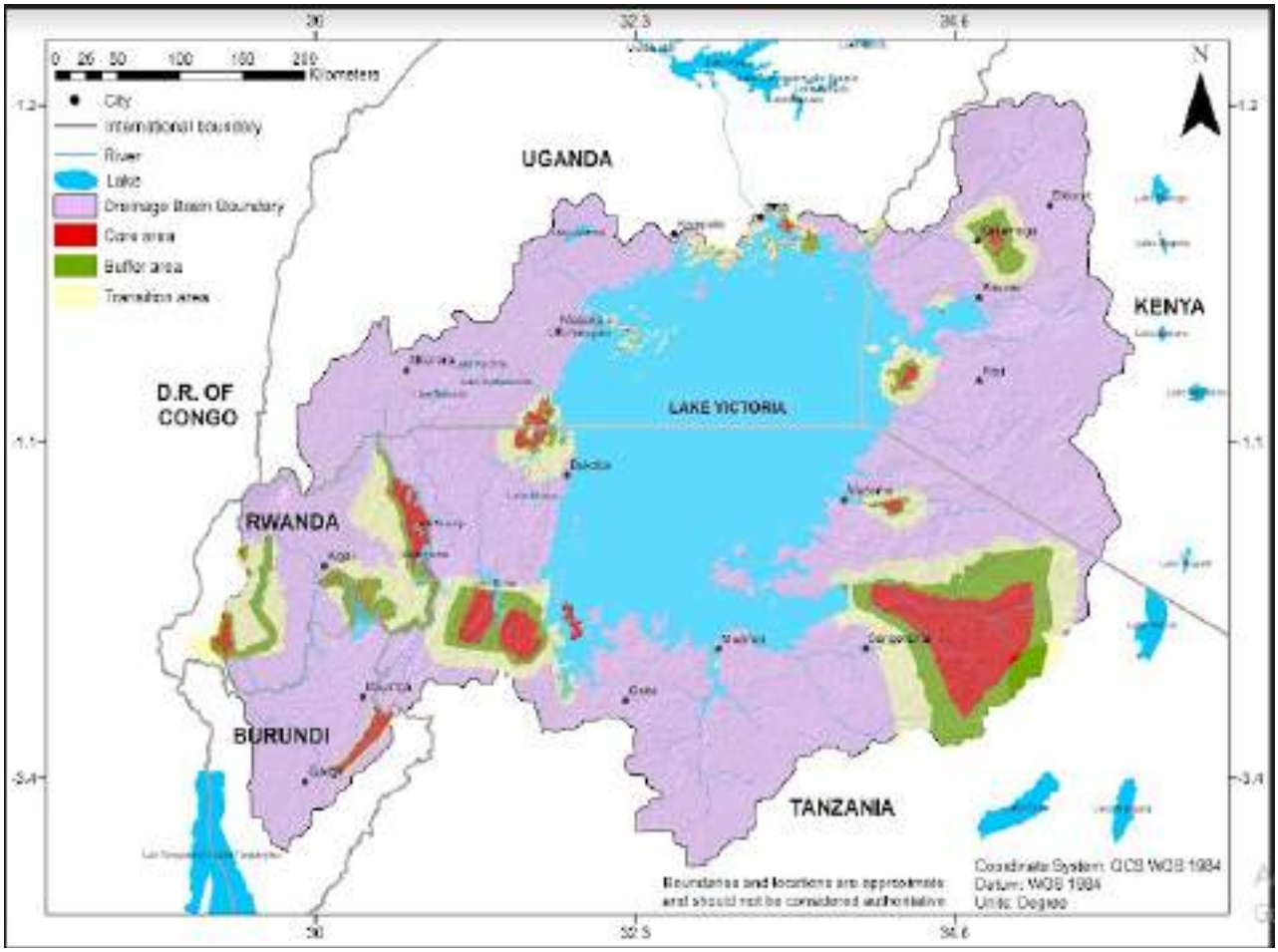


Figure 30: The Compiled Map of Lake Victoria Basin Ecosystem shwoing the mapped and zoned Sites that form individual Biosphere Reserves in the respective Countries

6.5. GENERAL MANAGEMENT/STRATEGIC PLAN FOR THE LAKE VICTORIA BASIN ECOSYSTEM BY EXECUTIVE SECRETARY/LVBC Ms. HILDA LUOGA

The presentation discussed the overview of LVB and LVBC, LVBC policies and strategic documents, the EAC shared vision and strategic framework for LVB, scope of cooperation with in EAC, LVBC governance structure, major development potentials and challenges, programme interventions. The detailed power-point presentation is in the **annex 6.**

6.6. CIVIL SOCIETY AND COMMUNITY ACTIVITIES IN THE LAKE VICTORIA BASIN ECOSYSTEM BY MR. MERCY SEBULIME

The presentation focused on the composition of the task team and report outline as follows;

- Section 1: Introduction:
- The task:
  Start 22/9/2020,
  Mandate of developing primary instruments necessary for grounding the revamp of the Forum.
- The tasks aimed at delivering'
  - concept note for the LVLPF complete with the structure for coordination
  - Draft constitution to govern the relationship and conduct of the Forum.
  - Suggesting 'quick-win' actions that would inspire the revamp of the Forum
- Section 2: Background
- Section 3: Summary Outputs
- Section 4: 'Quick-wins

The presentation also looked at the outline of instruments and the concept outline as follows;

- Introduction
- The Need for Lake Victoria Lead Partners Forum
- The Re-framing of the LVLPF
- Goal, Purpose, Focus Areas, Strategic Actions
- The LVLPF Partners
- LVLPF Structure
- Other Instruments
- Annex – Lead Partner Briefs

6.7. STATEMENTS FROM MINISTRIES, AGENCIES AND PARTNER ORGANISATIONS ON MANDATE IN RELATION TO THE INTERVENTION

6.7.1. Ministry of Environment, Rwanda by Mr. Theophile Dusengimana, Environment and Climate Change Policy Specialist.

He informed the meeting that together with National Commission for UNESCO, Rwanda and the Ministry of Environment has participated in data collection for baseline survey report. He noted that this is a big opportunity for Lake Victoria Basin Ecosystem to be nominated as a transboundary biosphere Reserve since it has a great contribution to the livelihood of the surrounding communities especially for economic, education, research and conservation. It will also contribute to the fight against climate change, conservation and development that will go together.

He noted that on the Rwandan side, the water resources are subdivided into 9 catchments out of which 7 are part of the Lake Victoria basin about 200800 Square KMs of the country. He hoped that when Lake Victoria Basin is nominated by UNESCO as a transboundary Biosphere Reserve, it will

lead to increased and long term cooperative efforts among member states, increased awareness on sustainable development across the region, increased funding opportunities to enhance conservation, research and also piloting restoration projects to protect and conserve the ecosystem.

He further noted that the Intervention is well understood, appreciated and supported and he promised that they will be technically involved to see this through and will coordinate other stakeholders in Rwanda to contribute whenever it is required together with the coordination of the National Commission to ensure that the nomination succeeds. He pledged the support of the Ministry of Environment in partnership with other institutions like the Rwanda Mining Company, Rwanda Water Board, Rwanda Forestry Authority all of which need to be involved in the coordination of efforts. He concluded that the Ministry was looking forward to working together with both Rwanda and Uganda NATCOMs to ensure success in the nomination process.

6.7.2. Ministry of Tourism, Wildlife and Antiquities, Uganda by Mr. Steven Fred Okiror

He appreciated all the previous presenters and noted so far it's a job well done however there is more that needs to be done. There are thematic areas i.e. Tourism, Wildlife and Antiquities as per the mandate of Ministry of tourism, wildlife and Antiquities and these areas are very important and critical and clearly connected to this intervention.

He noted that the Ministry alone cannot do much to put the ecosystem to its true potential without the involvement of other partners. As far as wildlife conservation is concerned, the Lake Victoria basic catchment has a lot of wildlife roaming freely and no protected areas around the Lake Victoria basin, he therefore noted that with the concept of TBR, all involved member states and organizations will work together to ensure that the wildlife is protected and conservation of Lake Victoria basic ecosystem is done sustainably. He emphasized the need for awareness especially for communities to appreciate the intervention and bringing all stakeholders on board.

He noted that Tourism is the greatest foreign exchange earner in Uganda and Marine tourism is increasing and becoming important, it is therefore the responsibility of the Ministry of Tourism to bring everyone on board since tourism is considered as everyone's business.

He noted that there is need to expand on the scope of stakeholder involvement within the Transboundary Biosphere Reserve for example Ministry of works and Transport Especially Maritime transport, Ministry of Energy and Mineral Development such that all stakeholders can optimally and sustainably utilize the water resources.

He informed members that the Ministry of Tourism is in full support of the initiative and it's their prayer that the potential to mobilise resources to drive the process faster would yield positive results.

6.7.3. Tanzania National Commission Statement by Ms Fatma Shaban

Apologized for coming late and delivered apologies from the Secretary General who could not attend the meeting due to other official engagements.

She commended EANATCOM's for the efforts put in to nominate Lake Victoria Basin Ecosystem as a Transboundary Reserve and she hoped that this nomination will maximize collaboration between East African Countries and also in protection of the environment sustainably.

She noted that there is need for extended cooperation in this regard and in other areas of interest of all member states. She appreciated everyone for listening.

6.7.4. Kenya Government Conservation Representatives

i) From the Forest Srvices Statement by James Mwamodenyi

He commended the initiative because it is a way of making member states involved to work together and in harmony. He assured members of their commitment in doing their part to make sure that the nomination process moves smoothly such that a record can set across the world of having a Transboundary Biosphere Reserve across five countries

ii) From Kenya Wildlife Services by Mr Solomon Kyalo, Deputy Director for Conservation Science Programmes

He commended the initiative as very important and timely urging the it should be taken forward. He pledged the support of his institution to ensure that the steps are taken to realise the objectives of the project. He said that his institution was looking forward to a completed process that would ensure the integrity of the identified sites are protected.

6.7.5. UNESCO Regional Office Statement by the Natural Science Specialist Dr. Samuel Partey

He noted that it has been a serious exercise and its evident that everything was in order. He congratulated all parties, institutions and relevant stakeholders involved and prepared the baseline report.

He informed members that the report has captured everything necessary for the nomination to take place and was confident that the report will meet the set criteria/requirement of the MAB Committee.

He emphasized that nominating the biosphere Reserve is very good for the member states however he was concerned that there after no one ever goes there to study anything and he recommended that there should be kind of a plan for conducting further studies to harmonize conservation and development. Studies like social economic value of the Transboundary Biosphere Reserve and how to mainstream sustainable tourism, environmental importance of the BR etc.

He informed the participants to benchmark and learn from a TBR project in Western and Central Africa that use similar undertaking for mobilizing resources to ensure promotioj of conservation to deliver on the objectives of the TBR.

6.7.7. UNDP Resident Coordinator Representative Uganda

The Representative observed protocol and delivered apologies from the UNDP Resident Representative H.E. Madama Elsie Attafuah who could not make it because of other urgent assignments.

He appreciated EANATCOMS for implementing the project and to spearheading the process of nominating Lake Victoria Basin Ecosystem as a mult state transboundary biosphere Reserve to strengthen cooperation among partner states of the East Africa Community.

He noted that the process is timely as the world faces the urgency to tackle the multidimensional challenges of climate change, land degradation and loss in biodiversity. Following the importance of the issue fifty years after the Stockholm Declaration, the UN General Assembly made a decision through two resolutions to convene an international meeting entitled :S tockholm+50: whose theme was “a health planet for the prosperity of all-our responsibility, our opportunity”. He noted that the intervention is fully in line with the global efforts and UNDP is fully aware of the strategic importance of the Lake Victoria Basin Ecosystem to countries and communities surrounding the lake.

He further said that Nature based solutions have emerged as an essential component of the overall global effort to achieve the goals of the Paris Agreement, the post 2020 Global Biodiversity Framework, the SDG’s and the United Nations Decade of Action to deliver the 2030 Agenda. The lake Ecosystem remain an important resource pool for economic development and in building climate resilience of societies. However, the state of the lake ecosystems and biodiversity which provide the foundation for nature-based solutions is declining at a very fast rate.

He further Noted that Lake Victoria is a critical ecosystem that is shared in the region and serve as the chief reservoir for major rivers and streams. It is the larges lake in Africa, as well as the world’s, largest tropical lake. The lake is reported to have warmed up by 1C due to climate change and this is creating low oxygen conditions, distributions of plankton, fish and the accumulation of toxins. Climate change is reducing the sizes of several species of fish and decline in indigenous fish species and actions must be taken swiftly to address this.

Additionally, like other shared ecosystems, there is high and rapidly growing population of 3.5 annually, surrounding the lake. Poverty levels are also high, and thus, high ate of depletion and degradation of the lake resources, and declining biodiversity especially fish population and diversity as the water temperature increases under climate change. The connection of the lake with the surrounding natural vegetation creates unique and suitable habitats for bid, crocodiles and hippopotamus.

The economic potential and the investment opportunities of the lake is well documented supporting one of the largest fresh water fisheries globally, and generates over 150 million dollars in export

earnings, employing about 200,000 people, and providing high quality fish proteins to about eight million people in the basin,

While there are regional institutional frameworks set up to support the governance such as the Lake Victoria Basin Commission and Lake Victoria Fisheries Organisation to share information and coordinate sustainable management of the Lake Victoria Basin, there is still need for measures to optimize the full potential of the lake and its contribution to the sustainable development agenda of the surrounding countries.

He applauded the countries of the Lake Victoria Basin Ecosystem for the bold steps taken in prioritizing and protecting of the critical ecosystem by promoting its nomination as UNESCO Man and Biosphere Reserve. He further noted that this offers great opportunity to improve human livelihoods, preserve important germplasms, and safeguard natural and managed ecosystems for human security.

In conclusion, he appreciated all experts who have developed the knowledge base and conducted the GIS mapping to inform the process for the nomination. Lastly, he appreciated the political leadership demonstrated by the regional commitment to safeguard the integrity and the health of the Lake Victoria and its surrounding ecosystem for posterity. He noted that UNDP will continue to support the intervention.

7.0. STAKEHOLDERS DISCUSSIONS AND RECOMMENDATIONS

It was noted with concern that there is need for strong partnerships especially with Lake Victoria Basin Commission (LVBC) for both technical and financial support to further facilitate and enhance the project. The Executive Secretary LVBC promised to look into this issue and provide support where possible.

It was observed that the extent to which a planned Biosphere Reserve can be determined when the catchment area is so huge was a challenge to most GIS Experts. They were advised to look out for the need for conservation, Development and Research to determine the extent to which to determine a planned Biosphere Reserve.

It was further noted that the distribution of wildlife in the different zones should be considered where wild life should be in the core zones where protection is strict and protected by the members' authorities in charge of wildlife such as Kenya Wildlife Service for Kenya, Uganda Wildlife Authority.

Further observation was that there is need for policies and regulation regarding the use and non-use of Lake Victoria Basin in all members' states to be consolidated in the resource manual.

The representative of LVBC pledged to take up the matter of TBR nomination and promised to talk to the various development partners the Commission is working with as well as present the matter to the Sectoral meeting.

That the management Structure presented was well organized but the leadership should be provided by government not Civil Society Organisation

The steering Committee structure/ Organogram presented by Civil Society Organisation was discussed and agreed that CSO's have a crutial role to play and it was welcomed, adopted and subjected to more work to make sure, it is inclusive of all stakeholders, and also subject it to UNESCO's guidelines as far as a transboundary Biosphere Reserve is concerned.

7.1 KEY ACTIONS FOR CONSENSUS

i. All stakeholders to join hands and the nomination process a success
ii. UNATCOM to reach out to partners/ stakeholders from all member states concerned from time to time for financial and technical support whenever required.
iii. It proposed that the Akagera area borering Rwanda with Tanzania be considered as a Transboundary Biosphere Reserve between Rwanda and Tanzania, therefore two countries concerned to take it up.
iv. On zonation and mapping, it was proposed that zonation areas near Jinja and Kampala be revised by the expert.

v. The report to have a proposed road map of the next steps which include the development of dossier, stakeholder consultations, MOU drafting etc.
vi. It was agreed that all relevant government MDA's take lead and then the Civil Society Organization are brought on board to support and representing the communities and other stakeholders

7.2. RECOMMENDATIONS

The following are some of the key recommendations made:

i. That fish breeding areas should be in the core zone and not buffer zones because the project in the core zone is strict and can protect the fish in the core zone.
ii. That the small-scale agriculture areas should be put in the transitional zone and not the buffer zone to avoid conflicts.
iii. That as most reports will be submitted in soft copies, where hard copy is needed the size of maps to be produces be rationally determined.
iv. That the LVBC appoints an officer dedicated to Biosphere Reserve issues as LVBC is best placed to lead the process for the nomination with the support of the National Commissions for UNESCO.
v. That the LVBC takes up the lead in tabling the TBR nomination issue with the EAC Council of Ministers as the representative pledged in her presentation so as to expedite the nomination process.
vi. That the resource book being developed for community sensitization and capacity building be translated into other languages such as Kiswahili, French for easy information sharing with communities.
vii. That the management Structure presented be adopted subject to the consideration that it is made inclusive of all relavant stakeholders in compliance with UNESCO guidelines for BRs and TBRs and leadership is provided by government not Civil Society Organisation.

7.3. WAY FORWARD

i. Rwanda and Burundi to submit their reports in five working days to UNATCOM Secretariat before 31st /03/2022
ii. The Secretariat to put together what was received from the three countries in close consultation with the Experts.
iii. All NATCOMs to review the resource book, identify gaps and share information with the consultant Mr. Cale Santus to fill the gaps identified in the Resource book.
iv. Where challenges were identified, measures, solutions and recommendations should be proposed by the Experts.
v. An emailing list of all experts and all participants to enable continuous engagements on Lake Victoria.
vi. GIS experts to refine zonation areas and provide more information to make them complete.
vii. The final report be compiled and work on the compilation of nomination dossier to begin immediately.

7.2. Remarks on behalf of the Secretary Generals of EANATCOM's by SG, Tanzania NATCOM, Ms. Fatima

She appreciated all participants and hoped that in the future the Lake Victoria will be a transboundary Biosphere Reserve between all East African Countries for sustainable protection of the area for the educational purposes, regional cooperation and sustainable development of all member states.

7.3. Remarks by the Executive Secretary, LVBC, Ms. Hilda Luoga

She appreciated all the participants and senior officials from partner states, consultants for making the time to participate in the meeting for nomination Lake Victoria as a transboundary Biosphere Reserve. She appreciated UNATCOM for spear heading the process and organizing and bringing all stakeholders together to deliberate on an important intervention for all member states concerned. She pointed out that the idea of Transboundary Biosphere Reserve (TBR) adds value to the work of the LVBC and fulfilling the mandate of LVBC. The TBR nomination is a quick win and entry point for expansion of partnership.

She noted that the process may take time because of its stakeholders' magnitude and she urged all involved to consider local involvement in order for the intervention to be accepted and appreciated. She recognized the support from UNESCO for assisting the EAC especially EANATCOMs to implement this important intervention. She pledges and committed LVBC support towards the nomination process both technically and financially when and where resources allow. She promised to present it to the Regional Council of Ministers to be held in May 2022 to gain their support and political will towards the Nomination process.

8.0. An Action Plan for each of the sites of the pluri-zoned TBR developed.

1. The Re-framing of the Lake Victoria Lead Partners Forum (LVLPF) Action Plan for the Lake Victoria Basin Ecosystem

Goal:
LVLPF will strive to contribute to the realization of the Shared Vision and Strategy for management and development of Lake Victoria Basin

Purpose:
To achieve the goal, LVLPF will endeavour to create a pool of competencies, knowledge, capacities and capabilities of the Partner Institutions majoring on their niche for the sustainable benefit of the populace and ecosystem of Lake Victoria Basin

Focus Areas
5: Natural Resource Mgt, Awareness, Knowledge & Innovation, Coordination, Joint Action

Strategic Actions:
6: Networking, Co-creation of knowledge, Capacity building, Institutional cooperation, public campaigns, Joint action platforms

2. The LVLPF Partners

The present partnership is constituted by;
Lake Victoria Basin Commission (LVBC), Nile Basin Initiative (NBI), Lake Victoria Region Local Authorities Cooperation (LVRLAC), UNHABITAT, UNESCO, East African Sustainability Watch Network (through Uganda Coalition for Sustainable Development (UCSD), Lake Victoria Fisheries Organization (LVFO), Nile Basin Discourse (NBD), Lake Region Economic Block (LREB), OSIENALA, Civil Society Urban Development Platform (CSUDP), ICLEI.

There is opportunity to provide a good platform for the establishment of a collaborative nectwork of the cities in the basin. An importabnt undertaking is to establish thematic groupings of stakeholders.

Resources for further Reading

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ANNEXES

ANNEX I: PROGRAMME FOR STAKEHOLDERS' CONSULTATION ON 29TH MARCH 2022

Venue for Physical: Board Room Ministry of Education & Sports 7th Fllor, Embassy House. All Others online.

Time	Sessions and Activities	Session Chair
8.30 - 09.30am	**Session One: General**	
8.30 - 09.00am **09.00-09.10am** **09.10-09.35am**	Registration, introductions and expectations Overview and Objectives of the Workshop -ASG Welcome and Official Opening Remarks: Secretary General, UNATCOM	UNATCOM Secretariat
09:35-12:00 Noon	**Session Two: Presentations on the Mapping and Zonation**	
09:35-09:45 am	Burundi GIS Expert	By the Secretary General- Kenya
09:45-09:50 am	Q&A	
09:50-10:10am	Kenya GIS Expert	
10:10-10:15 am	Q&A	
10:15-10:45 am	Tanzania GIS Expert	
10:45-10:50 am	Q&A	
10:50-11:05 am	Rwanda GIS Expert	
11:05-11:10 am	Q&A	
11:10-11:40 am	Uganda GIS Expert	
11:40-11:45 am	Q&A	
11:45-12:00 Noon	**General Discussions**	
12:00-12:20 pm	**Session Three: Presentations on the Resource Manual**	Secretary General, Rwanda
12.20-12:50 pm 12:50-1:00pm	Lake Victoria Basin Resource Book for Community Sensitization Question and Answer	
1:00-1:20 p m	**Management Arrangements: Management Plans of Existing Organisations in LVB**	Secretary General Tanzania
1:20-1:40pm	Lake Victoria Basin Commission	

1:40-2:00pm	Lake Victoria Lead Partners/Lake Victoria Regional Local Authorities Council (LVRLAC)	
2:00-210pm	Discussions and Resolutions on appropriate Arrangement for LVTBR	
2:10-2:20pm	**Wrap Up: Consensus on key actions and recommendations for Way Forward**	SG/UNATCOM
2:20-	**CLOSURE**	
	Remarks from the Secretary General, Burundi Remarks from Executive Director, LVBC and Closure.	Secretary General, UNATCOM
	DEPARTURE	

ANNEX 2:

PROGRAMME FOR SEMINAR ON THE NOMINATION OF LAKE VICTORIA AS A TRANSBOUNDARY BIOSPHERE RESERVE

Venue for 15 Physical: Board Room Ministry of Education & Sports 7th Floor, Embassy House. All Others online.

Time	Sessions and Activities	Session Chair
8.30 - 09.30am	**Session One: General**	
8.30 - 09.00am **09.00-09.10am** **09.10-09.20am** **09.20- 0940**	Registration, introductions and expectations Overview and Objectives of the Workshop -ASG Welcome and Official Opening Remarks: Secretary General, UNATCOM Official Opening by Minister for EAC Affairs	UNATCOM Secretariat Secretary General/UNATCOM
09:40-12:00 Noon	**Session Two: Presentations on the Mapping and Zonation**	
09:40-10:20 am	Presentation of the Combined Transboundary Biosphere Reserve Map with Site-specific Zonations . By One of the GIS Specialists(Tanzania or Uganda)	By the Secretary General- Kenya NATCOM
10:20-10:30 am	Q&A	
10:30-11:00 am	The Nomination Process: Ingredients, Gaps and Way Forward By ASG/UNATCOM	
11:00-11:10 am	Q&A	
11:10-11:40 am	The Current General Management/Strategic Plan for the Lake Victoria Basin Ecosystem By Executive Secretary/LVBC	
11:40-11:50 am	Q&A	
11:50-12:10pm	Civil Society and Community Activities in the Lake Victoria Basin Ecosystem (By Lake Victoria Lead Partners (LVLP)/Lake Victoria Regional Local Authorities Council (LVRLAC)	
12:10-12:30 Noon	General Discussions and Resolutions on appropriate Arrangement for LVTBR	
12:00-1:10 pm	**Statements from Ministries, Agencies and Partner Organisations on Mandate in relation to the Intervention.**	Secretary General, Rwanda NATCOM
12.20-12:30 pm	Ministry of Water and Environment-Rwanda, Burundi	

12:30-12:40p m	Ministry of Tourism, Wildlife and Antiquities-Tanzania, Uganda	
12:40-12:50 pm	Wildlife Services (Authority) -Kenya	
12:50-1:00pm	National Environment Management Authority-Rwanda.	
1:00-1:10 pm	UNESCO Natural Sciences Specialist, Nairobi	
1:10-1:20pm	UNDP Resident Representative-Uganda	
1:20-1:30pm	**Wrap Up: Consensus on key actions and recommendations for Way Forward**	Secretary General, Burundi.
1:30- 2:00pm	**CLOSURE**	
	Remarks on behalf of Secretary Generals of EANATCOMs by (SG-United Republic of Tanzania) Remarks from the Executive Secretary, LVBC . Closing Remarks from United Nations Resident Coordinator (RCC)-Uganda.	Secretary General, UNATCOM
	DEPARTURE	

ANNEX 3: PARTICIPANTS IN THE MAPPING AND ZONATION

1. PARTICIPANTS OF RIVER RUVUBU AS PART OF THE LAKE VICTORIA BASIN ECOSYSTEM TRANS-BOUNDARY BIOSPHERE RESERVE.

NO	NAME	TITLE	CONTACT
1	BAKUNDI NTWALI MARC	CHEF DE PARC	68936599
2	KEZAKIMANA JIANINE	PERSONNEL/PNR	62304022
3	NDAYISENGA OSILE	KEMITE COLINE	68987694
4	NYONKIRU ROGERS	CHEF ADJOINT	61133889
5	NKIRAMPIBA ANDER	MULTARINE	62989102
6	KINWA SYLVESTER	GUIDE TOURIST	69385690
7	EMMAUNEL NTAHONGOVERA	REP. LEGAL	61147228
8	NGEUDAKUBWAYU GERALD	ALCP URUMURI	678425894
9	LACYS LAC	ALOP UZUMURI	60660043
10	SCHWINGE CELINE	CUR PARIS	68985909
11	NRACONKURIKINA KIATALE	REP. LEG	69179432
12	MASHARABU TATIEN	AIE ASSOCIATION PEUCHHEAR	79982605
13	MARINANA COLERTIN		71688527
14			

2. STAKEHOLDER INVOLVED DURING FIELD DATA COLLECTION ON ZONATION FOR BIOSPHERE RESERVES IN TANZANIA IN MARCH 2022

NAME	**PLACE**	**CONTACT**	**POSITION**
Mr. Emmanuel Kisendi	Mwanza	0767 121 531	Director Lake Victoria Water Basin
Mr. Omary Myanza	Mwanza	0766 913 368	Forest reserve officer Mwanza region
Ms. Irene Kimaro	Mwanza	0756 766 751	Environmental officer NEMC Mwanza-Lake zone
Mr. Sospeter Luzangi	Mwanza	0674 037 833	Neighborhood chair in Rushamba village, Ngoma ward Sengerema district
Mr. Medard Byansi	Kagera	0689 985 057	Neighborhood chair in Rubafu village – Bukoba Region
Mr. Gration Ikanda	Kagera	0763 524 226	Village chairman in Rubafu village Bukoba Region
Ms. Sofia Sitamagunda	Kagera	0743 878 406	Bukoba DFC in Misenyi forest reserve
Mr. Braison Mkiwa	Kagera	0752 877 736 0757 216 849	Bukoba Forest officer in Minziro nature reserve
Mandalo Salum	Kagera	0754 816 076	Bukoba Forest officer in Rubale nature reserve.

Mr. Revodius Bishanga	Kagera	0714 013 009 0684 242 424	Officer in charge Lake victoria basin in Bukoba region
Mr. Anthony Matiko	Mara	0769 072 833	Forest reserve officer in Mara District
Mr. Joseph Urioh	Mara	0755 183 276	Forest reserve task force officer in Mara Region.
Mr. Wiston Agwaro	Mara	0688 680 607	Lake victoria basin officer in Mara Region
Mr. Yohana Mirumbe	Mara	0786 710 734	Director of Fisheries in Musoma Region
Ms. Aines Kamugisha	Mara	0756 859 137	Fisheries officer in Musoma district
Mr. Alli Said	Mara	0784 205 557	Fisheries officer in Musoma Region
Mr. Benedicto Nyamome	Shirati-Mara	0768 015 744	Neighborhood chair Shirati-Rorya district
Mr. Ladis Mbere	Shirati-Mara	0713 277 153	Villager-farmer in Shirati-Rorya district
Ms. Tausi Khitentya	Shirati-Mara	0685 669 040 0679 054 646	Director of Tafiri-Sota, Shirati-Rorya district
Mr. Petro Sweke	Speke Gulf	0767 979 880	Fisheries officer Bunda-Kibara district
Mr.Malulu Kulwa Masunga	Speke Gulf	0755 154 477	Fisherman Tairo village in Kibara-Bunda district
Mr. Mayala Juma	Speke Gulf	0765 080 078	Fisherman Tairo village in Kibara-Bunda district
Ms. Pendo Stephano	Speke Gulf	0747 882 899	Fisherman Tairo village in Kibara-Bunda district
Mr. Emanuel Kisosi	Speke Gulf	0762 388 347	Fisherman Tairo village in Kibara-Bunda district
Mr. Maginga Mwijarubi	Speke Gulf	0745 039 227	Fisherman Guta village in Kibara-Bunda district
Mr. Mpuya Lucas	Speke Gulf	0784 204 010 0753 887 398	Chairman in kalago village Lamadi-Busega district
Mr. Francis Balekele	Speke Gulf	0755 159 982	Neighborhood chair in kalago village Lamadi-Busega district
Ms. Suzana Kandolo	Speke Gulf	0789 415 239	Farmer in Lamadi Village-Busega district.
Mr. Mathias Godogodo	Speke Gulf	0653 143 034	Kianyari and Kialano forest reserve officer in Mwibagi village Butiama district

3. LIST OF RESPONDENTS/STAKEHOLDERS IN RWANDA.

No	Name	District/	Position
1	MUKAKAMARI Dancilla	NGO-ARECO Rwanda Nziza	National Coordinator
2	NIRAGIRE Ezechiel	Muhanga	District Environment Officer
3	KAYIRANGA Calliope	Muhanga	District Animal Resources Officer
4	KAYITSINGA Jean	Ngororera	District Forest and Natural Resources Officer
5	MUNYARUKIKO Aloys	Ngororero	District Environment Officer
6	USENGIMANA Philbert	Nyanza	District Environment Officer
7	BYIRINGIRO Emmanuel	Ruhango	Director of Agriculture and Natural Resources
8	RUGWIZANGOGA Dieudonné	Ruhango	District Animal Resources Officer
9	KABALISA Valens	Kamonyi	District Disaster Management Officer
10	MURENZI Samuel	Nyagatare	District Environment Officer
11	MUTABARUKA Fulgence	Nyagatare	District Agronomist
12	NGIRINSHUTI Fabien	Nyagatare	District Animal Resources Officer
13	MUHAWENIMANA Calter	Karongi	District Environment Officer
14	NGIRABAKUNZI Octavian	Kirehe	District Environment Officer
15	MUSONI Protais	Musanze	District Forest and Natural Resources Officer
16	NIZEYIMBABAZI Jean de Dieu	Burera	Director of Agriculture and Natural Resources
17	HARELIMANA Valens	Gakenke	District Forest and Natural Resources Officer
18	DUSHIMIMANA Monique	Gakenke	District Animal Resources Officer
19	SIJYENIBO Jean Damascene	Bugesera	Director of Agriculture and Natural Resources

ANNEX 4: VALIDATION WORKSHOP

LIST OF PARTICIPANTS DURING THE HYBRID (ONLINE AND PHYSICAL) REGIONAL CONSULTATIVE WORKSHOP	
Name (Original Name)	**User Email**
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ANNEX 5: PARTICIPANTS AT THE DISSEMINATION AND CONSENSUS BUILDING WORKSHOP

	First Name	Last Name	Email	Country	Organization	Job Title
1.	Abubakar	Kasimba	bacarykasimba@gmail.com	UG	Central division	Division mayor
2.	Akimana	Yvonne	akimanayvonne2020@gmail.com	RW	Geospatial solutions Ltd	GIS and remote sensing analyst
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						Programs
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60.	Thuita	Thenya	tthenya@yahoo.co.uk	KE	University of Nairobi	Snr Lecturer
61.	Tite	Niyitegeka	tite.niyitegeka@rmb.gov.rw	RW	RMB	Seismology Specialist
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63.	Tom	Guda	tguda2011@gmail.com	KE	Lake Victoria Regional BMU Network (EA)	Regional Chairman
64.	Twaha	Sempala	sempalatwaha@gmail.com			
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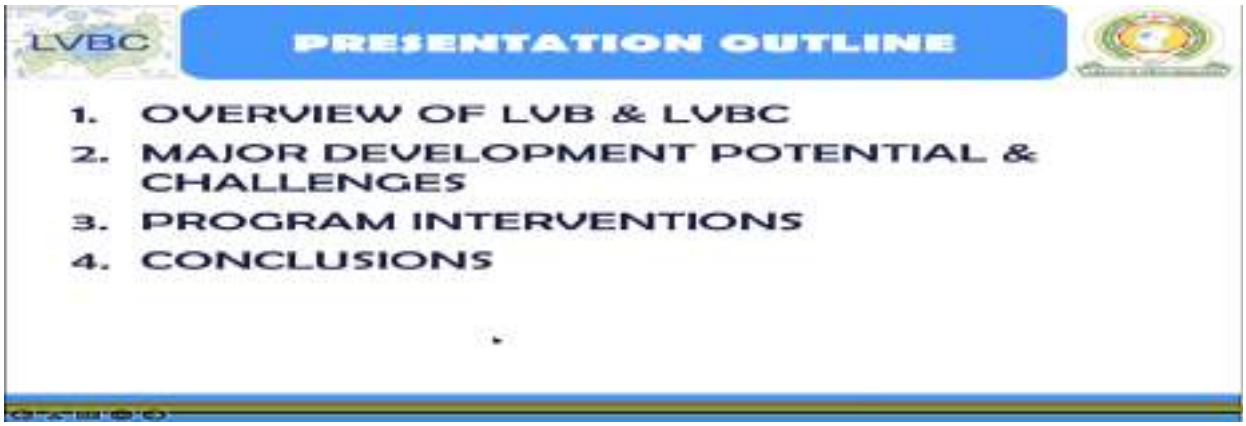
71.	Okiror Steven	Fred		UG	MTWA	Ag. PWO
72.	Johnson	Nkem		UG	UNDP	Senior Technical Advisor
73.	Nansikombi	Monica		UG	UNATCOM	Secretary
74.	Sebuliba Mercy	Steven		UG	LURLAC	Programs Officer
75.	Angela	Atukunda		UG		SIS
76.	Valentine	Owori		UG	MOES	I.T Officer
77.	Joan	Namono		UG	MOES	i.t Officer
78.	Pauline	Achola		UG	UNATCOM	PO/Sciences
79.	Daniel	Kaweesi		UG	UNATCOM	PO/Culture
80.	David	Twebaze	dtwebaze@unesco-uganda.ug	UG	UNATCOM	PO/ Education
81.	Kasolo	Henry		UG	UNATCOM	Driver

ANNEX 6: PRESENTATION FROM THE LAKE VICTORIA BASIN COMMISSION



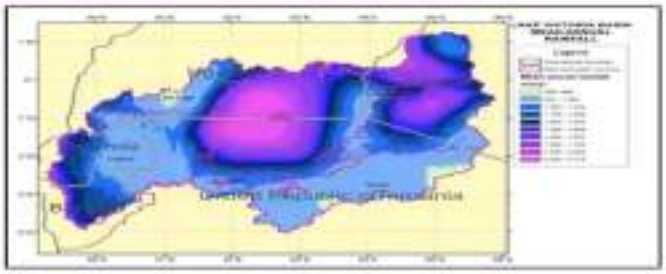
DESCRIPTION OF LAKE VICTORIA

Country	Flag	Lake Surface Area		Catchment Area		Lake Shoreline (4828 Km)	Population
		Sq Km	%	Sq Km	%	%	(million)
Tanzania		35,124	51	79,570	44	33	7.4
Uganda		29,613	43	28,857	15.9	50	7.5
Kenya		4,113	6	38,913	21.5	17	15.9
Rwanda		-		20,550	11.4	0	8.8
Burundi		-		13,060	7.2	0	5.3
Total		**68,870**		**180,950**		**100**	**44.9**

POTENTIALS IN LVB

RAINFALL:

- LVB has two rainfall seasons with the long rains from March to May and short rains from October to December
- Lake has great effect on rainfall in the basin
- Highest rainfall in the lake



The distribution of mean annual rainfall across the Basin

MORE FACTS ABOUT LAKE VICTORIA

Lake Victoria Drainage System:

- LVB comprises 11 defined Sub-basins (watersheds) includes:
  - Kagera River Basin;
  - Mara River Basin;
  - Simiyu River Basin;
  - The Nzoia Basin; and
  - Mara River Basin.
- Watersheds with largest flows in Lake Victoria:
  - the Kagera (32.7%); and
  - the Nzoia (14.6%)

Parameter	Figures
Surface Area	68,870 km²
Average Depth	40 m
Maximum Depth	84 m
Shore line length	4828 km
Volume	2,750 km³
Source of water	**Precipitation- 82%** **Rivers – 18%**
Loss of water	Evaporation – 76% **River Nile Outflow - 24%**
Water Residence Time	23 Years (P in P out)
Flushing Time	**123 Years (renewal)**

ABOUT LAKE VICTORIA BASIN COMMISSION

- LVBC is a specialized institution of the EAC
- Establishment of the Commission is provided for under Article 114 of EAC Treaty (1999).
- The establishment and operations of the Commission is governed by the Protocol for Sustainable Development of LVB (2003)
- LVB designated a Common Regional Economic Growth zone due to its huge environmental natural resources.

LVBC POLICY AND STRATEGIC DOCUMENTS

- The Treaty (1999): Article 114, 2 b (vi) Partner States agreed to establish a body for the Management of Lake Victoria;
- The Protocol (2003): provides the legal & institutional framework for development intervention in the trans-boundary LVB

NB: Article 3 gives provision for the 14 areas that the Partner States have agreed to cooperate in sustainable conservation and use of resources within the Basin

Other guiding Documents include:

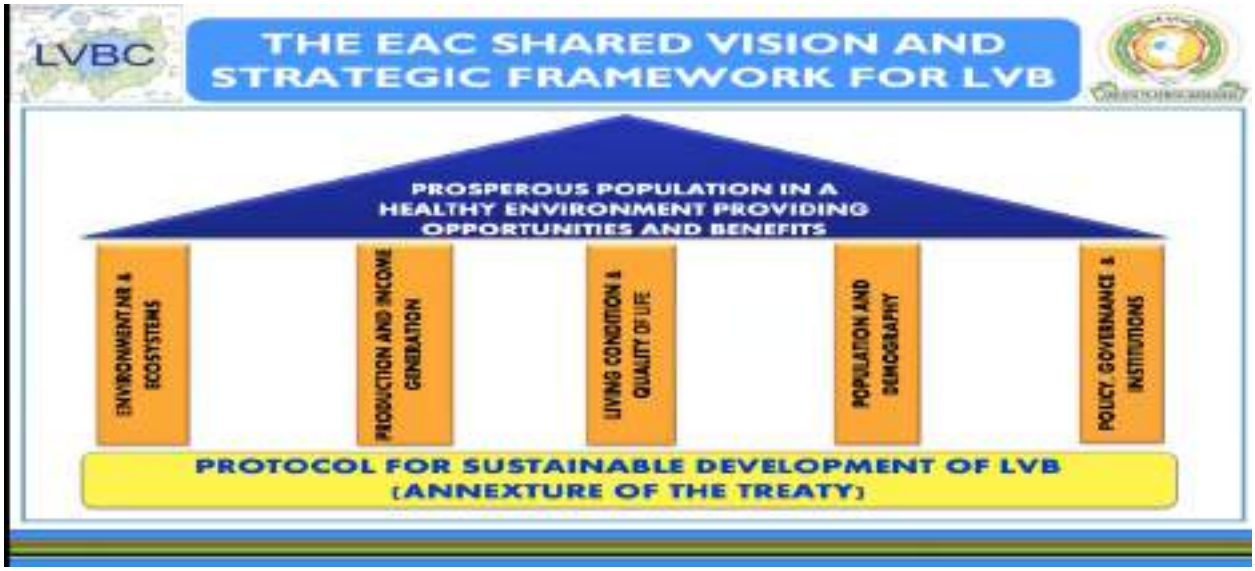
- Shared Vision & Strategy Framework of EAC
- EAC Development Strategy (2016/17 - 2020/21)
- LVBC Strategic Plan 2016-2021
- Sectoral Council & Council's Decisions & Directives
- Regional policies and strategies

Legal Frameworks for Transboundary Water Resources in Lake Victoria Basin (LVB), East African Community

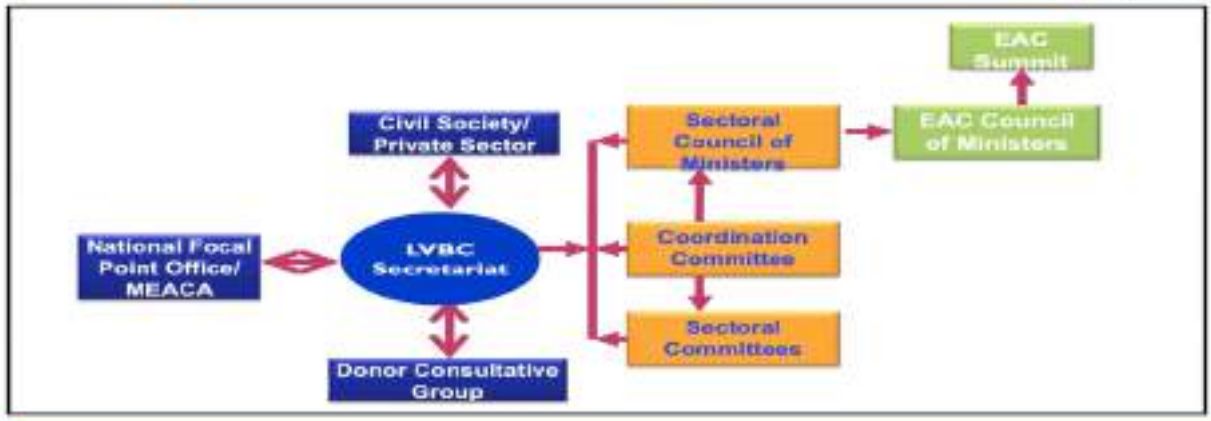
- **East African Community Treaty 1999 – Cooperation**
- **Water Scenarios to 2050**: Identify Climate Change (CC) will significantly affect future water availability in EA. Therefore, adaptation and mitigation to CC is an immediate and urgent regional priority.
- **EAC Climate Change Master Plan 2011-2031: Identifies water security as 2nd priority issue after agriculture and food security.** Strategic interventions include expansion of **transboundary cooperation on water resources management, regulation and governance in distributing water for domestic, industrial / energy, and agriculture, and advance water and climate information technology** (EAC-Secretariat, 2011a).
- **The EAC Vision 2050**: Articulates the dreams and aspirations of the EA peoples
- **African Union Agenda 2063:** which articulates the aspiration of all the people of the African continent; and
- **The Continental and Global Environment and Water Conventions such as SDGs**


LVBC
SCOPE OF COOPERATION
Defined under Article 3 of the Protocol (2013) for SD
14 areas provided for under the scope of cooperation:
1. Water resources management
2. Management of fisheries resources (convention establishing LVFO)
3. Sustainable agriculture and land use including irrigation
4. Sustainable management of forestry resources
5. Development and management of wetlands
6. Trade, commerce and industrial development
7. Infrastructure and energy development
8. Navigation safety and maritime security
9. Improvement of public health
10. Research, capacity building and information exchange
11. Environmental protection and management
12. Public participation in planning and decision making (governance)
13. Gender mainstreaming
14. Wildlife conservation and sustainable tourism development


LVBC
LVBC'S VISION, MISSION & OBJECTIVES
Vision
"A prosperous population living in a healthy and sustainably managed environment providing equitable opportunities and benefits"
Mission
To promote, facilitate & coordinate activities of different actors towards sustainable Development and poverty eradication of the LVB.
Objectives
A. Promote: Equitable economic growth,
B. poverty eradication,
C. Environment Conservation in the LVB.
D. Sustainable utilization of NRM within the LVB,
E. Safety of Navigation in Lake Victoria


LVBC
THE EAC SHARED VISION AND STRATEGIC FRAMEWORK FOR LVB
PROSPEROUS POPULATION IN A HEALTHY ENVIRONMENT PROVIDING OPPORTUNITIES AND BENEFITS
ENVIRONMENT & ECOSYSTEMS
PRODUCTION AND INCOME GENERATION
LIVING CONDITION & QUALITY OF LIFE
POPULATION AND DEMOGRAPHY
POLICY, GOVERNANCE & INSTITUTIONS
PROTOCOL FOR SUSTAINABLE DEVELOPMENT OF LVB (ANNEXTURE OF THE TREATY)

LVBC GOVERNANCE STRUCTURE



MAJOR DEVELOPMENT POTENTIALS WITHIN LVB

- **A source of water** for domestic, industrial use (about 87 cities and towns with 60% coverage);
- **Rich fishery resource** (2011: yielding about > 1million MT annually, Forex US$250 million;
- **Hydropower** potential (Produce about 720 MW)

POTENTIALS IN LVB

MINING ACTIVITIES

- Mining industry in the Basin is a major land use activity contributing about 2.3% of the GDP.
- Recently increased in the LVB with discovery of more gold, diamond, base metals, hydrocarbons (petroleum/gas).
- May have a negative impact on the environment because of pollution of the rivers/spills in the lake (flushing time quite long)

Mining activities in Nyamongo Gold Mine Tanzania

RICH AGRICULTURAL SOILS

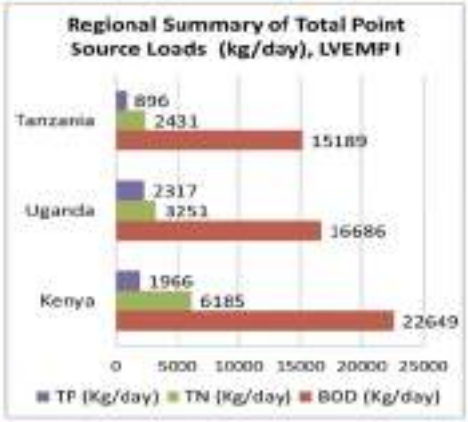
- **1.1 M ha of irrigation** - LVB is endowed with fertile soils ideal for a wide range of crops. It also falls within a good agro-climatic zone
- **Transport** - LVB is strategically connected through all modes of transport to outside market

ECOSYSTEM FUNCTION:

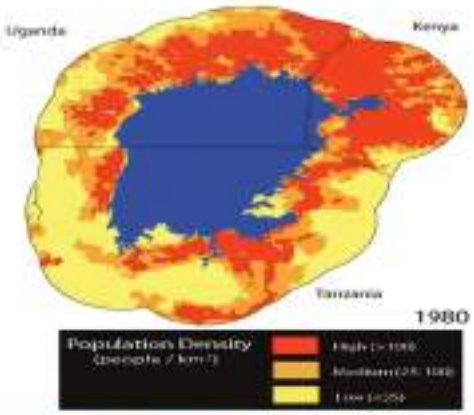
Support huge biodiversity; terrestrial & aquatic (Wetlands about 4,000 Km2), wildlife habitats for Mara/Serengeti (UNESCO World Heritage Site) of the most beautiful natural wildlife safari sites in the world (Est. income USD 270 Million annually)

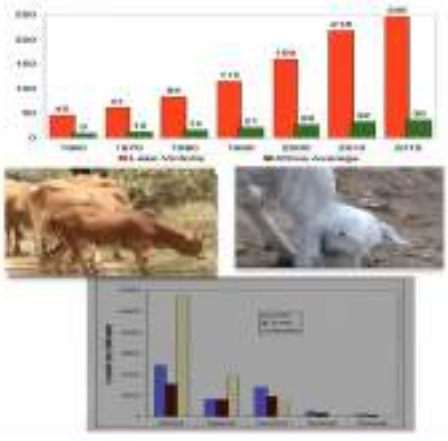
CHALLENGES AND STRESSES WITHIN LVB

- **Drivers for growth** (population growth, Urbanization)
- **Stresses from:**
  - **outside the basin** – deteriorating WQ –pollution and eutrophication; nutrients (N and P) atmospheric deposition, climate change
  - **within the lake** – over-fishing, untreated effluent, water hyacinth, cage culture, abstraction and release Fluctuating lake levels
  - **from the basin** – land degradation, pollution from agro-chemicals, sediment loads, poor solid waste management
  - **on littoral zones** – shoreline, conversion of wetlands, poor solid wastes management
- **Many stakeholders with different interest**
- **Climate change** (floods and severe droughts)



POPULATION GROWTH IN LVB





PROJECTS AND PROGRAMS
[ONGOING AND PIPELINE]

- The LVBC is implementing a number of projects/programmes in line with the 6 Strategic Plan Program Areas 4th Strategic Plan 2021-2026) to address the challenges in the Basin namely:
  1. ENR management;
  2. IWRM&D
  3. Maritime Transport, Safety and Security;
  4. Social Development; and
  5. Coordination and Institutional Strengthening

PROJECTS AND PROGRAMS FUND

PROGRAM AREAS	PROJECTS /PROGRAMS	FUNDING
1. ENR	▪ LAKE VIC ENV MGMT PROJECT ▪PREPARED, ▪ADAPTATION TO CC-LVB	▪WB ▪USAID/EA ▪AF/UNEP
2. IWRM&D	▪IWRM-LVB, ▪LVWATSAN, ▪TBFSM	▪BMZ, EU ▪AFDB ▪AFDB
3. MARITIME	▪MN LV COMM &TRANS PROJEC, ▪LAKE VIC TRANSPORT PROJECT	▪AFDB ▪WB
4. SOCIAL DEV	▪POP HEALTH AND ENVIRONMENT	▪USAID/EA
5. INVESTMENT	▪ LAKE VIC ENV MGMT PROJECT	▪WB
6. COORDINATION	▪PARTNER STATES, ▪ALL PROJECTS	▪BR, KE,RW,SS, TZ, UG ▪ALL ABOVE

PROGRAM INTERVENTIONS

PROJECTS	AREAS OF PROGRAM FOCUS	PC (USD)
LVEMP II	Environmental sustainability & Livelihood improvement and Policy harmonization (World Bank)	254 Million
LVWATSAN II	MDG target on WATSAN and Environmental Hygiene in 15 Secondary Towns (African Development Bank)	120 Million
PHE Program	Promoting the integration of population, health and environmental conservation initiatives (USAID KEA)	7 Million
PREPARED	Biodiversity, WASH and Climate Change (USAID KEA)	7 Million
MN LV MCT	Maritime communication and transport (African Dev Bank)	25 Million
IWRM-LVB	Integrated water resources management and development (KfW/EU) - infrastructure	33 Million
Green Growth (EPSGG)	Cleaner production mechanisms by private sector (NDF)	3.7 Million
ACC -LVB	Climate change adaptation/Smart Agriculture (UNEP/AF)	5.0 Million
SWP initiative	Sustainable management of water resources in the MRB	-
LVEMPIII (PL)	**Investments in collaborative environmental management (WB)**	**200 Million**
LVWATSAN III (PL)	**Upscale interventions in Water Supply and Sanitation to curb pollution in Lake Victoria (AFDB) – Preparations**	**1.7 Million**

PROJECTS & PROGRAMMES ACHIEVEMENTS

Name	Overall Objective	Achievements
LVEMP II	contribute to: (i) the improvement of the collaborative management of the transboundary natural resources of the LVB among the Partner States; (ii) the improvement of environmental management of targeted pollution hotspots and selected degraded sub catchments for the benefit of communities who depend on the natural resources of LVB.	improved livelihoods through the Community Driven Development (CDD) sub-projects approach, provided matching grants to communities organized, trained and strengthened by the project to promote local partnerships in addressing degradation of the watershed. Under LVEMP there are 714 approved CDD.
LVWARSAN II	to meet the MDG (and currently SDG) targets in water and sanitation to ensure the long-term sustainability of the physical interventions has been executed to support secondary urban centres in the basin to contribute to the reversal of the pollution of the Lake through the improvement of sustainable water supply and sanitation infrastructure in 15 secondary towns within the Lake Victoria Basin	• 32 boreholes (31) • Water supply improved for 783,470 residents of the 15 beneficiary towns (target 670,000 residents (+113,470))
Planning for Resilience in East Africa through Policy, Adaptation, Research and Economic Development (PREPARED).	to strengthen the resiliency and sustainability of East African economies, trans-boundary freshwater ecosystem and communities.	Undertook and completed VIA- LVB in five thematic sectors: agriculture, water, health, terrestrial ecosystems and energy/infrastructure. developed the LVB Climate Change Adaptation Strategy and Action Plan (LVB CCASAP) Resource mobilized – ACC – LVB Adaptation Fund.

SUMMARY ON PROJECTS & PROGRAMMES Continued

Name	Overall Objective	Achievements
PHE	to promote the integration of PHE Conservation initiatives in LVB. PHE operates with the assumption that people, their health, and the environment are interrelated and interdependent; changes in the number, state, and/or distribution of any of the above affects the other because human needs, their livelihood and a healthy environment are linked by chains of cause and effect.	Developed: • PHE Regional Operational Plan -LVB 2015-2020; • the PHE Monitoring & Evaluation Framework and Plan (2015- 2020); • Established PHE Stakeholders Forum
MLVMCT	to contribute to broad-based poverty alleviation and improvement of livelihoods of people through increased investment in maritime transport and fishing on Lake Victoria.	stablished maritime communications system for safety on Lake Victoria: • Maritime Safety Coordination Centre; • Search and Rescue Centres on the Lake; • Maritime Transport Strategy - EAC
EPSGG-LVB	to increase use of and investment in Resource Efficient and Cleaner Production (RECP) technologies by private enterprises -LVB.	Improved Resource use Efficiency and Cleaner Production (RECP) technologies by private enterprises in the LVB.

SUMMARY ON PROJECTS & PROGRAMMES Continued

Name	Overall Objective	Achievements
IWRM-LVB 2018 – 02/2023	• Regional economic integration is enhanced and a contribution to preservation of biodiversity and to conflict prevention is made through established regional water resources management at the Lake Victoria Basin; • Water quality and availability is improved through strategic and sustainable management of the Lake Victoria Basin	Feasibility studies for 4 High Potential Investments (HPIs) Ongoing (Kigali, Kisumu, Kampala, Mwanza,)
ScaleWAYS	Scaling out resilient Water and Agricultural Systems. Aims to contribute to resilience of land and water resources, improved health of ecosystems and human wellbeing in the extended LVB as these are threatened by a rapidly increasing population and economic growth, degradation of the environment and ecosystem, and the impacts of projected climate change for the coming decades. Austrian Development Cooperation, IIASA and its Partners LVBC & International Crops Research Institute for Semi-Arid Tropics (ICRISAT) are implementers of a research project.	Research project launched in May 2019 End Nov 2021

CHALLENGES FACE PROJECTS & PROGRAMMES

Project	challenges	Recommendations
MLVMCT June 2018	Delays in the disbursement of funds to LVBC for regionally implemented activities.	LVBC continued to negotiate with Partner States to disburse the fund
PHE, PREPARED	• Funding uncertainty occasioned by sudden changes in disbursement modalities by the traditional donor- USAID • Understaffing in the Program and difficulties in recruiting due to the one-year staff contracts as dictated by the donor's policy • Exclusion of Burundi due to changes of the donor policy	EAC/LVBC should continue to negotiate with Development partner to fast track disbursement

HIGH LEVEL POLICY MEETINGS

INSTALLATION OF AIDS TO NAVIGATION

COMMUNICATION NETWORK

WATER SUPPLY & SANITATION

WATER INTAKE FROM THE LAKE

SANITATION FACILITIES

WATER TREATMENT PLANT

Koroka water treatment plant

CONCLUSION

Effective Management of shared transboundary resources requires:

- stakeholder involvement in order to establish confidence and minimize conflicts while realizing benefits for the communities
- Serious need to devolve more resources to the institution (LVBC) – direct link to the people;

ANNEX 7: Tourism Potentials and Biodiversity in the proposed sites.

KAKAMEGA FOREST VISITORS STATISTICS

VISITOR CATEGORY	ADULT	CHILD	STUDENT
JAN	201	79	11
FEB	195	75	13
MARCH	150	20	8
APRIL	120	24	5
MAY	130	21	2
JUNE	112	55	3
JULY	105	49	1
AUG	100	52	6
SEPT	121	61	7
OCT	209	64	6
NOV	220	78	22
DEC	311	85	35
TOTALS	**1974**	**663**	**119**

WILDLIFE CHECKLIST FOR KAKAMEGA FOREST N.R

Mammals and reptiles

NO.	NAME	SCIENTIFIC NAME
1.	Bush buck	*Tragelaphus scriptus*
2.	African civet	*Viverra civetta*
3.	Red duiker	*Cephalophus harveyi*
4.	Cape hare	*Lepus capensis*
5.	Slender mongoose	*Herperstes sanguineus*
6.	Porcupine	*Atherurus africanus*
7.	Giant poached rat	*Cricetomys gambianus*
8.	Ground squirrel	Xerus erythropus
9	Agama lizard	
10	monitor lizard	
11	black mamba	
12	African rock python	
13	forest cobra	
14	wolf snake	
15	prickly bush viper	

16	green bush viper	
17	Gabon Viper	
18	Kaimosi Blind snake	
19		

Trees/shrubs

NO.	BOTANICAL NAME	ENGLISH NAME	STATUS
	Croton macrostachyus	*broad-leafed croton*	Tree
	Prunus africana	*Redstink wood*	tree
	Olea capensis	*Elgon teak*	Tree
	Albiza grandibractaea		Tree
	Acanthus pubescens		Shrub
	Spathodea campanulata	*Nandi flame*	Tree
	Kigelia africana	*sausage tree*	Tree
	Syzygium guineense	*Guinea water berry*	Tree
	Markhamia lutea		Tree
	Bridelia micrantha		Tree
	Vengearia apiculata		Tree
	Vitex doniana	*Black plum*	Tree
	Jacaranda mimosifolia	*Jacaranda*	Tree
	Ficus sur	*Cape fig*	Tree
	Erythrina abyssinica	*Abyssinica coral/Red hot-poker*	Tree
	Combretum molle		Tree
	Araucaria cunninghanii	*Hoop pine*	Tree
	Callindra calothyus	*Callindra*	Shrub
	Acacia abyssinica	*Flat-top acacia*	Tree
	Tithonia diversifolia	*Mexican flower*	Shrub
	Dovyalis macrocalyx		Shrub
	Dombeya ratundifolia	*Dombeya*	Shrub
	Flueggea virosa		Shrub
	Cacia didymobotrya	candle bush	Shrub
	Lantana camara	lantana	Shrub
	celtis africana	white stinkwood	tree
	Datura suaveolens	*Angel's trumpet*	Flower
	Plumeria rubra	*Frangipani*	Shrub/Tree
	Leonotis nepetifolia	*White leonotis*	Herb/Shrub

	Clerodendrum myricoides	*Butterfly flower*	Tree/Shrub
	Psidium guajava	*Guava*	Tree/Shrub
	Caesalpinia decapelata	*Mauritius thorn*	Shrub
	Endata abyssinica		Tree
	Mussaenda erythrophylla		Shrub
	Cythula cylindria		
	Ficus lutea	fig tree	Tree
	Ricinus communis	castor oil plant	Shrub
	Eriobotrya Japonica	loquat	Tree

Birds species

Pink-backed Pelican	(*Pelecanus rufescens)*
Grey Heron	(*Ardea cinerea)*
Black-headed Heron	(*A. melanocephala)*
Green-backed Heron	(*Butorides striatus)*
Hammerkop	(*Scopus umbretta*
Abdim's Stork	(*Ciconia abdimi)*
White Stork	(*C. ciconia)*
Marabou	(*Leptoptilos cruminiferus)*
Hadada	(*Bostrychia hagedash)*
African Black Duck	(*Anas sparsa*
Hooded Vulture	(*Neophron monachus)*
Eurasian Marsh Harrier	(*Circus aeruginosus)*
Pallid Harrier	(*C. macrourus)*
Harrier Hawk	(*Polyboroides radiatus)*
Banded Snake Eagle	(*Circaetus cinerascens)*
Brown Snake Eagle	(*C. cinereus)*
Bateleur	(*Terathopius ecaudatus)*
Shikra	(*Accipiter badius)*
Great Sparrowhawk	(*A. melanoleucus)*
Little Sparrowhawk	(*A. minullus)*
African Goshawk	(*A. tachiro)*
Steppe Eagle	(*Aquila nipalensis)*
Wahlberg's Eagle	(*A. wahlbergi)*
Augur Buzzard	(*Buteo augur)*
Common ("Steppe") Buzzard	(*B. buteo)*
Mountain Buzzard	(*B. tachardus)*
Ayres' Hawk Eagle	(*Hieraaetus dubius)*
Booted Eagle	(*H. pennatus)*
African Hawk Eagle	(*H. spilogaster)*

Lizard Buzzard (*Kaupifalco monogrammicus*)
Long-crested Eagle (*Lophaetus occipitalis*)
Crowned Eagle (*Stephanoaetus coronatus*)
Black Kite (*Milvus migrans*
Cuckoo Hawk (*Aviceda cuculoides*)
Honey Buzzard (*Pernis apivorus*)
Black-shouldered Kite (*Elanus caeruleus*
Bat Hawk (*Macheiramphus alcinus*)
Grey Kestrel (*Falco ardosiaceus*
Lanner Falcon (*F. biarmicus)*
African Hobby (*F. cuvieri*)
Eurasian Hobby (*F. subbuteo*
Eurasian Kestrel (*F. tinnunculus*
Common Quail (*Coturnix coturnix*
Harlequin Quail (*C. delegorguei*)
Scaly Francolin (*Francolinus squamatus*)
Crested Guineafowl (*Guttera edouardi*)

GRUIDAE, Cranes

Crowned Crane (*Balearica pavonina*)

RALLIDAE, Rails

Buff-spotted Pygmy Crake (*Sarothrura elegans*)
Red-chested Pygmy Crake (*S. rufa*)
White-spotted Pygmy Crake (*S. pulchra*)

CHARADRIIDAE, Plovers

Wattled Plover (*Vanellus senegallus*)
Common Sandpiper (*Actitis hypoleucus*
Wood Sandpiper (*Tringa glareola*
Green Sandpiper (*Tringa ochropus*)
Lemon Dove (*Aplopelia larvata*
Olive Pigeon (*Columba arquatrix*)
Bronze-naped Pigeon (*C. delegorguei*)
Ring-necked Dove (*Streptopelia capicola*)
Red-eyed Dove (*S. semitorquata*)
Blue-spotted Wood Dove (*Turtur afer*)
Tambourine Dove (*T. tympanistria*)
Green Pigeon (*Treron australis*
Red-headed Lovebird (*Agapornis pulchella*)
Brown Parrot (*Poicephalus meyeri*)
Grey Parrot (*Psittacus erithacus*)
Great Blue Turaco (*Corythaeola cristata*)
Eastern Grey Plantain Eater (*Crinifer zonurus*)

Ross's Turaco	(*Musophaga rossae*
Hartlaub's Turaco	(*Tauraco hartlaubi*)
White-crested Turaco	(*T. leucolophus*)
Black-billed Turaco	(*T. schuetti*)
Didric Cuckoo	(*Chrysococcyx caprius*)
Emerald Cuckoo	(*C. cupreus*
Klaas' Cuckoo	(*C. klaas*)
Levaillant's Cuckoo	(*Clamator levaillantii*)
Black Cuckoo	(*Cuculus clamosus*
Red-chested Cuckoo	(*C. solitarius*)
Yellowbill	(*Ceuthmochares aereus*
Black Coucal	(*Centropus grillii*)
Blue-headed Coucal	(*C. monachus*)
White-browed Coucal	(*C. superciliosus*)
Cape Grass Owl	(*Tyto capensis*)
Verreaux's Eagle Owl	(*Bubo lacteus*)
African Wood Owl	(*Ciccaba woodfordii*
Pearl-spotted Owlet	(*Glaucidium perlatum*
Red-chested Owlet	(*G. tephronotum*)
White-faced Scops Owl	(*Otus leucotis*
Eurasian Nightjar	(*Caprimulgus europaeus*)
White-tailed Nightjar	(*C. natalensis*)
Montane Nightjar	(*C. poliocephalus*)
Mottled Swift	(*Apus aequatorialis*)
Little Swift	(*A. affinis*)
Eurasian Swift	(*A. apus*
Black Swift	(*A. barbatus*)
White-rumped Swift	(*Apus caffer*)
Horus Swift	(*A. horus*)
Scarce Swift	(*Schoutedenapus myoptilus*)
Sabine's Spinetail	(*Rhaphidura sabini*
Speckled Mousebird	(*Colius striatus*)
Narina's Trogon	(*Apaloderma narina*)
Bar-tailed Trogon	(*A. vittatum*)
Giant Kingfisher	(*Ceryle maxima*)
Shining-blue Kingfisher	(*Alcedo quadribrachys*)
Striped Kingfisher	(*Halcyon chelicuti*)
Woodland Kingfisher	(*H. senegalensis*)
Pygmy Kingfisher	(*Ispidina picta*
Eurasian Bee-eater	(*M. apiaster*)
Blue-headed Bee-eater	(*M. muelleri*)

Cinnamon-chested Bee-eater (*M. oreobates*)
Little Bee-eater (*M. pusillus*
Madagascar Bee-eater (*M. superciliosus*)

CORACIIDAE, Rollers

Eurasian Roller (*Coracias garrulus*)
Rufous-crowned Roller (*C. naevia*)
Broad-billed Roller (*Eurystomus glaucurus*
White-headed Wood Hoopoe (*Phoeniculus bollei*)

BUCEROTIDAE, Hornbills

Black and White Casqued Hornbill (*Bycanistes subcylindricus*)
Crowned Hornbill (*Tockus alboterminatus*)
Ground Hornbill (*Bucorvus cafer*)

LYBIIDAE, African Barbets

Yellow-spotted Barbet (*Buccanodon duchaillui*)
Grey-throated Barbet (*Gymnobucco bonapartei*)
Double-toothed Barbet (*Lybius bidentatus*)
Black-billed Barbet (*L. guifsobalito*)
Hairy-breasted Barbet (*L. hirsutus*)
Yellow-rumped Tinkerbird (*Pogoniulus bilineatus*)
Speckled Tinkerbird (*P. scolopaceus*)
Yellow-billed Barbet (*Trachylaemus purpuratus*)
Thick-billed Honeyguide (*Indicator conirostris*)
Least Honeyguide (*I. exilis*)
Black-throated Honeyguide (*I. indicator*)
Lesser Honeyguide (*I. minor*)
Scaly-throated Honeyguide (*I. variegatus*)
Cassin's Honeybird (*Prodotiscus insignis*)
Little-spotted Woodpecker (*Campetheracailliautii*)
Brown-eared Woodpecker (*C. caroli*
Buff-spotted Woodpecker (*C. nivosa*)
Nubian Woodpecker (*C. nubica*
Fine-banded Woodpecker (*C. tullbergi*)
Cardinal Woodpecker (*Dendropicos fuscescens*)
Grey Woodpecker (*Mesopicos goertae*
Yellow-crested Woodpecker (*M. xantholophus*)
African Broadbill (*Smithornis capensis*)
Blue Flycatcher (*Erannornis longicauda*
Red-bellied Paradise Flycatcher (*Terpsiphone rufiventer*)
Paradise Flycatcher (*T. viridis*)
White-tailed Crested Flycatcher (*Trochocerus albonotatus*)
Dusky Crested Flycatcher (*T. nigromitratus*)

Drongo	(*Dicrurus adsimilis*)
Square-tailed Drongo	(*D. ludwigii*)
Pied Crow	(*Corvus albus*)
Cape Rook	(*C. capensis*)
African Golden Oriole	(*Oriolus auratus*)
Western Black-headed Oriole	(*O. brachyrhynchus*)
Black-headed Oriole	(*O. larvatus*)
Eurasian Golden Oriole	(*O. oriolus*
Montane Oriole	(*O. percivali*
Black Cuckoo Shrike	(*Campephaga flava*)
Petit's Cuckoo Shrike	(*C. petiti*)
Red-shouldered Cuckoo Shrike	(*C. phoenicea*)
Purple-throated Cuckoo Shrike	(*C. quiscalina*)
Grey Cuckoo Shrike	(*Coracina caesia*)
White-breasted Cuckoo Shrike	(*C. pectoralis*)
Fiscal	(*Lanius collaris*)
Red-backed Shrike	(*L. collurio*)
Grey-backed Fiscal	(*L. excubitorius*)
Mackinnon's Shrike	(*L. mackinnoni*
Lesser Grey Shrike	(*L. minor*)
Pink-footed Puffback	(*Dryoscopusangolensis*)
Northern Puffback	(*D. gambensis*)
Tropical Boubou	(*Laniarius ferrugineus*
Lühder's Bush Shrike	(*L. luehderi*
Grey-green Bush Shrike	(*Malaconotusbocagei*)
Doherty's Bush Shrike	(*M. dohertyi*)
Brown-headed Tchagra	(*Tchagra australis*
Marsh Tchagra	(*T. minuta*
Black-headed Tchagra	(*T. senegala*)
Black-headed Batis	(*Batis minor*
Chinspot Batis	(*B. molitor*
Shrike Flycatcher	(*Megabyas flammulata*)
Jameson's Wattle-eye	(*Platysteira blissetti*)
Chestnut Wattle-eye	(*P. castanea*
Yellow-bellied Wattle-eye	(*P. concreta*)
Wattle-eye	(*P. cyanea*)
Black-throated Wattle-eye	(*P. peltata*)
Brown-chested Alethe	(*Alethe poliocephala*)
White-tailed Ant Thrush	(*Neocossyphus poensis*)
Northern Wheatear	(*Oenanthe oenanthe*)
Northern Olive Thrush	(*Turdus abyssinicus*)

African Thrush	(*T. pelios*)
Violet-backed Starling	(*Cinnyricinclus leucogaster*)
Sharpe's Starling	(*C. sharpii*)
Splendid Glossy Starling	(*Lamprotornis splendidus*)
Waller's Chestnut-winged Starling	(*Onychognathus walleri*
Stuhlmann's Starling	(*Poeoptera stuhlmanni*
Red-billed Oxpecker	(*Buphagus erythrorhynchus*)
Pale Flycatcher	(*Bradornis pallidus*)
Collared Flycatcher	(*Ficedula albicollis*)
White-eyed Slaty Flycatcher	(*Melaenornis chocolatina*)
Black Flycatcher	(*M. edolioide)*
Dusky Flycatcher	(*Muscicapa adusta*)
Ashy Flycatcher	(*M. caerulescens*)
Chapin's Flycatcher	(*M. lendu*)
Spotted Flycatcher	(*M. striata*)
Brown-backed Scrub Robin	(*Cercotrichas hartlaubi*)
White-browed Scrub Robin	(*C. leucophrys*)
Robin Chat	(*Cossypha caffra*
Blue-shouldered Robin Chat	(*C. cyanocampter*)
Snowy-headed Robin Chat	(*C. niveicapilla*)
Grey-winged Ground Robin	(*Dryocichloides poliopterus*)
Anteater Chat	(*Myrmecocichla aethiops*)
Whinchat	(*Saxicola rubetra*)
Stonechat	(*S. torquata*)
Equatorial Akalat	(*Sheppardia aequatorialis*)
House Martin	(*Delichon urbica*)
Striped Swallow	(*Hirundo abyssinica*)
Angola Swallow	(*H. angolensis*
Red-rumped Swallow	(*H. daurica*)
Grey-rumped Swallow	(*H. griseopyga*)
Eurasian (or Barn) Swallow	(*H. rustica*)
Rufous-chested Swallow	(*H. semirufa*)
Mosque Swallow	(*H. senegalensis*)
Wire-tailed Swallow	(*H. smithii*)
White-headed Roughwing	(*Psalidoprocne albiceps*)
Black Roughwing	(*P. pristoptera*)
African Sand Martin	(*Riparia paludicola*)
Ansorge's Greenbul	(*Andropadus ansorgei*)
Cameroon Sombre Greenbul	(*A. curvirostris*)
Little Grey Greenbul	(*A. gracilis*)
Slender-billed Greenbul	(*A. gracilirostris*

Yellow-whiskered Greenbul	(*A. latirostris*)
Shelley's Greenbul	(*A. masukuensis*
Little Greenbul	(*A. virens*)
Honeyguide Greenbul	(*Baeopogon indicator*)
Bristlebill	(*Bleda syndactyla*
Joyful Greenbul	(*Chlorocichla laetissima*
Toro Olive Greenbul	(*Phyllastrephus baumanni*)
Placid Greenbul	(*P. placidus*)
Common Bulbul	(*Pycnonotus barbatus*)
Yellow White-eye	(*Zosterops senegalensis*)
Grey Apalis	(*Apalis cinerea*
Black-throated Apalis	(*A. jacksoni*)
Chestnut-throated Apalis	(*A. porphyrolaema*)
Black-collared Apalis	(*A. pulchra*)
Buff-throated Apalis	(*A. rufogularis*)
Grey-backed Camaroptera	(*Camaroptera brachyura*)
Olive-green Camaroptera	(*C. chloronata*)
Rattling Cisticola	(*C. chiniana*)
Chubb's Cisticola	(*C. chubbi*)
Red-faced Cisticola	(*C. erythrops*)
Winding Cisticola	(*C. galactotes*)
Whistling Cisticola	(*C. lateralis*)
Croaking Cisticola	(*C. natalensis*)
Stout Cisticola	(*C. robusta*)
Grey-capped Warbler	(*Eminia lepida*)
Banded Prinia	(*Prinia bairdii*)
White-chinned Prinia	(*P. leucopogon*)
Tawny-flanked Prinia	(*P. subflava*)
Reed Warbler	(*Acrocephalus scirpaceus*)
Black-faced Rufous Warbler	(*Bathmocercus cerviniventris*
Yellow Warbler	(*Chloropeta natalensis*)
Turner's Eremomela	(*Eremomela turneri*)
Green Hylia	(*Hylia prasina*)
Southern Hyliota	(*Hyliota australis*)
Brown Parisoma	(*Parisoma lugens*)
Uganda Woodland Warbler	(*Phylloscopus budongoensis*)
Chiffchaff	(*P. collybita*)
Wood Warbler	(*P. sibilatrix*
Willow Warbler	(*P. trochilus*
Brown Woodland Warbler	(*P. umbrovirens*)
Fan-tailed Warbler	(*Schoenicola platyura*)

Moustached Warbler	(*Sphenoeacus mentalis*)
Blackcap	(*Sylvia atricapilla*)
Garden Warbler	(*S. borin*)
Whitethroat	(*S. communis*)
White-browed Crombec	(*Sylvietta leucophrys*)
Green Crombec	(*S. virens*)
African Hill Babbler	(*Alcippe abyssinica*
Grey-chested Illadopsis	(*Kakamega poliothorax*
Scaly-breasted Illadopsis	(*Trichastoma albipectus*)
Brown Illadopsis	(*T. fulvescens*)
Mountain Illadopsis	(*T. pyrrhopterum*)
Pale-breasted Illadopsis	(*T. rufipennis*)
White-bellied Tit	(*Parus albiventris*
Dusky Tit	(*P. funereus*
Rufous-naped Lark	(*Mirafra africana*)
Flappet Lark	(*M. rufocinnamomea*
Plain-backed Pipit	(*Anthus leucophrys*)
Richard's Pipit	(*A. novaeseelandiae*
Tree Pipit	(*A. trivialis*)
Rosy-breasted Longclaw	(*Macronyx ameliae*)
Yellow-throated Longclaw	(*M. croceus*
African Pied Wagtail	(*Motacilla aguimp*)
Grey Wagtail	(*M. cineria*
Mountain Wagtail	(*M. clara*)
Yellow Wagtail	(*M. flava*
Grey-headed Sparrow	(*Passer griseus*)
Zebra Waxbill	(*Amandava subflava*
Waxbill	(*Estrilda astrild*)
Yellow-bellied Waxbill	(*E. melanotis*
Black-crowned Waxbill	(*E. nonnula*)
Fawn-breasted Waxbill	(*E. paludicola*)
Black-bellied Firefinch	(*Lagonosticata rara*)
African Firefinch	(*L. rubricata*
Red-billed Firefinch	(*L. senegala*)
Green-backed Twinspot	(*Mandingoa nitidula*
Chestnut-breasted Negrofinch	(*Nigrittabicolor*
Grey-headed Negrofinch	(*N. canicapilla*)
White-breasted Negrofinch	(*N. fusconota*)
Red-headed Bluebill	(*Spermophaga ruficapilla*)
Red-cheeked Cordon-bleu	(*Uraeginthusbengalus*)
Black and White Mannikin	(*Lonchura bicolor*)

Bronze Mannikin (*L. cucullata*)
Red-billed Firefinch Indigobird (*Hypochera chalybeata*)
Pin-tailed Whydah (*Vidua macroura*)

PLOCEIDAE, Weavers

Grosbeak Weaver (*Amblyospiza albifrons*)
Parasitic Weaver (*Anomalospiza imberbis*)
White-winged Widowbird (*Euplectes albonotatus*
Red-naped Widowbird (*E. ardens*)
Yellow Bishop (*E. capensis*
Black Bishop (*E. gierowii*
Marsh Widowbird (*E. hartlaubi*)
Yellow-mantled Widowbird (*E. macrourus*)
Red-headed Malimbe (*Malimbus rubricollis*)
Baglafecht Weaver (*Ploceus baglafecht*)
Dark-backed Weaver (*P. bicolor*)
Black-headed Weaver (*P. cucullatus*)
Brown-capped Weaver (*P. insignis*)
Golden-backed Weaver (*P. jacksoni*)
Yellow-backed Weaver (*P. melanocephalus*)
Black-billed Weaver (*P. melanogaster*)
Vieillot's Black Weaver (*P. nigerrimus*)
Black-necked Weaver (*P. nigricollis*)
Spectacled Weaver (*P. ocularis*)
Yellow-mantled Weaver (*P. tricolor*)
Holub's Golden Weaver (*P. xanthops*
Cardinal Quelea (*Quelea cardinalis*)
Red-billed Quelea (*Q. quelea*)
Collared Sunbird (*Anthreptes collaris*)
Green Sunbird (*A. rectirostris*)
Orange-tufted Sunbird (*Nectarinia bouvieri*)
Olive-bellied Sunbird (*N. chloropygia*)
Copper Sunbird (*N. cuprea*)
Blue-throated Brown Sunbird (*N. cyanolaema*
Bronze Sunbird (*N. kilimensis*)
Olive Sunbird (*N. olivacea*)
Northern Double-collared Sunbird (*N. preussi*
Green-throated Sunbird (*N. rubescens*)
Scarlet-chested Sunbird (*N. senegalensis*)
Superb Sunbird (*N. superba*)
Variable Sunbird (*N. venusta*)
Green-headed Sunbird (*N. verticalis*

Oriole Finch	(*Linurgus olivaceus*)
Yellow-rumped Seed-eater	(*Serinus atrogularis*)
Thick-billed Seed-eater	(*Serinus burtoni*)
African Citril	(*Serinus citrinelloides*)
Yellow-fronted Canary	(*S. mozambicus*
Brimstone Canary	(*S. sulphuratus*

Ruma Visitors and Revenue statistics

RUMA N. PARK

REVENUE STATISTIC FROM 2015 - 2021

	JAN	FEB	MAR	APR	MAY	JUNE	JUL	AUG	SEPT	OCT	NOV	DEC	TOTALS	AVERAGE
2015	126,540	165,700	110,010	139,695	49,150	160,365	416,455	274,700	161,210	184,260	138,120	220,600	**2,146,805**	178,900
2016	148,500	179,175	187,805	183,500	159,490	194,245	614,010	171,245	204,550	187,390	173,860	345,337	**2,749,107**	229,092
2017	207,244	140,673	285,428	236,998	76,434	136,325	350,667	100,654	92,115	65,582	46,347	304,655	**2,043,123**	170,260
2018	168,432	159,219	168,033	77,343	56,078	243,522	333,667	255,344	217,316	281,114	215,610	222,018	**2,397,696**	199,808
2019	187,665	182,350	214,044	145,162	109,658	274,912	496,215	345,229	144,496	163,441	158,338	132,350	**2,553,860**	212,822
2020	88,595	224,680	79,143	31,750	2,900	14,710	44,815	54,475	42,290	80,200	34,010	151,830	**849,398**	70,783
2021	83,620	73,345	29,025	74,560	48,480	82,970	99,425	121,830	83,550	154,590	108,825	275,425	**1,235,645**	102,970
2022	126,306	145,031											**271,337**	22,611
													14,246,970	**1,187,248**

RUMA N. PARK

VISITORS STATISTIC FROM 2015 - 2021

	JAN	FEB	MAR	APR	MAY	JUNE	JUL	AUG	SEPT	OCT	NOV	DEC	TOTALS	AVERAGE
2015	161	225	75	160	59	184	929	476	179	185	190	314	**3,137**	261
2016	89	137	234	392	147	233	900	264	393	318	226	532	**3,865**	322
2017	193	81	488	392	126	222	935	127	85	124	111	478	**3,362**	280
2018	154	170	354	94	29	514	883	435	274	425	441	358	**4,131**	344
2019	227	251	438	327	237	798	1,562	519	291	190	215	258	**5,313**	443
2020	133	223	125	14	4	27	71	102	94	158	60	316	**1,327**	111
2021	110	150	62	139	76	115	164	250	318	368	265	959	**2,976**	248
2022	347	416											**763**	64
													24,874	**2,073**

Ruma mammals check list

#	**Common Name**	**Scientific Name**	**Conservation Status**
1	Roan Antelope	*Hippotragus equinus*	LC (IUCN) Nationally endangered (Ken)
2	Black Rhino	*Diceros bicornis*	CR
3	Southern White Rhino	*Ceratotherium simum simum*	NT
4	Plains Zebra	*Equus guagga*	LC
5	Rothschild Giraffe	*Giraffa camelopadalis rothschildii*	VU
6	Buffalo	*Cincerus caffer*	LC
7	Topi		
8	Lelwel's Hartebeest		
9	Impala		
10	Oribi		
11	Bohor Reedbuck		
12	Waterbuck		
13	Bushbuck		
14	Vervet Monkey		
15	Olive Baboon		
16	Wild Pig		
17	Leopard		
18	Spotted Hyena		
19	African Civet		
20	Serval Cat		
21	Genet Cat		
22	Dwarf Mongoose		
23	Slender Mongoose		
24	Banded Mongoose		
25	White-tailed Mongoose		
26	Aardvack		
27	Porcupine		

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