

**IDENTIFICATION AND MAPPING OF ECOLOGICALLY
SENSITIVE AREAS (ESAS) IN LAKE VICTORIA**



**EAST AFRICAN COMMUNITY
LAKE VICTORIA BASIN COMMISSION**

**IDENTIFICATION AND MAPPING OF ECOLOGICALLY
SENSITIVE AREAS (ESAS) IN LAKE VICTORIA**

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Lake Victoria Basin Commission

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FOREWORD

The Lake Victoria Basin (LVB) in East Africa has been designated an Economic Growth Zone due to its central role it plays in the economic, social, cultural and general development of the population in and outside the basin. The Lake is the most dominant geographical feature in the Lake Victoria Basin with a surface area of 68,800 km² and a catchment covering 194,000 km². Lake Victoria as a whole can be considered as an Ecologically Sensitive Area (ESA) because of its mosaic of habitats which include many shallow bays, embayments and long swampy shorelines. ESAs are landscapes within an ecosystem but which are fragile and vulnerable to damage by human activities and thus require special protection. This is critical with LVB because any slight disturbance may record significant changes in the ESAs may have significant socio-economic impact of the region.

Lake Victoria as an ESA is an economic mainstay of the region providing source of food, potable water, wetland products, transportation, agriculture, hydro-power production and tourism. As an ESA it also offers socio-economic values such as flood control, maintenance of water quality, stress reduction and home for society. However, the Lake is facing wide spread disruptions and threats principally from human activities. Some of these are local problems that require community centered interventions while others are national, regional or international in nature that must be addressed from a much wider scale.

It is therefore imperative to identify and map ESAs in Lake Victoria for their protection and more so to provide managers with a scientific basis to guide sustainable management of the natural resources for the benefit of the present and future generations. In line with its mandate as established in the Protocol for Sustainable Development of the Lake Victoria Basin, the Lake Victoria Basin Commission (LVBC) commissioned this study on "Identification and Mapping of Ecologically Sensitive Areas (ESAs) in Lake Victoria" in 2009. The study was carried by three institutions from the partner states namely; National fisheries Resources Institute (NaFIRRI-Uganda), Kenya Marine Fisheries Research Institute (KMFRI-Kenya) and Tanzania Fisheries Research Institute (TAFIRI-Tanzania).

The active participation of institutions from the partner states signifies the importance attached to ESAs and commitment to implement the recommendations from the study. There is therefore need to create more awareness and sensitize stakeholders at all levels on the importance of ESAs. The findings of the study should be of value to a wider audience in the Partner States as well as the international community.

LVBC greatly appreciates the generous funding from the Lake Victoria Basin Partnership Fund that facilitated the study and the role of National Fisheries Resources Research Institute (NaFIRRI), Uganda that spearheaded the study and all other collaborators for making the study a reality. I urge all players in the LVB to support the implementation of the study findings by taking the first steps to actualize the recommendations.



Dr. Tom. O. Okurut
Executive Secretary
Lake Victoria Basin Commission

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ACRONYMS

BCM	Billion Cubic Meters
BMU	Beach Management Units
CITES	Convention on International Trade in Endangered Species
DFR	Department for Fisheries Resources
EAC	East African Community
ESAs	Ecologically Sensitive Areas
EIA	Environmental Impact Assessment
EU	European Union
FAO	Food and Agricultural Organization
GIS	Geographical Information System
GDP	Gross Domestic Product
GPS	Global Positioning Systems
IBA	Important Bird Areas
IMCE	Inter-Ministerial Committee for Environment
ITK	Indigenous Technical Knowledge
IUCN	International Union for the Conservation of Nature
IUU	Illegal, Unregulated and Unreported
JPOI	Johannesburg Plan of Implementation
Km	Kilometre
KMFRI	Kenya Marine and Fisheries Research Institute
KWS	Kenya Wildlife Service
LGs	Local Governments
LTD	Limited
LVB	Lake Victoria Basin
LVBC	Lake Victoria Basin Commission
LVFO	Lake Victoria Fisheries Organization
MAB	Man and the Biosphere
MDGs	Millennium Development Goals
MWENR	Ministry of Water, Environment and Natural Resources
NaFIRRI	National Fisheries Resources Research Institute
NAWESCO	National Wetland Steering Committee
NEMA	National Environmental Management Authority
NGOs	Non-Governmental Organizations
NORAD	Norwegian Agency for Development Cooperation
NWP	National Wetlands Programme
NWSC	National Wetlands Standing Committee
PAHs	Polycyclic Aromatic Hydrocarbons
PCBs	Polychlorinated Biphenyls
RCMRD	Regional Centre for Mapping of Resources for Development
Ref.	Reference
RELMA	Regional Land Management Unit
RPOA	Regional Plan of Action
SAMUKA	Sango Bay – Musambwa Island – Kagera Wetland
SIDA	Swedish International Development Agency
Sp	Species
TAFIRI	Tanzania Fisheries Research Institute
TDA	Trans-boundary Diagnostic Analysis
TSs	Tanzania Shillings

UNEP
UNESCO
WSSP
Yr

United Nations Environment Programme
United Nations Educational, Scientific and Cultural Organization
Wetland Sector Strategic Plan
Year

EXECUTIVE SUMMARY

The East African Community (EAC) Partner States (Burundi, Kenya, Rwanda, Tanzania and Uganda) designated the Lake Victoria Basin (LVB) as a regional economic growth zone to be sustainably utilized, with the Lake Victoria Basin Commission (LVBC) as the apex body responsible for the basin's coordinated development. With more than 35 million people dependent on the natural resources of the lake basin, the LVBC recognized the direct and indirect impacts of human activities on the natural resources. This prompted the Council of Ministers responsible for the lake basin to direct the LVBC to facilitate enactment of legislation that would lead to protection of Ecologically Sensitive Areas (ESAs) in and around the lake.

The LVBC identified three regional fisheries research institutions (Kenya Marine & Fisheries Research Institute – KMFRI, the Tanzania Fisheries Research Institute – TAFIRI, and the National Fisheries Resources Research Institute – NaFIRRI, Uganda) as the agencies to provide the required outputs in response to the LVBC's agenda on ESAs in Lake Victoria, with NaFIRRI as the lead institution. The LVBC's expected output from the assignment was a report comprising:

- (i) A summary on the status of ESAs in Lake Victoria;
- (ii) Comprehensive information on the current threats to the ESAs in Lake Victoria;
- (iii) Concrete and actionable recommendations that would guide formulation of laws and policies that would ensure protection of ESAs in Lake Victoria;
- (iv) Digitized maps clearly showing the ESAs in Lake Victoria.

A regional team of experts in biodiversity, fisheries and fish biology, socio-economics, wetlands ecology, aquatic sciences, GIS mapping technology and remote sensing carried out the assignment in three phases between October 2009 and August 2010. This report provides a systematic and detailed result of that assignment.

The first phase involved preparation, discussion and agreement with LVBC on the Inception Report. The study methodology was elaborated to include a standard definition of Ecologically Sensitive Areas (ESAs) in contrast to the more general concept of Environmental Sensitivity. ESAs were defined as landscapes that provide ecosystem services but are fragile and vulnerable to human impacts and thus require special protection. In the case of Lake Victoria, the Terms of Reference (ToRs) dictated that the assignment could not be accomplished within the time and resources available and the assignment concentrated on the lake while the wider Lake Victoria Basin aspects of ecological sensitivity were not covered. However, the methodology used i.e. literature searches and reviews, expert consultations in relevant institutions, community-level interviews (Key informant and Focus Group Discussions), field surveys and ground-truthing, ESA identification and characterization from satellite images and GIS-mapping, scoring of intrinsic (positive) and human-induced (negative) attributes, should be adopted in future for a Lake Victoria Basin wide activity.

Based on positive intrinsic attributes, the following Lake Victoria ESAs were identified, characterized and mapped namely: Wetlands, rocky-outcrops, sheltered bays, river mouths, forested areas and cultural sites. Other ecologically fragile areas with intrinsic values (water abstraction, waste water treatment areas and transport routes) were also mapped. The ESAs were ranked from "Highly Degraded" to "Least Degraded" scales based on positive attributes while the human induced (negative influences) attributes ranked the ESAs from "Highly Threatened" to "Least Threatened" as elaborated in Section two.

From ecosystem to socio-economic perspectives, Lake Victoria as whole can be recognized as an Ecologically Sensitive Area (ESA) because of its mosaic of habitats (wetlands, forested areas, rivers and river mouths, rocky shores and outcrops) that provide ecosystem services (intrinsic values) ranging from biodiversity reservoirs, fish breeding and nursery areas, bird nesting (Important Bird Areas), flood control, climate modulation, water quality regulation to globally recognized bird migratory routes and high rates of endemism of flora and fauna. In turn, Lake Victoria Ecosystem provides socio-economic services including the much valued fisheries, water for industrial, municipal, portable and hydro-power uses. Agricultural practices and the attendant dependence of the estimated 35M people are supported by the resources and services provided by the ecosystem. On a lake wide scale, human impacts in the diverse ESAs pose threats to their inherent values that need to be mitigated to avoid further degradation of the ecosystem.

Section three present results based on community perception of intrinsic values of Lake Victoria ESAs and the impacts of human activities on the ecosystem services. At least 70% of the sampled communities rated wetlands as important for the fisheries, birds, sources of important plants and as habitats for wildlife. Similar perceptions were attached to river mouths, sheltered bays and rocky areas. The communities near ESAs were also generally aware of threats posed to them including over-extraction, illegal methods of extraction, pollution and soil erosion and the dangers of environmental degradation. The communities related ESA degradation to poverty, limited law enforcement, corruption and negative attitudes within the communities.

The status of ESAs in terms of sensitivity and level of threats (Section four) was assessed into six sensitivity classes:

- (i) Highly degraded and highly threatened;
- (ii) Highly degraded and least to moderately threatened
- (iii) Moderately degraded and highly threatened
- (iv) Moderately degraded and least to moderately threatened
- (v) Least degraded and highly threatened and
- (vi) Least degraded and least to moderately threatened

In the same order, ESA types in class (i) were considered the most “Sensitive” and thus requiring priority action with subsequent sensitivity classes per ESA requiring action in a descending order of priority. From this sequence, the following conclusions were revealed for each ESA type:

(a) Wetlands

There are at least 422 wetlands occupying an area of 4,322 km² around Lake Victoria (417 km² in Kenya, 1,880 km² in Tanzania and 2,025 km² in Uganda) dominated by emergent vegetation especially papyrus (*Cyperus papyrus*), reeds (*Phragmites*), hippo grass (*Vossia cuspidata*), Ambatch tree (*Aeschynomene elaphroxylon* and *Typha*). About 3% of wetlands in the vicinity of urban centres were in the “Highly degraded and highly threatened ESAs” category.

(b) Forests

There were 222 forest units occupying an area of 1120.6 km² around Lake Victoria (3 km² in Kenya, 401 km² in Tanzania and 716.5 km² in Uganda) dominated by indigenous trees. There were 20 and 180 forest units each greater than 10 km² and less than 5 km² respectively.

(c) River mouths

Sixty six (66) River mouth ESAs (24 in Kenya, 20 in Tanzania and 22 in Uganda) were identified. This type of ESA included streams and disturbance classes were recognised from levels of water clarity related to silt loads and de-vegetation. There were four river mouths in the “Highly degraded” class (one in Kenya, one in Tanzania and two in Uganda).

(d) Rocky outcrops

About 239 rocky outcrop ESAs (57 in Kenya, 131 in Uganda and 51 in Tanzania) were mapped. Fifteen (15) rocky outcrops occurred in the “Highly degraded and highly threatened” sensitivity class (7 in Kenya, 4 in Uganda and Tanzania respectively). Some rocky outcrops may have not been captured. However, a large number of the rocky outcrops tended to feature under the sensitivity class “Moderately degraded and least to moderately threatened”.

(e) Sheltered bays

The study mapped 234 sub bays within sheltered bays in Lake Victoria (56 in Kenya, 83 in Uganda and 95 in Tanzania). There were 10 “highly degraded and highly threatened” (1 in Kenya, 5 in Uganda and 4 in Tanzania). Majority (124) sub bays were “least degraded and least to moderately threatened” (10 in Kenya, 54 in Uganda and 60 in Tanzania).

Section five provides an in-depth analysis of current threats to ESAs. In general, the diverse threats have three common features: uncontrolled access, over-extraction (e.g. over fishing, poor land use) and habitat degradation. The three features manifest as water quality deterioration through pollution including siltation, removal of wetland buffers, and decline in fish species diversity and stock abundance. Uncontrolled access paves the way for unplanned settlements, urban infrastructure and poorly designed schemes that impact the ESAs.

Despite apparent community awareness of ESAs, a major driver of the current threats to ESA is a large human population living with limited livelihood options and conservative attitudes. However, some threats that could be managed (e.g. domestic, municipal and industrial waste discharges into ESAs, deforestation, and commercial agriculture) are driven in part by poor land use practices, uncoordinated application of selective sectoral policies and limited enforcement of otherwise required regulations and guidelines. Lake Victoria ESAs are the basis for the socio-economic survival of the densely populated Lake Victoria Basin. The benefits (e.g. high endemism of flora and fauna especially fish species and climate modulation) from the ESAs are also shared by the international community. An effective regulatory framework for the ESAs should encompass local, national, regional and international dimensions.

Section six analyses the scope of the regulatory environment and how various Declarations, Conventions, Codes of Conduct/Practices as well as national and regional policies can be applied to Lake Victoria ESAs. For example, from the global perspective, the RAMSAR Convention on Wetlands would be effective if fully applied to Lake Victoria wetlands as much as the FAO Code of Conduct for Responsible Fisheries would for the fisheries. At national level, the Constitutions provide the basis for a wide range of Policies, Acts, Instruments and Guidelines of direct relevance to ESAs (e.g. The Fish Acts and Regulations, The Forestry Acts, The Water Statutes and Nature/wildlife Acts). Despite their potential for mitigating further deterioration and loss of Lake Victoria ESAs, the current regulatory environment does not appear to be as effective as it should.

Apart from outlining major threats to Lake Victoria ESA and providing an impression of the status of the ESAs from digitised maps, a major output from this study is a set of Actionable Recommendations (Section 7) that fall under five key areas: Governance, Capacity building, Scientific Monitoring, Legal and Policy interventions, and Sustainable utilisation of the ESAs.

The report recognises that the Protocol for Sustainable Development of the Lake Victoria Basin empowers the LVBC to initiate the required actions to protect and conserve the ESAs. The recommended actions are given time frames ranging from short term (one-to-two years) to long term (through five years and beyond). In effect, the LVBC through its various organs and programmes should engage Partner States to harmonise and eliminate deficiencies in sectoral jurisdictions among Government Departments/Ministries (e.g. Environment, Water, Fisheries, Forestry, Agriculture, Wildlife, Culture and Social Services) that often have contrasting priorities and are not singularly responsive to ESA conservation needs. The recommended actions range from implementation of national, regional and international Policies, Protocols and conventions in addition to practical steps towards increased capacity building/sensitisation at grass roots, local and national levels as well as Scientific Monitoring.

Lake Victoria is a relatively large ecosystem in comparison to water-focused ESAs in other parts of the world where similar work has been carried out and there is thus much less researchable data on specific ESAs. Lake Victoria ESAs differ in complexity and attributes (wetlands, sheltered bays, forests, rocky out-crops, and associated human use features like water-transport routes and water-intake points). The current study was designed to focus on the main lake using the shoreline as the bench-mark.

Lessons learned from this study strongly show that this report needs to be updated in the short term by addressing the following aspects:

- (a) Detailed field assessments using biotic, physical and chemical indicators;
 - (b) Quantification of intrinsic attributes e.g. numbers of species, habitat and other diversity indices;
 - (c) Mapping of ESAs in the immediate catchment of the lake;
 - (d) Seasonal assessments and verification of ESAs with respect to the impacts of human activity and trends (e.g. fish breeding and migration, wetland buffering capacity at critical points, bird nesting, and associated transport routes and water intake infrastructure with respect to water level changes).
1. As required by the ToRs, the subject matter in this report should vigorously be disseminated to: Partner States and particularly, institutions, organizations and the private sector ranging from and including resource users and managers, conservationists, research, policy makers, international agencies and private developers. Of immediate need, is for the LVBC to undertake a systematic elaboration of the human, Institutional and financial resources that need to be mobilised to protect and conserve ESAs.

1. INTRODUCTION

Ecologically Sensitive Areas (ESAs) are landscapes that provide ecosystem services but are fragile and vulnerable to damage by human activities, and thus require special protection. Ecological sensitivity is but one element in the broader area of the environment concerns. For purposes of this study, Ecological sensitivity may be defined as **“The imminent possibility of permanent and irreparable loss of extant life forms from the ecosystem or significant damage to the natural processes of evolution and speciation.”** Many natural habitats that have been or may be converted into uses such as agriculture, aquaculture urban developments or other forms of human settlements may yield greater productivity in the shorter term but if not sustainably developed, may result into greater long term losses in productivity. The Lake Victoria Basin (LVB) in East Africa (Fig. 1.1) has been designated an Economic growth zone but is a zone where even slight disturbances may record significant changes in the ESAs that are fragile but are of socio-economic importance. Therefore identification and mapping of ESAs is essential for their protection. This process involves distinguishing distinct, unique and critical habitats and their characteristic features which are then ranked according to their fragility, ecological rarity, ecological services and relative degree of disturbance.



Figure 1.1. Main geographical features in the Lake Victoria Basin

Lake Victoria (surface area: 68,000km²), located in the central region of East Africa, has a catchment covering an area of 194,000 km² (7% is in Burundi, 22% in Kenya, 11% in Rwanda, 44% in Tanzania and 16% in Uganda). The lake, which is shared by Tanzania (51%), Uganda (43%) and Kenya (6%), is the most dominant geographical feature in the LVB. In comparison to the other Great Lakes of Africa (e.g. Tanganyika, Turkana and Nyasa), Lake Victoria is considered to be relatively young, formed

through tectonic forces some 750,000 years ago and went through periods of complete desiccation as recently as 12,000 years ago. The main rivers draining into the lake include Sio, Nzoia, Yala, Nyando, Sondu-Miriu, Awach, Kuja, Mara and Kagera. The lake has only one outlet, the River Nile, which flows northward through north-eastern Africa into the Mediterranean Sea.

Lake Victoria as a whole can be considered as an Ecologically Sensitive Area because of its mosaic of habitats, which include many shallow bays, embayments and long swampy shorelines. Lake Victoria and satellite lakes are fringed in many parts by extensive wetlands of vital ecological functions and support different components of aquatic biodiversity, several of which are recognized internationally as Important Bird Areas (IBA) and are inhabited by the endangered *Sitatunga* antelope. Historically, Lake Victoria was well known for its characteristic high endemism and rapid adaptive radiation of fish species, particularly the cichlids. The lake had high fish species diversity of over 500 species, most of which were endemic to the lake and of economic and scientific value. However, following introduction of exotic species (Nile perch and the Tilapiines) into Lake Victoria, coupled with over exploitation and environmental degradation, many native species of fish disappeared from the lake. The other attributes that make Lake Victoria an ESA include migratory routes for various fauna, maintenance of the water table, climate modulation, flood control and water quality regulation through wetlands.

Lake Victoria as an ESA is an economic mainstay of the region. It is a source of food in form of fish, potable water, wetland products, transportation, agriculture, hydro-power production and tourism. About 35 million people (about 30% of the entire population of East Africa) are estimated to live and derive their livelihood directly or indirectly from the basin. Apart from production of about one million tons of fish annually valued between US\$ 300-400 million, the lake provides water for irrigation, industrial and domestic use. Lake Victoria as an ESA also has special features or attributes that have a potential future development for the economy, ecology and society. It also offers socio-economic values such as flood control, maintenance of water quality, stress reduction, recreation and home for society. Like the other Great Lakes of the world, Lake Victoria is already facing wide spread disruptions due to human activities. ESA identification and mapping will provide managers with a scientific basis to guide sustainable utilization of the natural resources for the benefit of the present and future generations.

In the last two decades, there has been increased political and socio-economic interest in Lake Victoria due to its vast natural resources. The consequences of development pressures on the lake and its resources are already manifested in increased land, wetland and forest degradation; declining fish stocks and fish species diversity; increasing pollution and eutrophication; unsustainable water resources management and declining water levels. Some of the development activities on or by the lakeshore include: increased fishing using wrong fishing methods that often target immature fish; haphazard water abstraction and waste water discharges from industries, urban centers, small fishing villages and other settlements; increased tourism; increased cargo and passenger transport involving large ships and diverse merchandise (oil products, building materials, food stuffs, livestock); fish processing, mining and human settlements along the shoreline. Some of the ongoing economic activities include fish processing, agriculture, mining, water supplies, lake transport and tourism. These activities are continuing unabated with little regard on their impact on the critical habitats and the overall integrity of the ecosystem which is intrinsically critical to survival and persistence of both flora and fauna. Therefore to enable sustainable exploitation of the lakes resource, there is need to balance between socio-economic activities and maintenance of ecosystem integrity *vis a vis* conservation of biodiversity.

The constraints facing the proper management of ESAs are many in the region. Some are local problems that require community-centred interventions, while others are national, regional or even international shortcomings that must be addressed from a much wider scale. ESAs generally fall under different sectors and within the jurisdiction of separate government departments, such as Environment, Water, Forestry, Fisheries, Wildlife, Culture and Social Services, Agriculture etc. In this situation it is

difficult to develop common management strategies for ESAs since the sectors often have contrasting interests and objectives. ESAs therefore are subjected to uncoordinated and singular sectoral management strategies. The property rights for many ESAs are not clearly defined, allowing ambiguity on the rights and responsibility for use and protection. In many areas there are no community-based institutional structures for management of ESAs, and especially cross-border ESAs lack clear institutional arrangement for management. While there are many laws and by-laws in the Partner States for environmental protection and conservation of natural resources these are not adequately enforced by the relevant state agencies in the central or local governments due to either incapacity or lack of willingness. Generally government institutions, Non-government organizations and community-based organizations lack the technical and human capacity for effective management of ESAs.

ESAs should be managed from a well informed position based on good scientific data. Such scientific information is generally not available for Lake Victoria ESAs, and it will take many years to develop a good database of the critical parameters. To avoid degradation of ESAs in the meantime, it is necessary to base management on the Precautionary Principle. This study marks a significant step by collecting and collating information on the current status of ESAs, including their geographical scope (size and positioning), physical parameters, ecological attributes and related socio-economic issues. This should be seen as the baseline which other detailed studies should build upon for better understanding of the status and functioning of ESAs. Ultimately ESAs ecosystem shall be monitored through continuous generation and analysis of scientific information.

To guarantee the resources of Lake Victoria for the present and the future generations, the Lake Victoria Basin Commission (LVBC) found it prudent that key and Ecologically Sensitive Areas (ESAs); areas that provide ecosystem services but are vulnerable to damage by human activities in Lake Victoria are inventoried and mapped as initial measures of protecting and restoring both functional services and values of the areas. The mandate of the LVBC includes coordinating conservation and sustainable utilization of key natural resources such as water, fisheries, wetlands, forestry, and wildlife in the LVB towards which such an initiative directly contributes.

LVBC draws its mandate from the Protocol for Sustainable Development of the Lake Victoria Basin, which has been ratified by all five member states of the EAC. Through this protocol, the Partner States agreed to cooperate in the areas of conservation and sustainable utilization of the resources of the Basin, including; Sustainable development, management and equitable utilization of water resources; Sustainable development and management of fisheries resources; Promotion of sustainable agricultural and land use practices including irrigation; Promotion of sustainable development and management of forestry resources; Promotion of development and management of wetlands; Promotion of trade, commerce and industrial development; Promotion of development of infrastructure and energy; Maintenance of navigational safety and maritime security; Improvement in public health with specific reference to sanitation; Promotion of research, capacity building and information exchange; Environmental protection and management of the Basin; Promotion of Public participation in planning and decision-making; Integration of gender concerns in all activities in the Basin, and; Promotion of wildlife conservation and sustainable tourism development. The Protocol specifically entrusts the Partner States, with active participation of all stakeholders, to protect, conserve and where necessary rehabilitate the Basin and its ecosystems

This study will enable the LVBC to address some of the key components of the protocol relevant to ESAs, specifically; Protecting and improving water quantity and quality within the Basin; Preventing the introduction of species, alien or new, into the Basin's water resources which may have effects detrimental to the ecosystems of the Lake; Identifying the components of and developing strategies for

protecting and conserving biological diversity within the Basin; Conserving migratory species of wild animals; Conserving endangered species of wild fauna and flora; Protection and conserving wetlands within the basin; Restoring and rehabilitating degraded natural resources; and Conserving fisheries Resources. It will show the direction for building the technical and human capacity for scientific research, exchange of data and information and coordinated approach for development of sustainable tourism in the region.

1.1 Overall objective

To identify and map Ecologically Sensitive Areas (ESAs) in Lake Victoria to provide a basis for decisions on enactment of the legislation for their protection.

1.2 Specific objectives

- (i) Review existing information on ESAs and identify the ESAs within Lake Victoria
- (ii) Map the identified ESAs using GIS technology
- (iii) Suggest actionable recommendations towards protection of ESAs

1.3 Expected outputs

- (i) Summary report on the status of ESAs;
- (ii) Comprehensive information on the current threat to the ecologically sensitive areas in Lake Victoria;
- (iii) Concrete and actionable recommendations that would guide formulation of laws and policies that would ensure protection of ESAs in Lake Victoria; and
- (iv) Digitized map clearly showing the ESAs in Lake Victoria.

1.4 Target beneficiaries

- (i) Partner States;
- (ii) Lake Victoria Basin Commission and affiliate institutions;
- (iii) Resource users;
- (iv) Resource Managers;
- (v) Conservationists;
- (vi) Research Organizations;
- (vii) International Research Organizations, UNEP, UNESCO and UN Habitat);
- (viii) Policy Makers;
- (ix) Institutional of higher learning; and
- (x) Private Sector

2. METHODOLOGY

A regional team of experts (Appendix I) in various areas of specialization were sourced by the LVBC from the three partner states of Tanzania, Kenya and Uganda. The experts led by NaFIRRI and drawn from the Fisheries Research Institutes and the RCMRD were tasked to identify and map ecologically sensitive areas in Lake Victoria.

Following discussions of the project proposal and Terms of Reference (Appendix II) with LVBC Secretariat technical staff, an inception report (IR) was prepared and presented to LVBC secretariat staff and Lake Victoria key stakeholders. The inception report was discussed and adopted on the basis of which, the team embarked on the study. As part of capacity building, the team enlisted the participation of relevant technical staff from the institutions that do ESA related activities (Appendix III) who acted as counterpart professionals in conducting the study. The participation of these professionals was intended to enhance analytical skills of the relevant officers and draw on their rich practical experience to inform the study. The study methods were modified from the frame work developed for designating ecologically sensitive areas in India (Pronab, 2000) and sensitive lake shores in Minnesota (Thompson *et al.*, 2009).

Given the complexity and scope of work, the study adopted a methodology that was designed to enlist the widest participation of most key stakeholders with interest in ESA related activities. The ESAs were categorised and geo-referenced through literature search, consultation with relevant agencies, community interviews and ground truthing primary data. Stakeholder consultation provided a rapid means of collecting data that could usually be difficult to obtain by other methods. Sample questions in form of questioners were prepared by experts in the national institutions responsible for ESA related activities and communities in the vicinity of the potential ESAs. The study commenced during October 2009 and, through three phases was completed in August 2010).

2.1 Data Collection

2.1.1 Literature review

The Lake Victoria ESA-related literature searches were undertaken in relevant agencies and through extensive internet searches. This was intended to establish status, identify trends that are relevant for policy and decision making and situate the current status in the broader international scope of ESAs. Literature reviews combined with expert consultations identified the need for some basic primary data on the biological and physical location to strengthen information/data on the candidate ESAs.

2.1.2 Stakeholder consultations

Community-level interviews were undertaken in the three countries to provide additional information for identifying, mapping and ranking ecologically sensitive areas in Lake Victoria. The information generated focused on community perceptions of the uses and values of ESAs to the riparian communities and observed or perceived changes over the years. The ESAs assessed were; Wetlands, forests, rocky outcrops, river mouths and sheltered bays. Human use features associated with the ESAs e.g. transport routes, water intake/waste water disposal, cultural sites and sites with tourism potential such as Important Bird Areas (IBAs).

The data was collected through Key Informant interviews using a structured questionnaire (Appendix IV) designed to generate community-level information on ESAs located within or nearby community settlements. For communities with multiple ESAs, the respondents were required to give information on the three most important sites. The respondents comprised leaders of key community-based stakeholder groups, such as Beach Management Units (BMUs), Women groups, Youth Groups, Conservation Groups, Local Authorities and NGOs.

Information from community interviews covered the following details:

- (i) Number and types of ESAs in the community
- (ii) Fauna and flora found in ESAs
- (iii) Economic activities carried out in each ESA e.g. fishing, hunting etc.
- (iv) Annual pattern of use of ESAs
- (v) Observed changes in ESAs over time e.g. reduction in size or species of fauna and flora etc.
- (vi) Community awareness about function and value of ESA and consequences of overuse
- (vii) Sources of community information about ESAs
- (viii) Threats to ESAs through socioeconomic activities e.g. fishing, water extraction, sand mining, cultivation, waste disposal, human settlement, tourism, harvesting wetlands & forest, cultural practices.
- (ix) Protection and conservation of ESAs
- (x) Success and constraints in conserving ESAs
- (xi) Community recommendations about conservation of ESAs

In Kenya, the survey covered 67 communities representing 11 sheltered bays, three islands, three pristine sites, 12 river mouths, seven rocky outcrops, 12 forests and 18 wetlands from eight riparian districts. In Tanzania, the survey covered 78 communities representing 11 forests, 11 nursery/breeding areas, 9 river mouths, 19 rocky outcrops and small islands, 14 sheltered bays and 14 wetlands from 10 riparian districts. In Uganda, the survey covered 64 communities representing 19 wetlands, seven small islands, 13 rocky outcrops, five river mouths, six sheltered bays, five non-wetland vegetated shoreline, nine pristine areas representing cultural sites and natural forests from 11 riparian districts.

To ensure study output compatibility across the countries, scope of the literature reviews; development of questionnaires, selection of criteria for ESAs, ground-truthing coverage, acquisition of satellite images; and arrangements for mapping were agreed on and harmonized during the planning meeting held immediately after presentation of the Inception report in Kisumu. National reports and data were collated and synthesized into one Regional Report.

2.3 ESA characterization

The criteria used to characterise the ESAs were categorised into three major classes: physical, biological and human use factors (Table 2.1). Each criterion had attributes that were ranked and scored to quantify sensitivity thresholds of the different categories of ESAs (Table 2.1). The higher the score, the better is the attribute for the specific criteria. Sensitivity associated with human disturbance activities were scored based on negative rankings and then weighted in the same order as the ecological attributes (Table 2.2). Using comparative framework of sensitivity thresholds, the ESAs were mapped and delimited to guide determination of need for protection.

Table 2.1. Rationalised criteria used for determining ESAs

SN	Criteria	Justification
A Physical features		
1	Area	The bigger the ESA the higher the biological intrinsic value
2	Distance from the nearest similar ESA	Conservation of similar areas close to each other can be more efficient and effective than areas far apart. This enhances sustainable management of the areas.
3	Rock size	High rates of discharge can cause scouring of habitats
4	Water Clarity	Turbidity is a measure of water and habitat quality which reflect in genetic isolation among closely related species. On other hand productivity is lower in turbid waters while predation is hampered.
5	Gradient	Gentle slopes offer wider habitable areas for various species with preference for different depths. Slight lake level changes in such areas interpret into significant loss of habitats
6	Discharge	High rates of discharge can cause scouring of habitats
B. Biological characteristics		
7	Habitat diversity	Heterogeneous habitats harbor larger numbers of species. Their conservation needs are therefore higher.
8	Bird nests	Areas with large numbers of nests are preferred by birds for breeding. To sustain bird populations areas with higher nest densities need to be protected.
9	Macrophyte/vegetation cover	Vegetation is associated to breeding and feeding of fish and aquatic invertebrates
10	Rare and endangered species	Number of rare and endangered species is an indication of habitat integrity
11	Exotics/invasive	Exotic/invasive species in an area may have negative competitive and genetic impact on closely related native species. Perturbed environments encourage invasion ultimately altering the ecosystem to the disadvantage of the natives
12	Species richness (invertebrates, birds, reptiles, fish, mammals, plants)	Number of species is an indicator of ecological carrying capacity/niche breadth and hence its stability
13	Fish breeding/nursery	Breeding areas serve to replenish populations of organisms in the ecosystem. For sustenance of populations such areas need to be prioritized for conservation
14	Refugia	Refugia serve as source of seeds of resurgence
15	Buffering capacity	Ecological functions are dependent on the intrinsic/natural attributes of an ecosystem. Less perturbed areas should be given higher priority for conservation
c Human use features		

SN	Criteria	Justification
16	Level of fragmentation/disturbance	Ecological functions are dependent on the intrinsic/natural attributes of an ecosystem. Less perturbed areas should be given higher priority for conservation
17	Proximity to industrial and urban activities	Point discharge of untreated waste, water abstraction, pollution (noise, carbon dioxide, toxic substances, non-biodegradable material etc)
18	Cultivation	Loss of buffer zones, loss of habitats, increased turbidity in water bodies, contamination with pesticides, erosion, nutrient loading, water resource over utilization
19	Human settlements in the proximity < 1km	Waste generation, habitat degradation and over exploitation
20	Grazing	Erosion, loss vegetation cover, disease transmission, invasion of exotics
21	Proximity to transport routes	Oil spills, habitat modification, pollution (noise, carbon dioxide, lead poisoning)
22	Fishing	Fishing activities have negative effects on the ecosystem in terms of habitat destruction, biodiversity loss and ecosystem functions
23	Water abstraction points	Habitat destruction
24	Hunting	Loss of biodiversity, loss of habitat, instability and loss of ecosystem functioning
25	Cultural uses	Enhances conservation

Table 2.2. Ecological attributes of ESAs, their ranks and weights for determining sensitivity thresholds

NS	ESA attribute	Attribute rank					Parameter weight				
		Wetlands	River mouth	Rocky outcrops	Forests	Sheltered bays	Wetlands	River mouth	Rocky outcrops	Natural forests	Sheltered bays
A Physical features											
1	Area	4		9	11	10	85		45	40	30
2	Shoreline length	4			10	11	85			45	25
3	Distance from the nearest similar ESA	12	8	8	9	8	35	20	50	50	55
4	Rock size			4					80		
5	Substratum		9			2		10			80
6	Water clarity		9	7		9		10	65		50
7	Gradient			4		12			80		20
8	Discharge		9					10			
B Biological characteristics											
9	Habitat diversity	3	3	2	6	2	90	85	90	70	80
10	Bird nests	6	7	12	5	14	60	30	30	75	10
11	Macrophytes/vegetation cover	10	5	11	4	2	45	60	40	80	80
12	Rare and endangered species	1	2	1	1	7	100	95	100	100	60
13	Exotics/invasive	13	9	13	13	14	20	10	10	10	10
14	Species richness (invertebrates, birds, reptiles, fish, mammals, plants)	2	4	2	6	5	95	80	90	70	70
15	Fish breeding/nursery	6	1	10	12	1	60	100	40	25	100
16	Refugia	8	6	6	6	6	50	50	70	70	65
17	Shoreline protection	8			2		50			90	
18	Buffering capacity	5			2		80			90	
C Human use features											
19	Level of fragmentation /disturbance	11	7		8	13	40	30		55	15

2.4 ESA sensitivity classification

ESAs were classified into categories of sensitivity using indices generated from weighted scores of ecological and human use attributes (Table 2.2). The ESA categories of wetlands, sheltered bays and forests were delineated from satellite images and their relative sensitivities based on the level of degradation and threats from human use were subsequently marked on maps with color-coded legends that resulted into six portfolios as:

- (vii) Highly degraded and highly threatened
- (viii) Highly degraded and least to moderately threatened
- (ix) Moderately degraded and highly threatened
- (x) Moderately degraded and least to moderately threatened

- (xi) Least degraded and highly threatened
- (xii) Least degraded and least to moderately threatened

For the sheltered bays, an integrated approach i.e. one based on the collective assessment of the presence, ranking and level of sensitivity of ESA categories (wetlands, rocky outcrops, river-mouths and forests) on them was adopted.

Other GIS Data Layers prepared included:

- (i) Administrative boundaries, namely; International boundaries (Kenya, Uganda and Tanzania)
- (ii) Transport infrastructure (i.e. key road networks and water transport networks)
- (iii) Major cities / towns and key townships
- (iv) Rivers
- (v) Digital Elevation Model (DEM) and Digital Terrain Model (DTM)

2.5 Data collection, processing and mapping

Landsat satellite images acquired from the United States Geological Survey (USGS) covering 2009 to 2010 were used to carry out preliminary mapping for wetlands, forests, rivers and river mouths, sheltered bays, shoreline, and Islands. Field surveys were later undertaken to groundtruth preliminary mapping and further collect additional information using GPS technology (accuracy of less than 10 m) and field data collection forms (Appendix V). Also mapped by GPS in the field were Rocky outcrops, cultural sites IBAs, water abstraction and waster water disposal points. Photographs of unique features in the various categories of ESAs and human use activities were also taken. These generated data were incorporated into GIS using ArcView 3.2a and ArcGIS software. Other data sets such as transport routes, road networks, urban centers and international boundaries were mapped from existing maps, Google Earth and reports. The mapping was done using World Geographic System (WGS) 84 UTM Zone 36N projection. ESA attributes were enjoined to GIS databases. From these shapefiles, total ESA area and relative sensitivities of the various categories were determined.

Maps were therefore generated for each ESA category showing various sensitivity levels as well as human use features.

3. RESULTS

3.1. COMMUNITY PERCEPTIONS OF DIFFERENT ESAs IN LAKE VICTORIA

In identifying protective regimes that are most appropriate for the different ESAs, local social, political, and economic factors need to be considered along with the ecological ones. Therefore opinions and perceptions of local communities are central issues in the sustainable management of Ecologically Sensitive areas. Usually there is a dilemma towards protection of natural resources between local people and natural resource managers in terms of the goals and objectives and this is no exception to ESAs. While managers might be concerned about the conservation of natural resources, local people may be more concerned about their economic benefits. The importance of perceptions that the public creates for protection of ESAs is therefore significant for providing the basis for local participation therefore this part of the study documented the perceptions and opinions of the local people that live or have traditionally used the natural resources in the ESAs around Lake Victoria as an input towards their designation, mapping and eventually protection. The community perceptions of different ESAs are documented below.

3.1.1 Wetlands

3.1.1.1 Kenya

Community-level information was obtained for 18 wetland systems in Kenya. 94% of respondents perceived wetlands as fish breeding areas, particularly for; Tilapia species, *Clarias gariepinus* (Mumi), *Protopterus aethiopicus* (Kamongo) and Haplochromines (Fulu). About 67% indicated that fishing took place in the breeding areas, with most fishing activity concentrated between March-June, a period that coincides with high populations of young fish in these areas. Decline in fish catches and average fish sizes were reported in 67% of the communities around wetlands. However, communities in all these ESAs indicated that they were aware of the role of wetlands as fish breeding areas.

Nearly all the wetland side communities (94%) were perceived as bird nesting areas and habitats of other rare /threatened animal species. Commonly reported birds on the wetlands are represented in Table 3.1. Most birds were thought to occur in wetlands throughout the year, but with peaks between March and August. The other animals found in wetlands were; Hippopotamus, Sitatunga, Crocodiles, Monitors lizards., Wild pigs, Water Otters, other Lizards, Monkeys, various species of Snakes including African Python, Porcupine, Mongoose, Rats, Dik dik, Rabbits and Squirrels. Generally these animals appear throughout the year, with peaks between May and August. None of the communities are licensed to hunt in any of the wetlands; however illegal hunting was reported to take place in two of the wetlands, targeting mainly antelopes such as Water bucks, while birds are not hunted at all. About 33% of wetland side communities experienced decline in birds while 44% reported decrease in other animal populations. Communities in two-thirds of the cases indicated they were aware of wetlands as important bird nesting areas and animal habitats.

All the wetlands were a rich host of indigenous plants, which included; Local names in parenthesis) *Ricinus communis* (Obala), *Sida acuta* (Owich), *Acacia brevispica* (Osiri), *Ficus sur* (Ngou), *Cyperus* spp., Palm trees, Reeds *Phragmites* sp., Hippo grass *V.cuspidata*, Water lily *Nymphae* sp., and *A. elaphroxylon*, (Ambatch/Orindi) among others,. Wetland plants were used for house construction, fencing, firewood, making baskets, mats, ropes and furniture; medicines, detergents, fodder and fishing rafts, traps and rods. In 83% of wetland side communities there was active harvesting of these plants, particularly; *Cyperus* spp., Hippo grass, *Phragmites* species and Ambatch tree. It was indicated that indigenous plants were declining in 44% of the wetlands, despite the fact that 50% of communities were aware of the value of wetlands as host of these plant species.

Only two of the wetland side communities recognized wetlands as cultural sites, mostly for offering rituals to stop strong winds and prevent bad spell. Five of the communities indicated wetlands as water extraction points and were used throughout the year while only one indicated flood control as use for wetlands in the rainy season, an indication of low community awareness of some important wetland functions and therefore the need for targeted public awareness.

About 61% wetland side communities perceived them as threatened, mainly by bad fishing practices, cultivation and harvesting. About 44% of wetland side communities perceived them as legally protected by BMUs and the Fisheries Department but only half of them had achieved some level of success, indicated from increase in young and adult fish besides regeneration of plants.

3.1.1.2. Tanzania

The survey covered 14 wetlands in Tanzania, all which were perceived as fish breeding areas. The fish species inhabiting the wetlands were; Tilapia, Haplochromines, *Clarias*, *Protopterus*, among others. About 79% of wetland side communities perceived fishing as a common activity in all surveyed wetlands and took place throughout the year while the rest of the communities perceived peaks between April and December; a period that coincided with high populations of young fish. All the sampled wetlands were thought to have experienced decline both fish catches and average sizes. All communities were aware that wetlands were important fish breeding areas and they knew consequences of fishing in those areas.

All sampled communities' perceived wetlands as bird nesting areas and important habitat for other rare and endangered animals. The birds observed frequently in the wetlands (some in local names) included; *Leptoptilos crumeniferus* (Marabou stork), *Phalacrocorax carbo* (Bata maji), *Circaetus cinereus* (Tai), Quelea quelea, Heron, Egrets, Goose, Hammerkops, Crane, Cormorants, Weavers, Kingfisher, among others. Based on 64% of community responses, birds occurred throughout the year with peaks in June-August (21%) and September-February (14%). The other animals inhabiting the wetlands included; Hippopotamuses, crocodiles, otters, lizards and snakes and occurred throughout the year (79% of wetland communities) and in the rainy season (21%). No form of hunting for birds was reported although 36% of the communities indicated ongoing hunting of other animals. About 86% of those interviewed reported a decline in both bird and other animal populations. Only 36% were aware of wetlands as bird nesting areas and habitat for other rare animals, but 79% knew the consequences of hunting birds and animals in these wetlands.

All Tanzanian wetlands were perceived to host a rich variety of plants. Among the plants found in the wetlands were Baobab, *Albizia sp.* (Mfausiku), *C. papyrus* (Malindi), *Phragmites sp.* (Matete), *A. elaphroxylon* (Ambatch tree). Water hyacinth, an exotic plant, was also found at the edges of some of the wetlands. Harvesting of plants took place in all the wetlands and targeted some indigenous plants were said to be declining in all the sampled wetlands and even more worrying, only 36% of the wetland side communities knew the consequences of harvesting wetland plants.

The wetlands were also commonly used as cultural sites. In this study 79% of those interviewed attached cultural values to the wetlands. About 86% perceived wetlands as water abstraction points mainly for domestic use, and this occurred throughout the year. None were aware of the role of wetlands in flood control. It was also indicated that all these wetlands occur on maritime transport routes and about 64% communities reported cases of oil spills but could not establish the magnitude.

All the wetlands were perceived threatened, by fishing, waste disposal, cultivation, cattle grazing, human settlement and harvesting plants. There was no legal protection status for wetlands but 14% indicated there was some degree of protection although with limited success.

3.1.1.3 Uganda

Information was obtained on 19 wetland systems in Uganda. Most of the wetland side communities (84%) had some ongoing socio-economic activities including fishing (15), cultivation (6), harvesting wetland plants (5), supporting industrial activities (5), hunting (3), human settlement (3), water abstraction (2), tourism (2), cultural practices (2) and grazing (1).

About 68% of wetland side communities indicated a decline both in fish catches and in average fish sizes. However, 74% were aware that wetlands were fish breeding areas and knew the consequences of fishing in those areas.

There were large numbers of birds and other rare animals living in most of the wetlands in Uganda and hunting was perceived to be taking place in three of the wetlands. The birds observed included the *Chlidonias leucopterus* (White-winged Black Terns), *Balaeniceps rex* (Shoebill), *Hirundo atrocaerulea* (Blue Swallow), Papyrus Yellow Warbler, *Larus cirrocephalus* (Grey-headed Gulls) and other birds of global concern. The other rare and threatened animals included the Sitatunga. About quarter of those interviewed experienced a decline in the number of birds while more than half reported decreasing numbers of the other animals. Only 40% were aware of the value of wetlands as bird nesting areas and habitats of other rare animals.

Wetlands hosted a rich diversity of indigenous plants however some plants, especially *C. papyrus* and *Phragmites* sp. (reeds), were indicated as being over-harvested, by 32% of the communities. Four communities reported a decline in plant numbers and diversity, even though communities in the same wetlands knew the consequences of harvesting wetland plants. It was however known that all wetlands in Uganda are legally protected despite the laxity in enforcement of the laws and regulations.

3.1.2 Forests

3.1.2.1 Kenya

The community-based study covered 12 forested areas. The forests had a number of indigenous plants, some of the most common included Musizi, *Ficus* and palm trees. There was ongoing harvesting of indigenous plants in most areas, particularly targeting; the hard woods and medicinal plants leading to decline in diversity of plants in the forests.

Forests were perceived as bird nesting areas and habitat of other rare and threatened animal. Frequently observed birds are shown in Table 3.1. Most birds were found in forests throughout the year with peaks between March and June. The other animals inhabiting the areas included; Hippopotomus, Wild pigs, Lizards, Monkeys, Snakes, Otters, Wild cats, Porcupine, Hyena, Monitor lizards, Tortoise and Jackal, among others. Only 17% of the communities perceived decline in bird species while 34% observed the same trend on other animal species. Communities were well aware of the importance of forests as bird nesting areas and other animal habitats but did not appreciate any direct benefits.

None of the forests was perceived as a cultural site. Only 17% noted forests as useful in flood control and none was reported within a maritime transport route. These areas were under threat from human activities especially deforestation, cultivation and human settlements.

3.1.2.2 Tanzania

Information was gathered on 11 forested sites in Tanzania. All interviewed communities' perceived forests as important bird nesting areas and habitat for other rare/endangered animals. The inhabitant bird species (some in local names) named included; Marabou stork, Egret, *P. carbo* (Batamaji) and Red-billed Quereza (*Q. quelea*). These birds were reported to occur throughout the year but with peaks in April coinciding with crops harvesting period. There was no form of hunting reported in any of the visited sites. Other animals commonly found in the forested areas were; Hippopotamus and snakes; which inhabited the sites throughout the year. About 82% of the communities reported declining numbers of birds and other animals.

Only two forest side communities perceived forests as important habitats for a large diversity of indigenous plants, including; *Ficus* sp. (Mkuyu), Malindi, *C. papyrus* and Mizuzume. About 64% recognized harvesting as a common activity in the sites and particularly targeting Malindi and Mizuzume and about the same percentage experienced a decline in the plant numbers and species.

The communities indicated that all the forests covered in this study were threatened by; cultivation, illegal fishing, deforestation, grass cutting and human settlement. However, 45% of the communities knew some forests were protected by legal instruments and to some degree this was successful as indicated by sustained natural vegetation.

3.1.2.3 Uganda

The community-level study covered six forested areas in Uganda. There were various ongoing socio-economic activities (human settlement, cultivation and deforestation) in four of these forests.

Forests were perceived as bird nesting areas and habitat to other rare and endangered animals. The other rare animals included the Bush elephants, Colobus monkeys and the sub species of the Blue monkey. Two sites reported decline in numbers of birds while the other in the other rare animals in these forests. Forest side communities in three sites were aware that forests were bird nesting areas and habitat of other rare and endangered animals.

These forests were also considered to host a large diversity of indigenous plants, which were harvested in three of the sampled forests. The most commonly harvested plants were; Kisura and Musizi. Communities perceived decline in plant diversity in two of the sampled forests. All communities around the forests were aware of the role of these forests as host of rich diversity of indigenous plants and knew the consequences of uncontrolled felling of plants. In Uganda the forests are gazetted and are legally protected but there are those that are outside protected areas and these are in most cases the most abused. However for Lake Victoria all forests within a distance of 100 m from the lake shore and 50 m from river banks are legally protected by the Lake, Rivers, and Wetlands Regulation 2000 but its enforcement is limited.

3.1.3 River mouths

3.1.3.1 Kenya

Information was obtained on 12 river mouths, all of which were indicated as breeding areas for a number of fish species, especially; Tilapinnes, catfishes such as mud fish (*Clarias gariepinus*) and *Synodontis* spp., *Protopterus aethiopicus* (Lungfish), *Lates niloticus* (Nile perch), Haplochromine spp., *Schilbe intermedius*, *Mormyrus*, spp., *Labeo victorianus* (Ningu) and *Barbus* spp. About 92% of the respondents indicated that fishing around the river mouths took place throughout the year but with peaks between March and May, period also associated with abundant fish juveniles. All the communities reported decline both in fish catch and average sizes over the years.

The communities further recognized rivers mouths as bird nesting areas and habitat of rare/threatened animals. Common birds are represented in Table 3.1. The birds were found throughout the year but with peaks between March and August. The other inhabiting animals included; Hippopotamuses, Ndhowe, wild pig, Ongwaye, Ngao, crocodile, otter, leopard, snakes, porcupine, water buck, monkey, mongoose, monitor lizard, Wild cats, Leopard, sitatunga, Anyier. About 42% of the communities reported decline in

population of birds and other animals. However, all communities indicated that they had received some sensitization on river mouths as bird nesting areas and habitats other rare/threatened animals.

Communities also indicated presence of several indigenous plants in most river mouths, which were harvested for a various uses. Plants targeted for harvesting included *C. papyrus* (common Papyrus), *Phragmites* sp., and Hippo grass. Other common plants reported included; (common names in parenthesis) *Cyperus dives* (See), *Sesbania sesban* (Asao), *Typha latifolia* (Ondhong), *Ficus sur* (Ngou), *A. elaphroxylon* (Orindi), *Acacia brevispica* (Osiri), *Sida acuta* (Owich), *Albizia coriaria* (Ober), *Kigelia Africana* (Yago), *Balanites aegyptiaca* (Otho), *Markhamia lutea* (Siala), *Sesbania sesban* (Asao), *Sesbania sesban* (Oyieko), *Melia azedarach* (Dwele), Gum tree, palm tree, *Hyparrhenia rufa* (Ogare), Water hyacinth an exotic plant was also commonly found in these areas. About 42% of the communities reported decline in plant species around the river mouths.

Only one river mouth was reported as a cultural site where prayers and sacrifices were offered. Five of the rivers had water extraction points reportedly used throughout the year. One river mouth was very close to a maritime transport route, but had no reported incident of oil spillage.

About two-thirds of the communities indicated river mouths as experiencing enormous threat from anthropogenic related activities such as fishing, sand mining, plant harvesting and cultivation. There was some level of protection of these areas, especially against illegal and other destructive fishing practices, hunting and cultivation. Protection was mainly provided by the BMU and local government administrators, although this had not generally recorded success, 17% of river mouths were considerably protected.

3.1.3.2 Tanzania

The study covered 9 communities around river mouths in Tanzania. All communities indicated river mouth as important breeding areas for Tilapiine species, *Schilbe, intermedius Synodontis* spp., *L. victorinus*, *L. niloticus* (Nile perch) and Haplochromine species. Fishing was reported as a common activity for all the communities and occurred throughout the year with peaks in the rainy season (February-April) when fishes are known to move upstream the rivers to spawn. All communities visited reported a decline in both catches and average fish sizes around river mouths despite the awareness that river mouths are fish breeding areas and the need to avoid fishing using wrong methods and more so in the rainy season.

All communities also recognized river mouths as bird nesting areas and habitat of rare/endangered animals. The most common bird and animal species reported included; *Quelea quelea* and Water duck respectively. Other animals observed inhabited the river mouths were Hippopotamus, Otters, Crocodiles and Monitor lizards. These animals were reported to occur throughout the year. None in the communities had hunting licenses but hunting for birds and other animals was frequently reported. This was indicated as responsible for the reported decline in birds and animals species.

All communities reported river mouths as rich in diversity of indigenous plants with *C. papyrus*, *Phragmites* sp., and *Ficus* sp. (Mkuyu) as the most dominant plants. Plant harvesting was indicated as an ongoing activity in all visited communities around the river mouths with Matete species as the main target. In spite of existing awareness within communities on the roles of river mouths and the consequences of uncontrolled plant harvesting therein, all communities reported strong decline in plants attributed mostly to the ongoing unsustainable exploitation. All communities did not attach any specific cultural values on river mouths except for use as water abstraction points for domestic purposes.

The river mouths were indicated as threatened mostly from illegal fishing, cultivation, cattle grazing, cutting grass, deforestation and sand extraction. There was no evidence of any form of protection from any of the threats.

3.1.3.3 Uganda

Five communities close to river mouths were covered in the survey. Three of the communities indicated various socioeconomic activities taking place namely; fishing and harvesting wetland plants. All the communities perceived a decline in fish catches around river mouths catches but no observable change in the average fish sizes. Three of the communities surveyed were aware of river mouths as important breeding areas and knew the consequences of fishing in breeding areas.

All communities recognized river mouths as bird nesting areas and host rare/ endangered animals. There was no form of hunting reported in the river mouths but communities perceived a decline in bird numbers and no observable change in other animals. Four communities around river mouths were aware that they were bird nesting areas and habitats of other animal and knew the consequences of hunting in those areas.

All communities recognized river mouths as rich in populations of indigenous plants and indicated harvesting of plants as common in those areas. The main plants targeted were; Kisura, Ebibobo-drying sticks and palm trees. All the five communities perceived a decline in indigenous plants despite the fact that river mouths are legally protected in Uganda.

3.1.4 Rocky outcrops

3.1.4.1 Kenya

The study covered seven communities around rocky outcrops in Kenya. Six communities around these sites indicated them as fish breeding areas, especially for tilapia and haplochromines. About four communities indicated that people fished in the breeding areas close or on the rocky outcrops between March and August, the period that coincided with increased numbers of juvenile fish and the same number noted experienced a decline both in fish numbers and their sizes, despite existing awareness on rocky outcrops as fish breeding areas.

Five of the interviewed communities knew rocky outcrops as nesting areas for birds and habitat of other rare animals. Checklist of common bird species on the outcrops are as shown in Table 3.1. Other animals reported to occur on the rocky outcrops throughout the year included Crocodiles, Monitor lizards, Snakes, and Porcupines. No form of licensed hunting was reported but illegal hunting targeting Porcupines was mentioned. All visited communities perceived a decline in number of birds and other animals. The communities were aware that rocky outcrops are important for bird nesting and habitats of other animals.

Four of the communities knew rocky outcrops as a host to some indigenous plants: (local names in parenthesis) are; *Fiscus sur* (Bongu), *Kigelia Africana* (Yago), *Acacia abyssinica* (Ogongo), *F. sur* (Ngou), *Markhamia lutea* (Siala), *Rhus natalensis* (Sangla), *Sesbania sesban* (Asao), *A. elaphroxylon* (Orindi), *Indigofera arrecta* (Olando), Reeds, *Ricinus communis* (Obala), *Vernonia amygdalina* (Olusia), Caster plant, Euphobia and *Dombeya burgessiae* (Owich). The communities indicated harvesting of plants as a common activity with *S. sesban* and *A. elaphroxylon* as their main targets. Due to uncontrolled harvesting, some rocky outcrops were already experiencing decline in numbers and diversity of plants.

No community recognized rocky outcrops as cultural sites. Five communities indicated that rocky outcrops were under threat from human activities especially unsustainable fishing and disposal areas for human wastes. A community indicated one rocky outcrop on a maritime transport route which exposes it to risks of oil spill and but were also a threats in themselves to transport vessels. In about four communities some level of protection of the rocky outcrops by BMUs was reported, particularly from fishing activities. Respondents in two communities close to these indicated that protection has been fairly successful as shown by improving catches and numbers of young fish.

3.1.4.2 Tanzania

Information was provided by 19 communities close to rocky outcrops in Tanzania. All communities indicated rock outcrops as fish breeding areas, especially for; Tilapia, Nile perch, Haplochromines and *Synodontis* and fishing taking place in all the rocky outcrops but with peaks in May-June and September-January. Young fish was common throughout the year but most abundant in June-February or November-January. However all communities reported general trend in decline in fish catches and average fish sizes. About 84% of the communities were aware that rocky outcrops are fish breeding areas and knew consequences of fishing in those areas.

All the communities also knew rocky outcrops as bird nesting areas and habitat of rare and endangered animals. The birds (some in local names) are; *Quelea quelea*, Pigeon, Egret, Duck, Pelican, Heron, Marabou stocks, Goose, Hammerkops, Cormorants, Weavers, Kingfisher. Most birds were found throughout the year but a few were only seen in January-May or May-November. A number of animals inhabited the sites throughout the year, including; crocodiles, snakes, and monitor lizards. There was no one issued with a hunting license and neither birds nor animals are hunted. However, 68% and 84% of respondents perceived a decline in birds and other animals respectively. About 52 % of the communities were aware of their status as bird nesting areas and habitat of rare animals, but only 11% knew the consequences of hunting birds and animals in these areas.

About 89% of respondents around these ESAs reported a diversity of indigenous plants. The common plants (some in local names) included; *Adansonia digitata* (Baobab), *Euphorbia tirucali*, Water hyacinth, *Phragmites* sp., *Cyperus rotundu*, *Cyperus papyrus* (Mafunzyo), and *Aeschynomene elaphroxylon* (Mazuzume). About 80% of the communities reported harvesting of plants around the sites, targeting; *Phragmites* sp. (Matete) and *Cyperus rotundu*. About 63% of the communities knew of the consequences of uncontrolled harvesting of plants.

Nearly a half (47%) of the respondents' recognized rocky outcrops as cultural sites, where prayers were offered at particular times of the year, however all respondents were aware of the role of the cultural sites. Most of the respondents (63%) indicated that some rocky outcrops lay along the maritime transport route and about 47% have experienced oil spillage in the past.

All the ESAs were indicated as threatened, especially arising from; illegal fishing (use of monofilament nets, taccooning and beach seine), waste disposal, and harvesting of plants.

3.1.4.3 Uganda

Information was provided by 13 communities close to rocky outcrops in Uganda. All visited communities indicated fishing and waste disposal as occurring in the rocky outcrop areas while only one community indicated rocky outcrop as cultural site.

About 62% of the respondents reported declining fish catches and decreasing average fish sizes. Interestingly 92% of the communities were aware that rocky outcrops were fish breeding areas, and 80% knew the consequences of fishing in those areas.

All the communities also indicated a number of birds and rare animals as common but only three of them knew rocky outcrops as bird nesting and animal habitats. No form of hunting was permitted around these sites but still about 23% and 31 % of the respondents reported experiencing decline in birds and other animal populations respectively.

About 38% of the respondents reported occurrence of indigenous plant species in rocky outcrops and the same percentage indicated harvesting of those plants as common. Only 23% of the communities were aware of the consequences of harvesting plants close rocky outcrops. The targeted plants included *Cinchona* sp. (Mululuza). As a result two communities reported decline in the number of plants. Communities in three cases indicated they are aware of the consequences of uncontrolled harvesting of indigenous plants.

3.1.5 Sheltered bays

3.1.5.1 Kenya

Information from community interviews indicated all respondents perceived most sheltered bays as important fish breeding areas. Approximately 73% of respondents indicated fishing as common in the bays and occurred throughout the year with peaks between April and June. Over 75% of the respondents reported a decline both in fish numbers and in average sizes. 83% of the respondents indicated they were aware of the role of sheltered bays as breeding areas and understood the consequences of using wrong fishing methods within the bays.

Over 92% of the community members recognized bays as nesting areas for various bird species and habitats of other rare animals. Common birds mentioned are represented in Table 3.1. The other animals inhabiting the bays were; Sitatunga, crocodile, hippopotamuses, monitor lizard, monkey, otter, porcupine, snakes, and wild pigs. Birds and animals occurred throughout the year but birds had peaks between April and August. Communities were not aware of any one with a hunting license but 8% and 17% of respondents respectively reported cases of illegal hunting of birds and other rare animals particularly Sitatunga. About half of the community members had experienced a decline in numbers and diversity of birds and other rare animals.

Over 80% of the community members recognized sheltered bays as important habitat for several indigenous plants, including; *A. elaphroxylon*, *S. sesban*, Papyrus, Hippo grass, *Ficus* sp., Caster plant, Euphobia and *Phragmites* sp. About 75% of the communities harvested these plants, especially *C. papyrus*, *S. sesban* and the grasses (Hippo grass and *Phragmites* sp.). The communities use plants for constructing houses, fencing, making baskets, mats and furniture; as well as medicines, firewood, fodder and for making fishing rafts. Most communities reported decline in numbers and diversity of indigenous plants. Only about 50% of respondents indicated that their communities are aware of the negative consequences of uncontrolled harvesting of indigenous flora in the bays. Only one Bay in Kenya was indicated as a cultural site with 42% of the communities reported to draw water from the bays for domestic purposes

Over 90% of the respondents felt that bays were under threat from anthropogenic related activities, mostly through fishing, cultivation and harvesting indigenous plants. About 75% of the communities indicated the bays to be under some form of protection mainly provided by BMUs guarding against

destructive fishing methods. However, only half of the respondents reported that protection of their bays was evidently successful through localized increase in fish stocks, re-emergence of certain fish species, reduction in illegal fishing and increasing vegetation.

3.1.5.2 Tanzania

Based on the 14 communities close to the sheltered bays, they were indicated as fish breeding areas, especially for; Tilapia, Nile perch, Haplochromines, *Clarias*, *Protopterus*, *Schilbe*, *Bagrus*, *Labeo* and *Synodontis*. Above 80% of the respondents considered fishing as a major activity and occurred throughout the year. About 63% of the communities reported presence of young fish throughout the year but with peaks between January and May. All the communities perceived a decline in fish catches and in average fish sizes despite the fact that the communities were aware of the importance of the sites as fish breeding areas and the consequences of fishing in them.

All the communities considered sheltered bays as important bird nesting areas and habitats of other animals. The birds included Heron, Marbour stock, Egrets, Goose, Hammerkops, Cranes, Cormorants, Weavers, and Kingfisher among others. All communities indicated that birds occurred throughout the year but had peaks between February and May. The other animals found in the bays were; Crocodiles, Nzobe, Wild pigs, hippopotamuses, Otters, Snakes and occurred throughout the year. No community reported either a form of legalized or illegal hunting for birds and animals around sheltered bays. However, 86% and 36% of the communities indicated that birds and other animals respectively were declining in bays. Only 36% of the communities were aware of their importance as bird nesting areas and habitats of other animals.

All the communities indicated sheltered bays as host to a rich diversity of indigenous plants, including; *C. papyrus* (Malindi), *Aeschyonomene elaphroxylon* (Mazuzume), *Cyperus rotundus* (Ndago). Plant harvesting was indicated to take place in all the bays. About 79% of the the communities close to the sheltered bays perceived a decline in plant numbers and diversity, and communities in only 14% of them were aware of the consequences of uncontrolled harvesting of indigenous plants.

All communities considered sheltered bays as important water abstraction points for domestic use and occurred throughout the year while above 60% the communities looked as sheltered bays for cultural purposes. None of the of the communities perceived sheltered bays as important for flood control while above 86% of the communities knew sheltered bays as important for maritime transport routes. About 64% of the respondents indicated having seen oil spills but could not tell to either to what extent or this study quantified it.

All the communities indicated sheltered bays are as threatened by human activities, in particular; illegal fishing, waste disposal, cultivation, deforestation, harvesting wetland plants and human settlement. None of the communities were aware of the protection status bays of sheltered bays.

3.1.5.3 Uganda

The community-level survey covered six sheltered bays, all of which had various socioeconomic activities. All the communities close to these bays indicated fishing as a common activity in most bays, while about half of the communities reported cultivation, tourism, harvesting wetland plants, cultural practices and grazing as activities in the bays.

Almost all the communities experienced declining fish catches and reduction in average fish sizes and less than half of the perceived a decline of other animals around the bays. All communities were aware

that the bays were fish breeding areas and knew the consequence of fishing within them. None of the communities reported that any hunting or plant harvesting were taking place in the sheltered bays. The communities were aware that the bays were legally protected.

Table 3.1 Common bird species reported on Kenyan ESAs

English names	Scientific names	Local Names
White Egret	<i>Ardea ibis</i>	Okok
Ducks	<i>Alopochen</i> spp.	Atudo
African Fish eagle	<i>Haliaeetus vocifer</i>	Ongo
Kingfisher	<i>Halcyon chelicuti</i>	Kirindi
Sacred Ibis	<i>Bostrychia hagedash</i>	Ngaga
Grey Crowned Crane	<i>Balearica pavonina</i>	Ongowang
Weaver Bird	<i>Ploceus</i> spp.	Osogo
Swallows	<i>Hirundo</i> spp.	Opija
Cormorant	<i>Phalacrocorax</i> spp.	Osou
Pelican	<i>Pelecanus</i> spp.	Mbusi
Vultures	<i>Gyps</i> spp.	Achuth
Heron	<i>Ardea</i> spp.	Nyamnaha
Plover	<i>Vanellus</i>	Orwenda
Fan tailed Widowbird	<i>Euplectes axilliaris</i>	Oseng
Northern Red Bishop	<i>Eupilectus orix</i>	Oseng
Coucal	<i>Centropus</i> sp	Tutu
Robin Chat	<i>Cossypha</i> sp.	Hundhwe
Pied Wagtail	<i>Motacilla</i> sp	Onchinyo
Doves	<i>Turtur</i> spp.	Akuru
Hamerkop	<i>Scopus umbretta</i>	Anam
Black kite	<i>Milvus migrans</i>	Otenga
Black-necked Grebe	<i>Podiceps nigricollis</i>	Hudiwiri

3.2 Community perception on constraints to protection of ESAs

There were various constraints identified by communities, which varied by country, ESA type and community but the common ones were:

- (i) Inadequate financial resources;
- (ii) Lack of technical capacity for enforcement;
- (iii) Lack of effective laws, bye-laws and policy framework;
- (iv) Status of beach land ownership not clear;
- (v) Corruption by law enforcers, and poverty.
- (vi) Poor attitude/ response by some community members
- (vii) Some ESAs are located too far away from community hence difficult to monitor
- (viii) Some ESAs are inaccessible
- (ix) Lack of clear property rights – some people claim ownership of ESAs
- (x) Inadequate information on pertinent attributes on some of the ESAs

3.3. Spatial distribution and status of ESAs

3.3.1 Wetlands

A total of 422 wetlands (61 in Kenya, 219 in Uganda and 142 in Tanzania) were mapped in and around Lake Victoria (Figures 3.1 and 3.2). The total wetland area delineated was 4,322 km² of which 417 km² was in Kenya, 2,025 km² in Uganda and 1,880 km² in Tanzania. These wetlands were mainly emergent or swamp systems characterized by herbaceous and emergent vegetation such as Papyrus (*C. papyrus*), Reeds (*Phragmites* sp.) and Hippo grass (*V. cuspidata*) (Plate 3.1). The other wetlands around the lake included the shrub land systems dominated by evergreen shrubs (Plate 3.2). The largest coverage of wetland by area was mapped in Uganda while the smallest was in Kenya and this pattern corresponds with the proportion of shoreline lengths around the lake. The water regime varied among the mapped wetlands and included saturated, seasonally flooded and semi permanently flooded soils.



Figure 3.1 Status and distributions of wetlands under different sensitivity classes

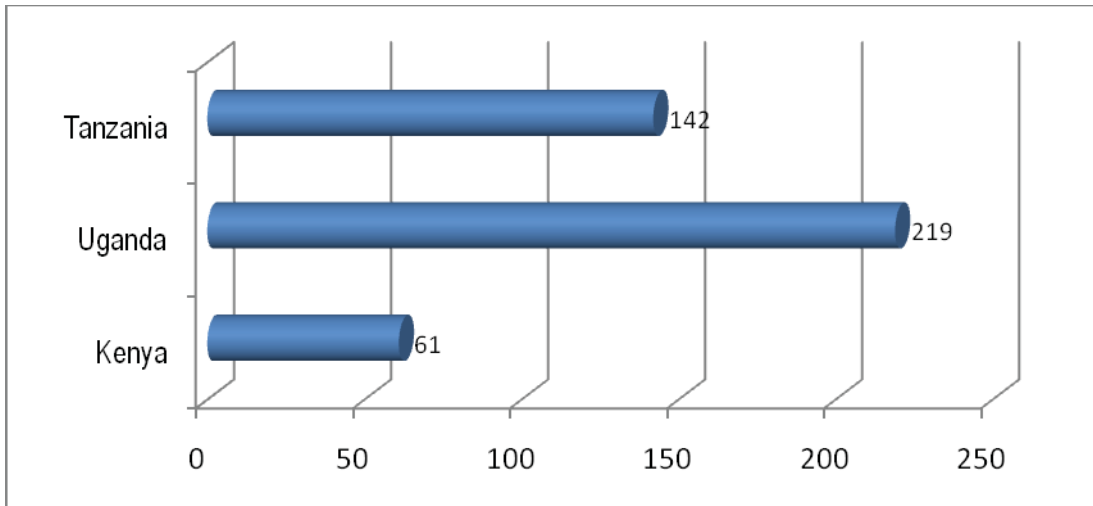


Figure 3.2 Number of wetlands mapped in and around Lake Victoria



Plate 3.1. The dominant emergent wetland around Lake Victoria



Plate 3.2. Shrub wetland around Lake Victoria dominated by Ambatch trees

Overall, there were 34 wetlands with areas greater than 10km² (Figure 3.3). Seven of which were in Kenya (Sio, Yala, Nzoia, Nyando, Kuja, and Kenga/Kibos/Nyam, 10 in Uganda (Mugango, Waya-1, Sango Bay, Nabugabo, Bussi, Bule-Kyagwe, Naguru/Namatu, Buyiri, Kaazi, and Katonga) and 17 in Tanzania (Kagera/Ruzinga, Ngoni, Sola-Bauman Gulf, Nyaruhwa, Simiyu-Magu Bay, Rubana, Kalukekele-Bauman Gulf, Mara, Yerarumbo, Ilalambogo, Mbalika, Ruiga, Nungwe, Luhorongoma, Mori, Ng'walogwabagole, and Mhalamba).

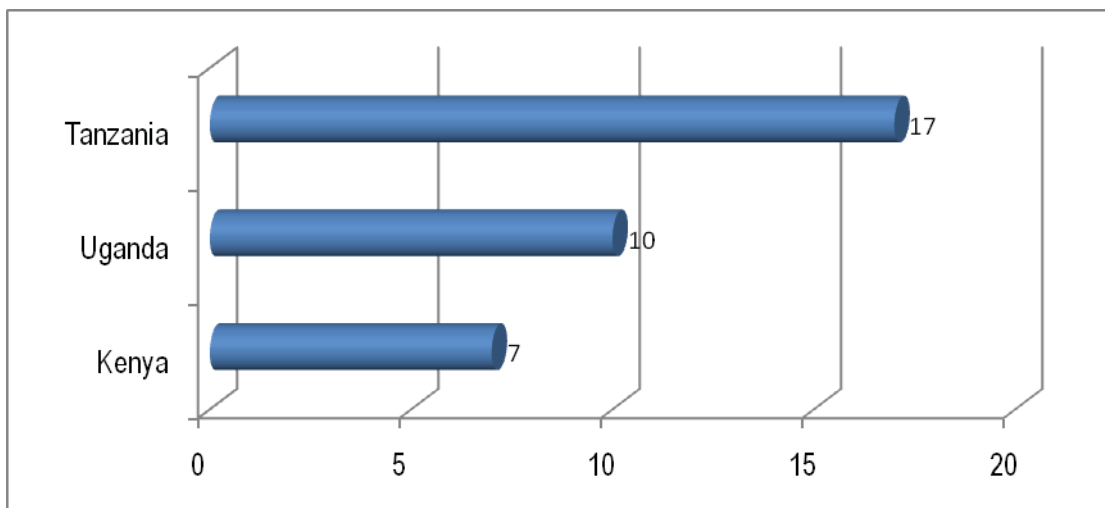


Figure 3.3 Number of wetland ESAs with area greater than 10 km² by country

There were 18 wetlands in the size range of 5 – 10 km² (Figure 3.4), 2 of which were in Kenya (Kabonyo, Sondu/Miriu), 8 in Uganda (Waya-2, Bukakata, Nabweyo, Kigugwo, Nsonga, Mutungo,

Nakivubo, and Bukasero/Kabere) and 8 in Tanzania (Rubafu, Nyashishi, Shinemba, Bulenda Bufwe-Baumann Gulf, Nyamirembe, Chanika, Bugonde, and Chigoga). Wetlands with an area less than 5 km² were 369 (Appendix VIII).

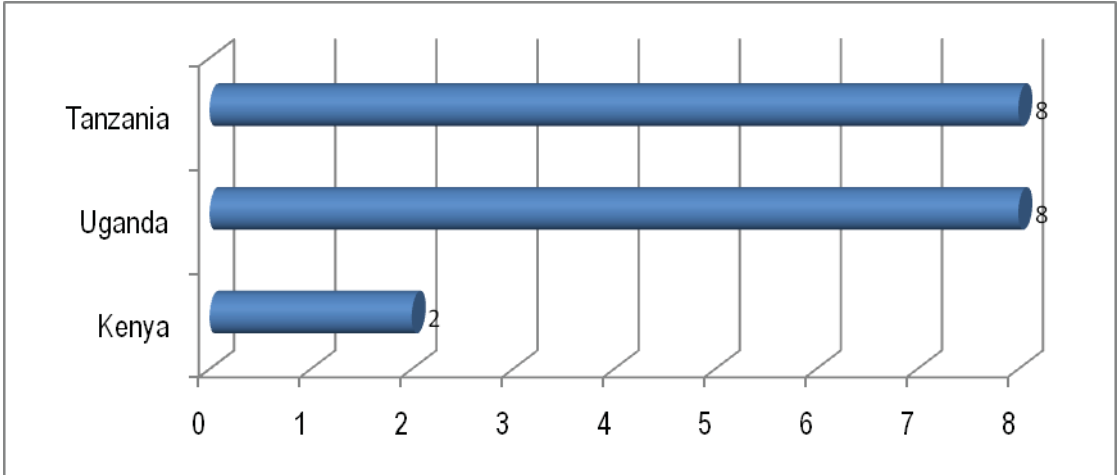


Figure 3.4 Number of wetland ESAs with area between 5 - 10km² by country

3.3.2 Sensitivity Classes of Wetland ESAs in and around Lake Victoria

The areas under the six sensitivity classes of wetlands identified in and around Lake Victoria are summarised (Table 3.2)

Table 3.2 Areas (km²) mapped under the six sensitivity classes of wetlands

Sensitivity classes	Kenya	Tanzania	Uganda	Total
Highly degraded and highly threatened	4	17	15	36
Highly degraded and least to moderately threatened	9	38	18	65
Least degraded and highly threatened		778	3	781
Least degraded and least to moderately threatened	373	435	1726	2534
Moderately degraded and highly threatened		74		74
Moderately degraded and least to moderately threatened	31	538	263	832
Total	417	1880	2025	4322

3.3.2.1. Highly Degraded and Highly Threatened wetlands

Wetlands in this extreme state of human disturbance covered less than 1% of the total mapped wetland area and were mostly associated with urban centres (Table 3.2 and Figure 3.1). They were all relatively small in size (less than 8 km²) distributed as follows: 3 in Kenya, namely; Dunga, Rota, and Kogony; 4 in Uganda, namely; Mutungo, Kirinya, Munyonyo, and Nakivubo; and 6 in Tanzania, namely; Igundu, Bulenda Bufwe, and Bwenyi in Baumann Gulf; Nyarusurya in Mara Bay; Shinemba, and Mugubya. A detailed list of wetlands, their sizes and sensitivity categories is appended (Appendix VI).

3. 3. 2.2 Highly Degraded and Least to Moderately Threatened wetlands

A total of 118 wetlands (25 in Kenya, 49 in Tanzania and 44 in Uganda) were ranked under this sensitivity class. They too were small in size and comprised less than 2% of the total mapped wetland area.

3. 3.2.3 Least Degraded and Highly Threatened wetlands

The wetlands ranked under this category were few in number (seven) but covered 18% of the total mapped wetland area. Two of these wetlands were in Tanzania, five in Uganda and none in Kenya.

3. 3.2.4 Least Degraded and Least to Moderately Threatened wetlands

Almost 60% of the total mapped wetland area with 81 wetlands (9 in Kenya, 12 in Tanzania and 59 in Uganda) was ranked under this sensitivity class. A trans-boundary wetland, the Sio fitted this sensitivity category, covering 24.8 km² in Kenya and 26.2 km² in Uganda. Several of the wetlands in this category were very large, e.g. Yala in Kenya (157 km²), Nyaruhwa in Tanzania (99 km²), and Katonga in Uganda (1004 km²).

3. 3.2.5. Moderately Degraded and Highly Threatened wetlands

This category of wetlands was not represented in Kenya and Uganda but was in Tanzania where 12 wetlands constituted close to 2% of overall mapped wetland area.

3. 3.2.6. Moderately Degraded and Least to Moderately Threatened wetlands

The largest number (185) of wetlands (23 in Kenya, 58 in Tanzania and 103 in Uganda) were ranked under this Sensitivity class. Amongst these was a trans-boundary wetland, the Kagera/Ruzinga which covers 89 km² in Uganda and 272 km² in Tanzania.

3.4. Forests

A total of 222 forest units (22 in Kenya, 125 in Uganda and 75 in Tanzania) were mapped in and around Lake Victoria (Figure 3.5, 3.6 and 3.7). The total forest area delineated was 1120.6 km² of which 3.0 km² was in Kenya, 716.5 km² in Uganda and 401.0 km² in Tanzania. Like for wetlands the largest coverage of forest by area was mapped in Uganda while the smallest was in Kenya.

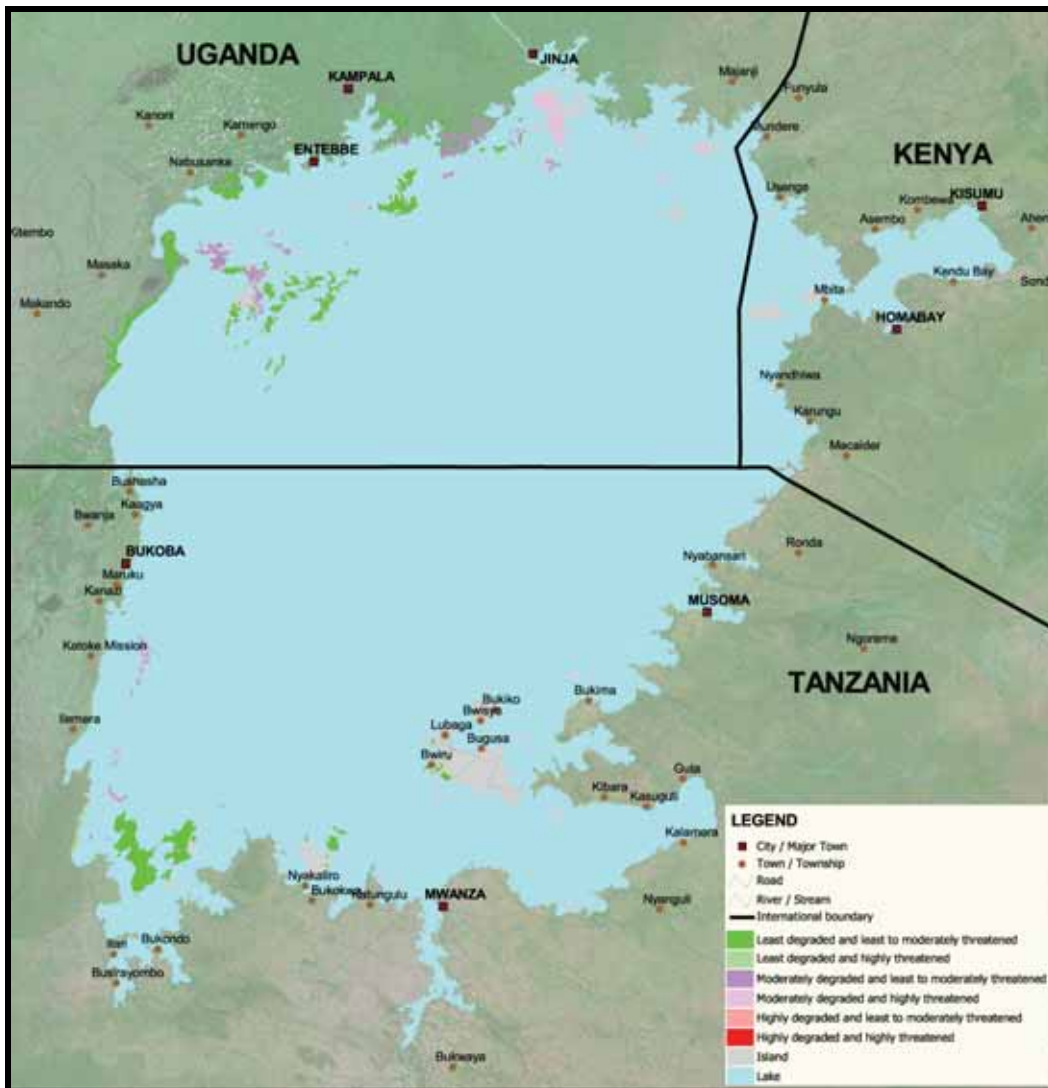


Figure 3.5 Status and distribution of forests under different sensitivity classes

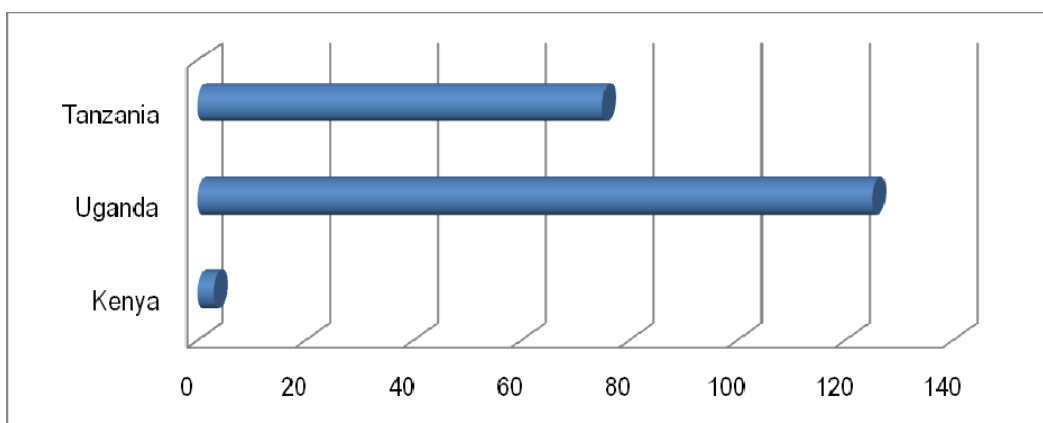


Figure 3.6 Number of forest units mapped in and around Lake Victoria

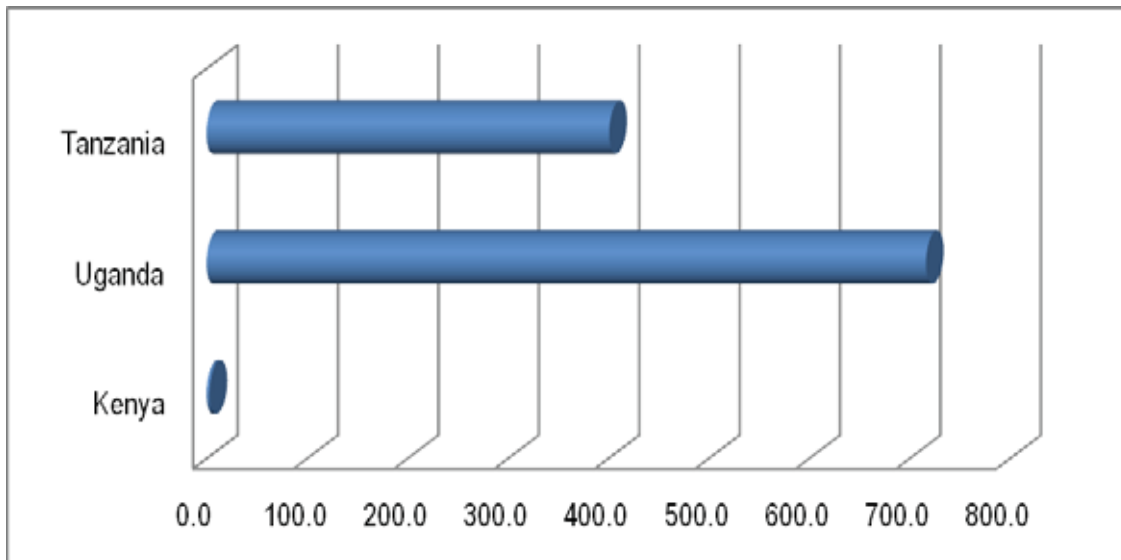


Figure 3.7 Total area of forest cover mapped in and around Lake Victoria

Overall, there were 20 forest units with areas greater than 10 km² (Figure 3.8). Six of which were in Tanzania (Rubondo, Biharamulo Game Reserve, Rubya, Buhama, Maisome and Bumbile) 14 in Uganda (Nkongwe, Bunyama, Buyovu, Kamengo, Kome, Mujuzi, Jubiya, Luwafu, Damaba, Bukassa, Bugalla, Nakiza, Kisisita and Buvuma) and none was mapped in Kenya.

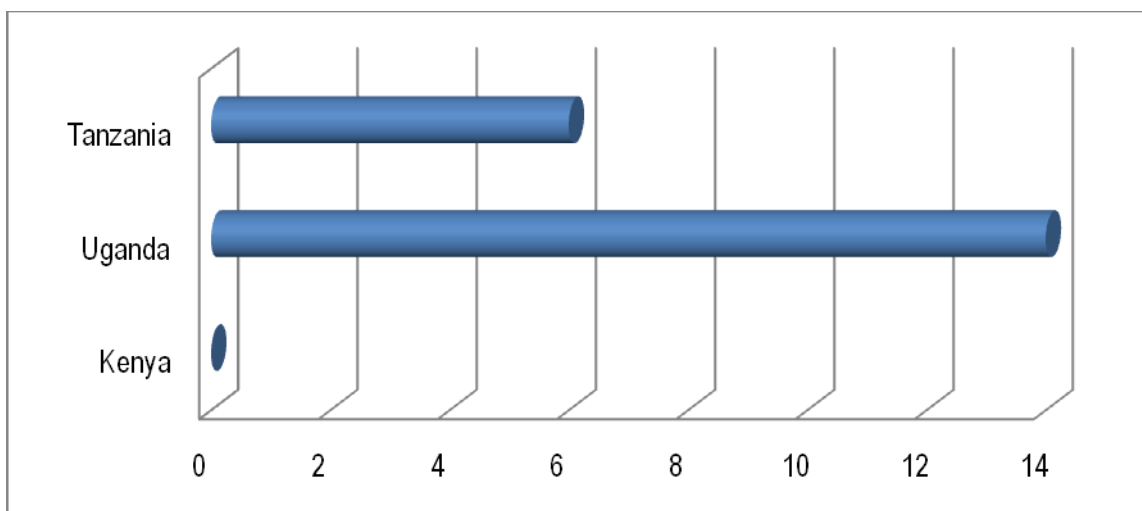


Figure 3.8 Number of forest ESAs with area greater than 10 km² by country

There were 18 forests in the size range of 5 -10 km² (Figure 3.9), Two of which-were in Tanzania (Zumacheri and Ikuza), 16 in Uganda (Bufumira, Bugabo, Fumwe, Nakalanga, Bunjazi, Nimu, Kuzito, Bugalla, Kasanje, Namatiwa, Luleka, Imanyiro, Bugaya, Sigulu and Bubemebe) and none in Kenya. Forest units with an area less than 5 km² were 180 (Appendix IV).

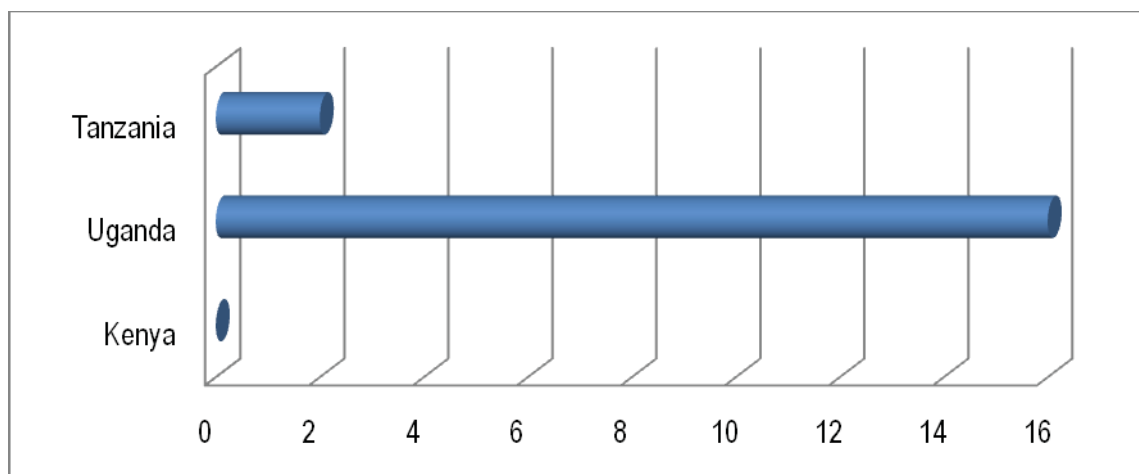


Figure 3.9 Number of forest ESAs with area between 5-10 km² by country

3.4.1 Sensitivity Classes of forests

The areas under the six sensitivity classes of wetlands identified in and around Lake Victoria are summarised (Table 3.3 and Figure 3.5).

Table 3.3 Areas (km²) mapped under the six sensitivity classes of forests

Sensitivity Class	Kenya	Tanzania	Uganda	Total
Highly degraded and least to moderately threatened	0.2		0.6	0.8
Least degraded and highly threatened		26.4		26.4
Least degraded and least to moderately threatened	1.5	337.3	415.4	754.3
Moderately degraded and highly threatened		0.4	114.4	114.7
Moderately degraded and least to moderately threatened	1.3	37.0	186.2	224.5
Total	3.0	401.0	716.5	1120.6

3.4.1.1. Highly degraded and highly threatened forests

There were no forests in this extreme state of human disturbance.

3.4.1.2. Highly degraded and least to moderately threatened forests

A total of 2 forests (one in Kenya, one in Uganda and none in Tanzania) were ranked under this sensitivity class. They covered a very small area comprised less than 0.1 % of the total the mapped forested area.

3.4.1.3 Least degraded and highly threatened forests

The forests ranked under this category were three and were only mapped in Tanzania and only covered about 2% of the total mapped forest area.

3.4.1.4 Least degraded and least to moderately threatened forests

About 40% of the total mapped forested area with 113 forests (5 in Kenya, 30 in Tanzania and 78 in Uganda) was ranked under this sensitivity class. These forests were mainly mapped on Islands and the North western parts of the lake shoreline.

3.4.1.5. Moderately degraded and highly threatened forests

This category of forests was not represented in Kenya like for wetlands but was only 2 forests in Tanzania and 13 in Uganda which constituted about 10% of overall mapped forest area.

3.4.1.6. Moderately degraded and least to moderately threatened forests

The second largest number (89) of forests (16 in Kenya, 40 in Tanzania and 33 in Uganda) were ranked under this Sensitivity class.

3.5. River Mouths

A total of 66 river mouths (24 in Kenya; 22 in Uganda; and 20 in Tanzania) were mapped along Lake Victoria shoreline (Table 3.4 and Figure 3.10). The full list of river mouths and their levels of disturbance are indicated in Appendix VIII. The water clarity at river mouths ranged from very clear to very turbid depending on the river catchment activities (Plates 3.3 and 3.4).



Figure 3.10 Status and distribution of river-mouth under different sensitivity classes

Table 3.4 Number of mapped river mouths by sensitivity category

	Kenya	Tanzania	Uganda	Total
Highly degraded and highly threatened		1		1
Highly degraded and least to moderately threatened	2	6		8
Least degraded and highly threatened	1	2	1	4
Least degraded and least to moderately threatened	14	0	14	28
Moderately degraded and highly threatened		5		5
Moderately degraded and least to moderately threatened	7	6	7	20
Total	24	20	22	66



Plate 3.3. Turbidity of an open river mouth



Plate 3.4. Clear waters of a densely vegetated river mouth with high buffering capacity

3.5.1. Sensitivity Classes of River mouths

Six sensitivity classes of river mouths identified in and around Lake Victoria are summarised (Table 3.4 and Figure 3.10).

3.5.1.1. Highly degraded and highly threatened river mouths

Only one river mouth (Mirongo) in Tanzania fell under this sensitivity class along the entire shoreline of the lake.

3.5.1.2. Highly degraded and least to moderately threatened river mouths

Two river mouths, Iditto and Ratieng in Kenya; and six (Luchilli, Bukingo, Kavivi, Kalukekele, Chigoga and Nisuiga) in Tanzania were characterized under this sensitivity class. Uganda registered none in this category.

3.5.1.3. Least degraded and highly threatened river mouths

Four river mouths, Samunyi in Kenya; Rubana and Simiyu in Tanzania; and Kiryowa in Uganda were categorised under this sensitivity class.

3.5.1.4. Least degraded and least to moderately threatened river mouths

This sensitivity category comprised of 28 of river mouths, 14 in Kenya and 14 Uganda which is 58% and 64% of river mouths respectively mapped in both countries. None of the river mouths in Tanzania was under this sensitivity class.

3.5.1.5. Moderately degraded and highly threatened river mouths

River mouths in this sensitivity class were only recorded in the Tanzania side of the lake. These were Lamadi, Mara, Mori, Ikungu and Suguti.

3.5.1.6. Moderately degraded and least to moderately threatened river mouths

Seven river mouths (Kisian, Magruk, Awach, Odhedhe, Nyandiwa, Wasiki and Akech) of this sensitivity were mapped in Kenya, 7 (Katonga, Kagera, Kigona, Namirembe, Ambacho, Muduzi and Kayanja-Kato) in Uganda and 6 (Nyamirembe, Nyashishi, Yerarumbo, Nungwe, Isanga and Luhorongoma) in Tanzania.

3.6 Rocky-outcrops

A total of 239 rocky outcrops (57 in Kenya, 131 in Uganda and 51 in Tanzania) were mapped in Lake Victoria (Figures 3.11 & 3.12). The Highly degraded and Highly threatened rocky outcrops in Lake Victoria were 10 in Kenya, namely; Nyenye, Sirongo, Ugambe, Luorkana, Osope, Morache, Nyatike I, Sumba and Wikwang; 4 in Uganda, namely; Mpagi, Kamutenga and 2 small Mutungo, and Nakivubo; 3 in Tanzania, namely; Bismack, Bwiru point and Capri point (Appendix IX).



Figure 3.11 Status and distribution of rocky-outcrops under different sensitivity classes

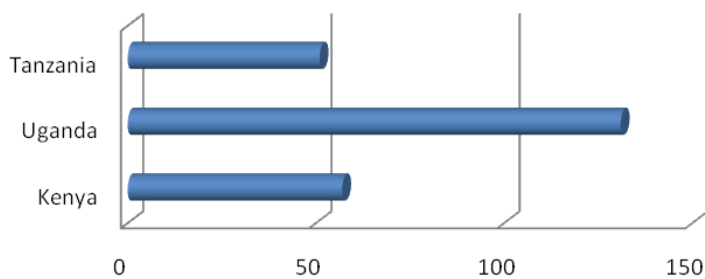


Figure 3.12: Mapped number of rocky outcrops by country

3.6.1. Sensitivity Classes of Rocky outcrops

Six sensitivity classes identified in and around Lake Victoria are summarised (Table 3.5 and Figure 3.11).

Table 3.5. Number of mapped rocky outcrops by sensitivity category

	Kenya	Tanzania	Uganda	Total
Highly degraded and highly threatened	5	4	4	13
Highly degraded and least to moderately threatened	8	6	15	29
Least degraded and highly threatened	1	3		4
Least degraded and least to moderately threatened		7	18	25
Moderately degraded and highly threatened	17	3	8	28
Moderately degraded and least to moderately threatened	26	29	86	141
Total	57	51	131	239

3.6.1.1. Highly degraded and highly threatened rocky outcrops

No rocky outcrop was delineated under this sensitivity class.

3.6.1.2. Highly degraded and least to moderately threatened rocky outcrops

Under this sensitivity class, 14 % and 12 % of the total number of rocky outcrops were delineated in Kenya and Uganda respectively. No rocky outcrop was characterized under this sensitivity category in Tanzania.

3.6.1.3. Least degraded and highly threatened rocky outcrops

Of the 239 rock-outcrops mapped in the entire lake, only 4 were recorded in this sensitivity category. Three were in Tanzania and one in Uganda (Table 3.5).

3.6.1.4 Least degraded and least to moderately threatened rocky outcrops

Twenty five rocky outcrops delineated under this sensitivity category, 18 of them in Uganda, 7 in Tanzania and none in Kenya.

3.6.1.5 Moderately degraded and highly threatened rocky outcrops

Twenty eight rocky outcrops were characterized in this sensitivity category, 17 of them in Kenya, 3 in Tanzania and 8 in Uganda.

3.6.1.6. Moderately degraded and least to moderately threatened rocky outcrops

In this sensitivity class; Kenya, Tanzania and Uganda recorded 26, 29 and 86 respectively of the total number of rocky outcrops mapped. The full list of rocky outcrops and their sensitivity levels are indicated in Appendix X.

3.7. Sheltered Bays

A total of 234 sub-bays (56 in Kenya, 83 in Uganda and 95 in Tanzania) were mapped in Lake Victoria (Figure 3.13 and 3.14; Table 3.6). One Tanzanian sub-bay was not characterised. The full list of sub-bays and their levels sensitivity are indicated in Appendix X.

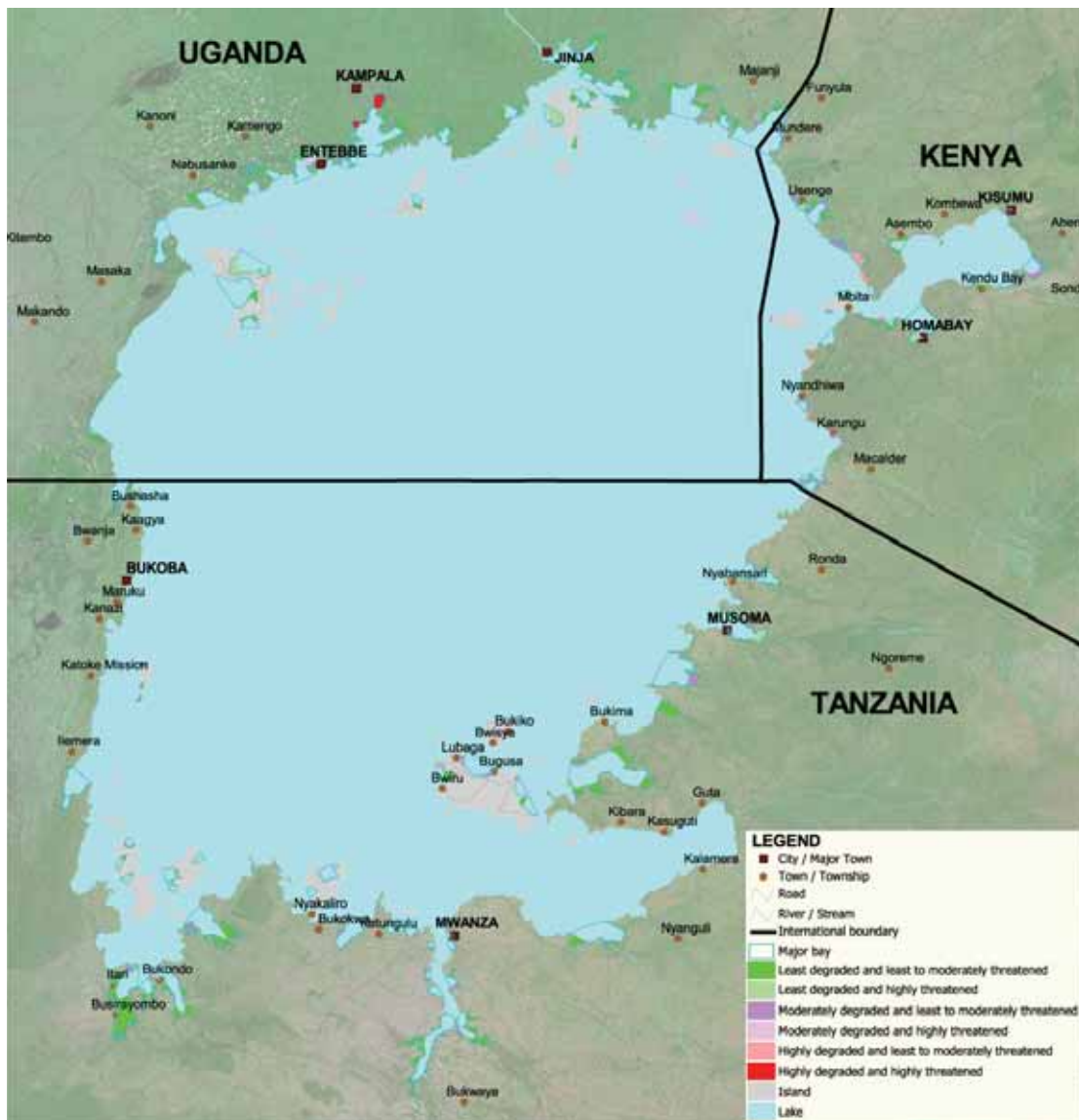


Figure 3.13 Status and distribution of major sheltered bays and sub-bays under different sensitivity classes

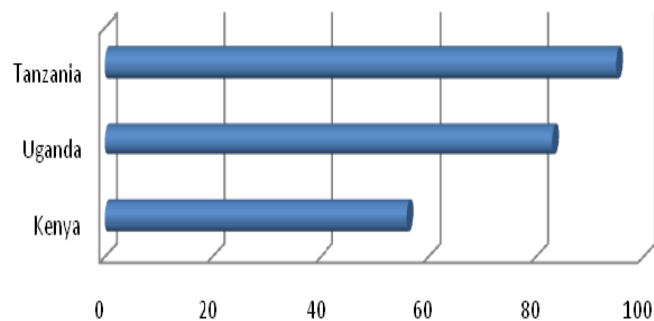


Figure 3.14 Mapped number of Sub-bays by country

3.7.1 Sensitivity classes of sub bays

Six sensitivity classes identified in and around Lake Victoria are summarised (Table 3.6 and Figure 3.13).

Table 3.6 Number of mapped sub-bays by sensitivity category

	Kenya	Tanzania	Uganda	Total
Highly degraded and highly threatened	1	4	5	10
Highly degraded and least to moderately threatened	20	4	1	25
Least degraded and highly threatened	2	1	12	15
Least degraded and least to moderately threatened	10	60	54	124
Moderately degraded and highly threatened	1		1	2
Moderately degraded and least to moderately threatened	22	25	10	57
Total	56	94	83	233

3.7.1.1. Highly degraded and highly threatened sub-bays

In Kenya, one sub-bay, Kisumu was characterised in this sensitivity class. Uganda and Tanzania recorded 4 (Musoma North Bay, Musoma South Bay, Kirumba Bay and Mwanza South Bay) and 5 sub-bays (Luzira-Portbel, Mutungo 1 & 2, Kitubulu 1& 2) respectively under this class (Table 3.6).

3.7.1.2. Highly degraded and least to moderately threatened sub-bays

Twenty five sub-bays were delineated, 20 of them were in Kenya, 4 in Tanzania and 1 in Uganda (Table 4.4). Appendix X outlines the names of the sub-bays in this category.

3.7.1.3. Least degraded and highly threatened sub-bays

There were 2 sub-bays delineated under this sensitivity category, one called Mulundu Bay in Kenya and the other called Waya in Uganda. In Tanzania, none was characterised under this category.

3.7.1.4. Least degraded and least to moderately threatened sub-bays

This sensitivity category comprised of 124 sub-bays, 10 in Kenya, 60 in Tanzania and 54 Uganda. The total number of sub-bays in this sensitivity class forms about 53% of all sub-bays delineated.

3.7.1.5. Moderately degraded and highly threatened sub-bays

River mouths in this sensitivity class were only recorded in the Tanzania side of the lake. These were Lamadi, Mara, Mori, Ikungu and Suguti.

3.7.1.6. Moderately Degraded and Least to Moderately Threatened sub-bays

Under this sensitivity class, 57 sub-bays were delineated, 25 of which were in Tanzania, 22 in Kenya and 10 in Uganda.

3.7.2. Selected major bays with contrasting sensitivity

3.7.2.1 Uganda

Murchison Bay (Fig. 3.15) in Uganda represents one of the most threatened major bays while Berkeley bay (Fig. 3.16) occurs in the least threatened class. Of the five sub-bays that were delineated as 'Highly Degraded and Highly Threatened sub-bays' in Uganda, three occurred in Murchison Bay (Fig. 3.15). These sub-bays also associated with degraded wetland and rock outcrops ESAs. The bay is one of those traversed by transport routes, has three water abstraction points and two waste water discharge points. None of the sub bays as well as ESAs in Berkeley Bay fell in 'Highly Degraded and Highly Threatened' sensitivity.

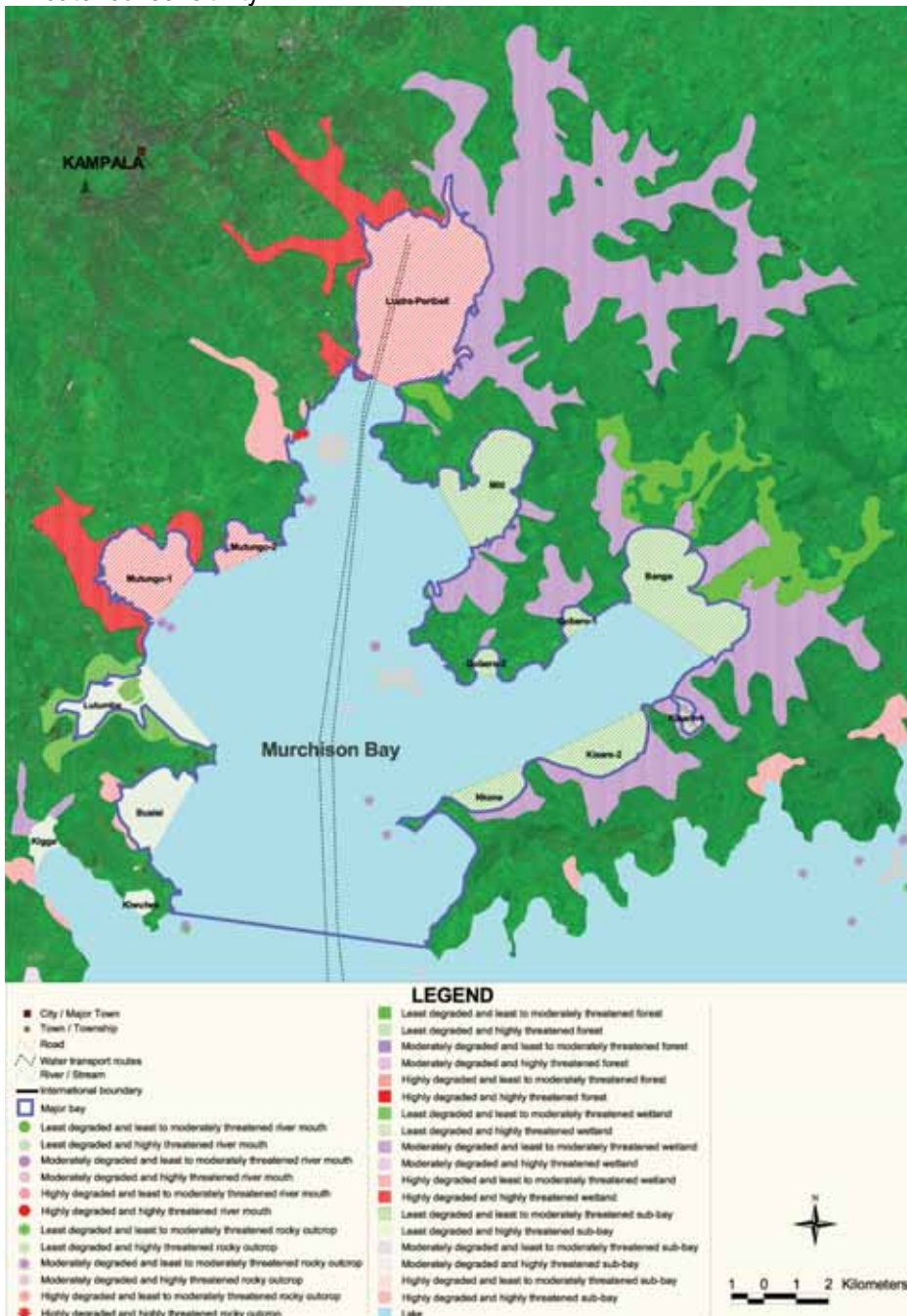


Figure 3.15 Status and distribution of major ESAs and sub-bays in Muchison Bay

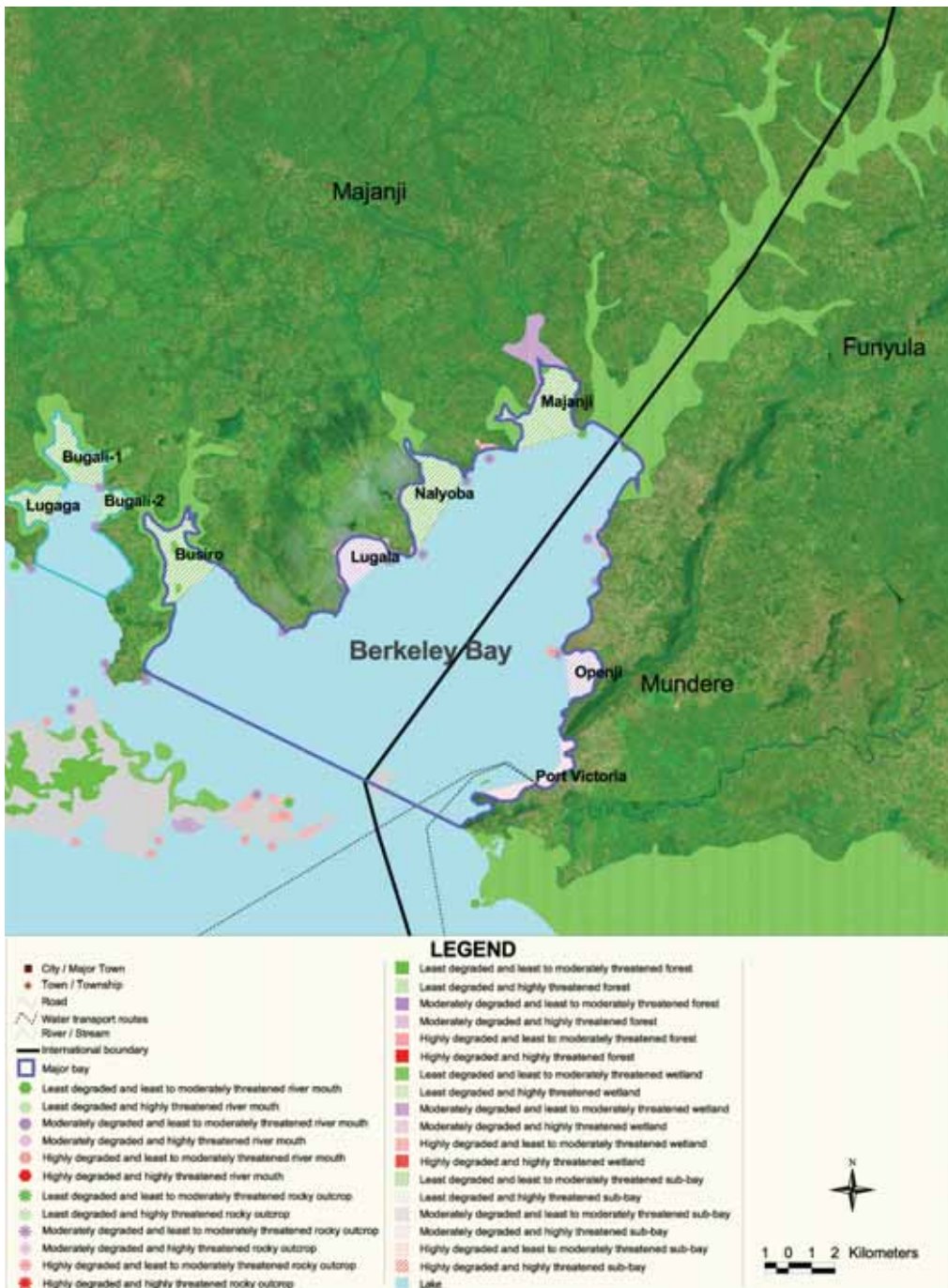


Figure 3.16 Status and distribution of major ESAs and sub-bays in Berkeley Bay

3.7.2.2. Kenya

Nyamonye is a major bay in Kenya containing several ESAs which include river mouths, wetland and rocky outcrops (Figure 3.17). The sub-bays delineated within the major Bay are also characterised with dense wetlands, several rocky outcrops and river mouths indicative of a critical habitat for breeding of fish and other aquatic biota. Nyakach (Figure 3.18) which is the other bay in Kenya and also host river

mouths and wetlands, is however small and open compared to Nyamonye and may not be as important as a breeding area except for its vegetated shoreline. Due to diverse attributes, the Nyakach have different sensitivities ranging from “least degraded and least to moderately threatened” to moderately degraded and least to moderately threatened’

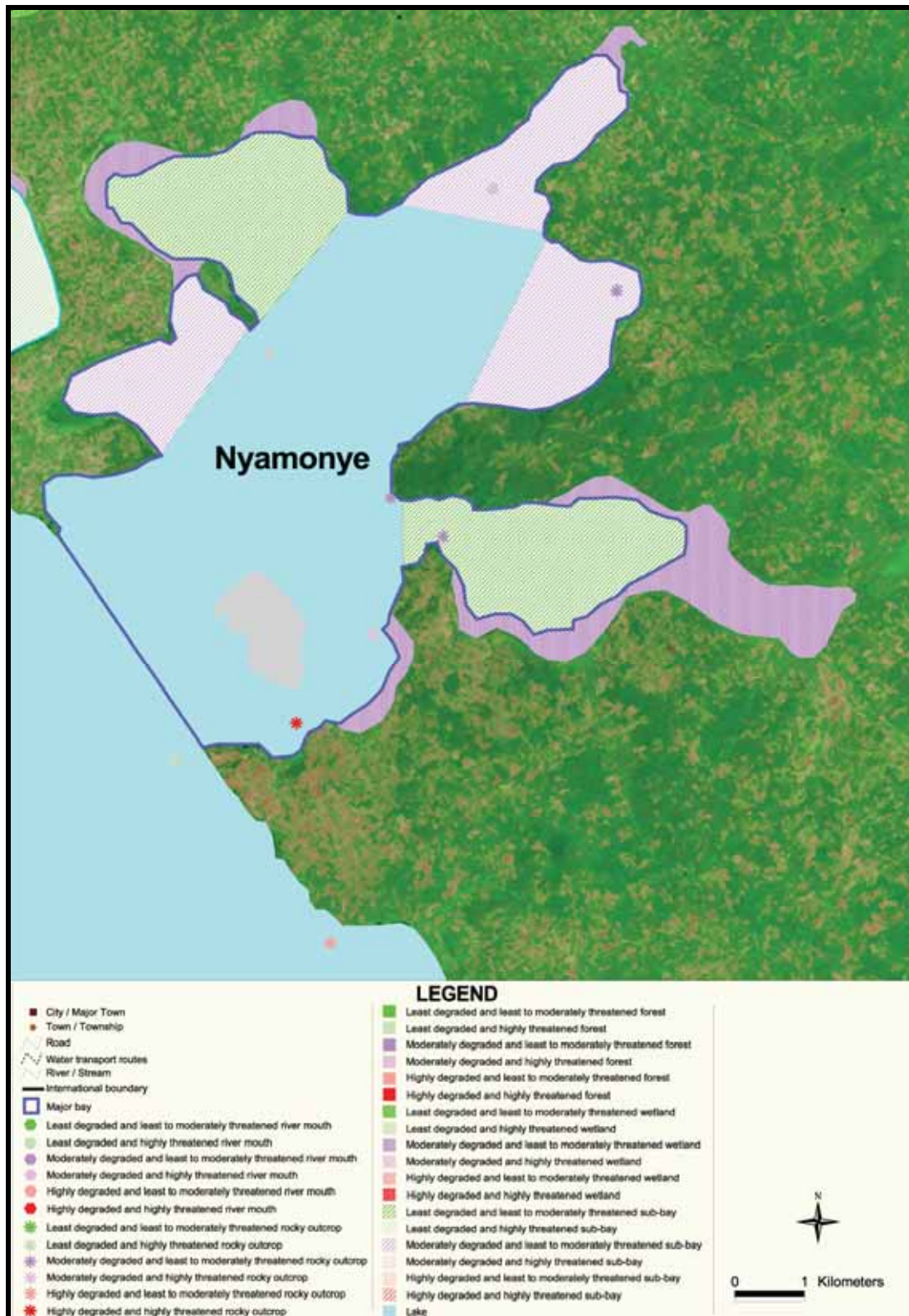


Figure 3.17 Status and distribution of major ESAs and sub-bays in Nyamonye Bay

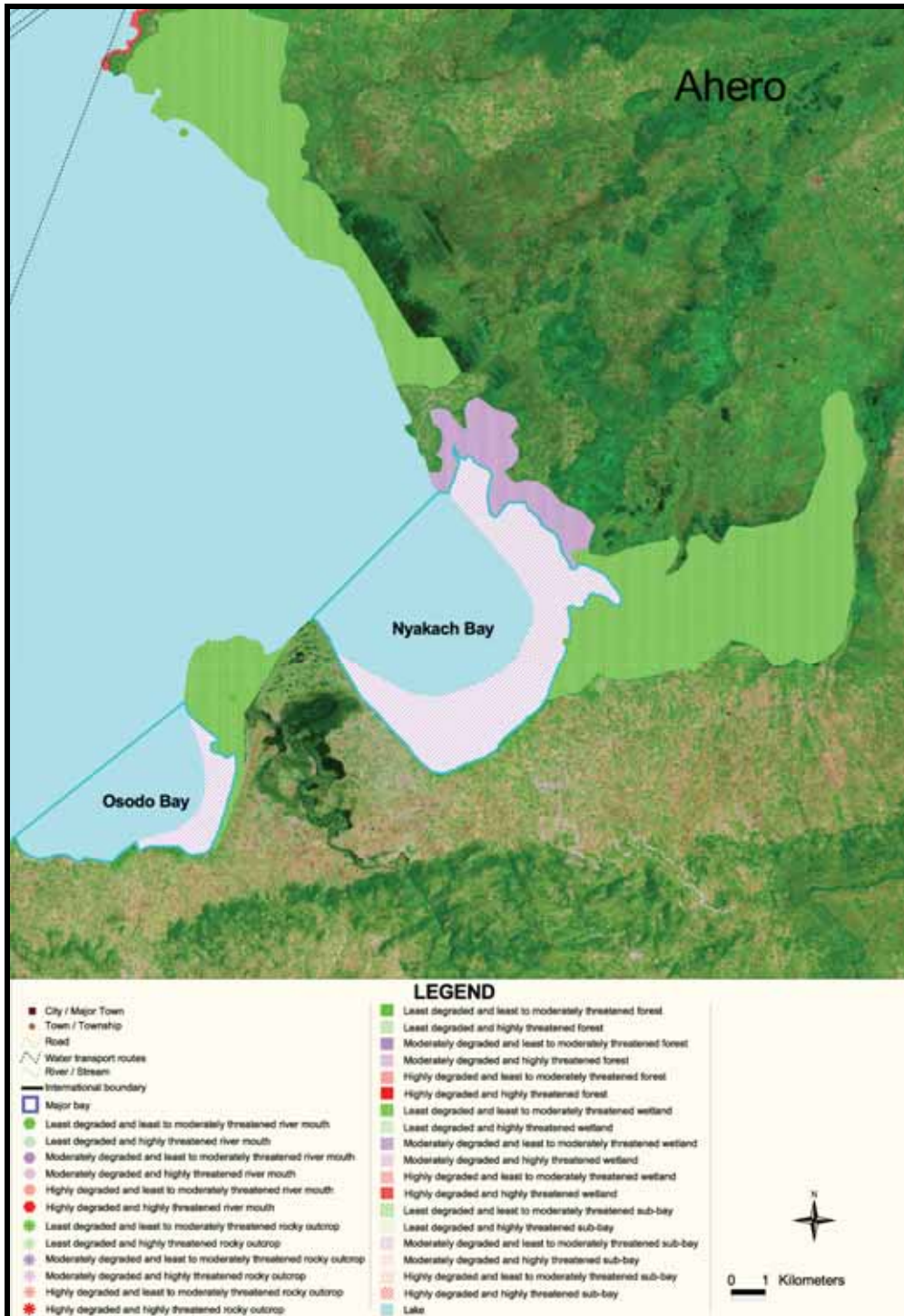


Figure 3.18 Status and distribution of major ESAs and sub-bays in Nyakach Bay

3.7.2.3. Tanzania

In Tanzania, Smith Sound Bay/Stuhlmann Sound Bay and Magu bay were considered. The sub-bays in the two major bays (Figure 3.19; 3.20) have diverse attributes including the presence of river mouths, wetlands, forests and rocky outcrops. The sub bays have different sensitivity levels ranging from 'Least degraded and least to moderately threatened sub-bays' sensitivity.

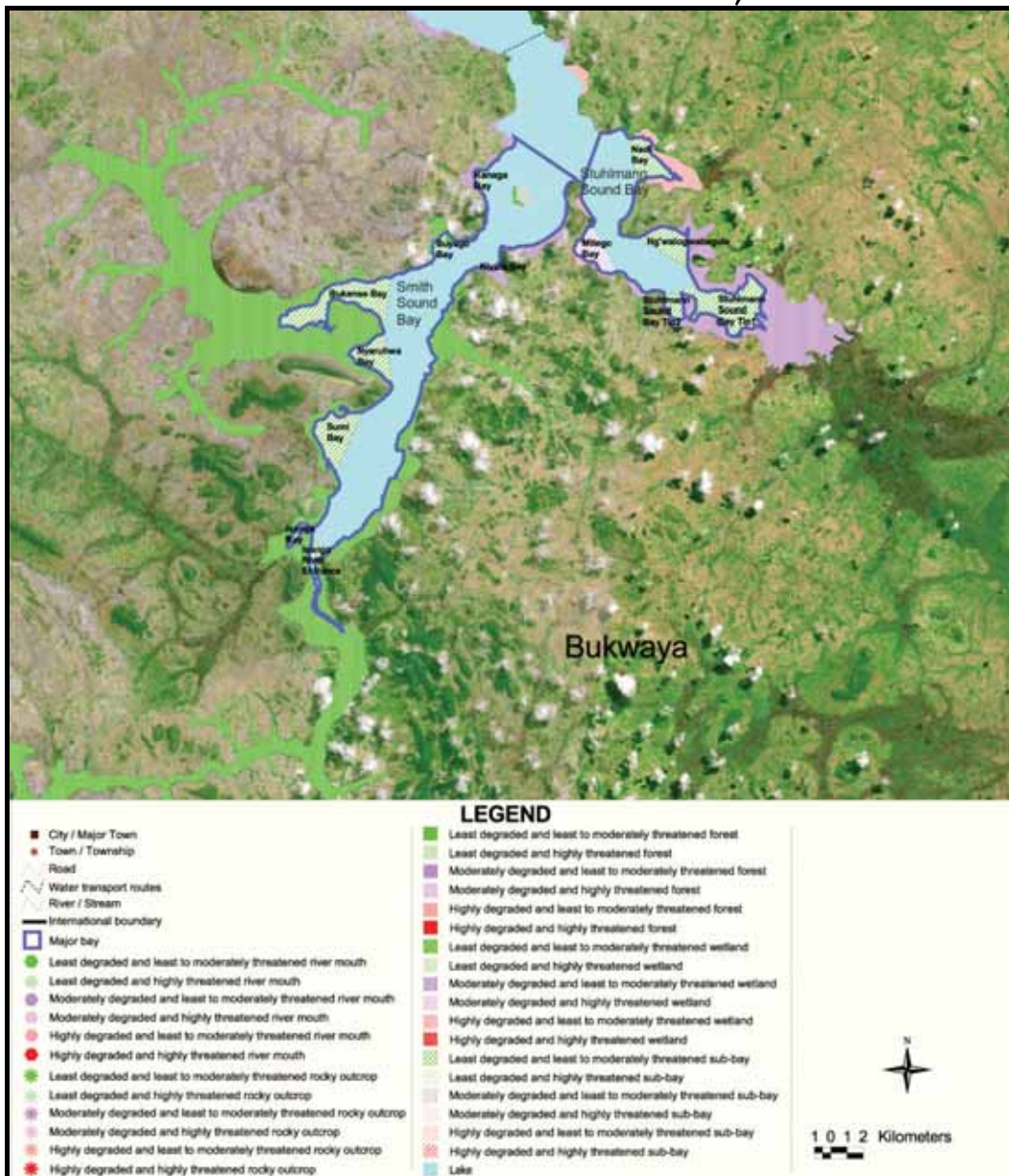


Figure 3.19 Status and distribution of major ESAs and sub-bays in Smith Sound Bay



Figure 3.20 Status and distribution of major ESAs and sub-bays in Magu Bay

3.8 Human use features associated with ESAs

Most human use features are those that are likely to impact or are impacted by the presence or absence of certain ESAs and are presented on a map either as lines or points. The features are transport routes, water intake points, cultural sites and important bird areas.

3.8.1. Water transport routes, water points and waste water disposal

A total of 38 transport routes, 10 water abstraction points (3 in Uganda and 7 in Tanzania) and 6 lake-wide wastewater disposal points (4 in Kenya, and 2 in Tanzania) were mapped (Figure 3.21) and detailed in Appendix XI and XII.

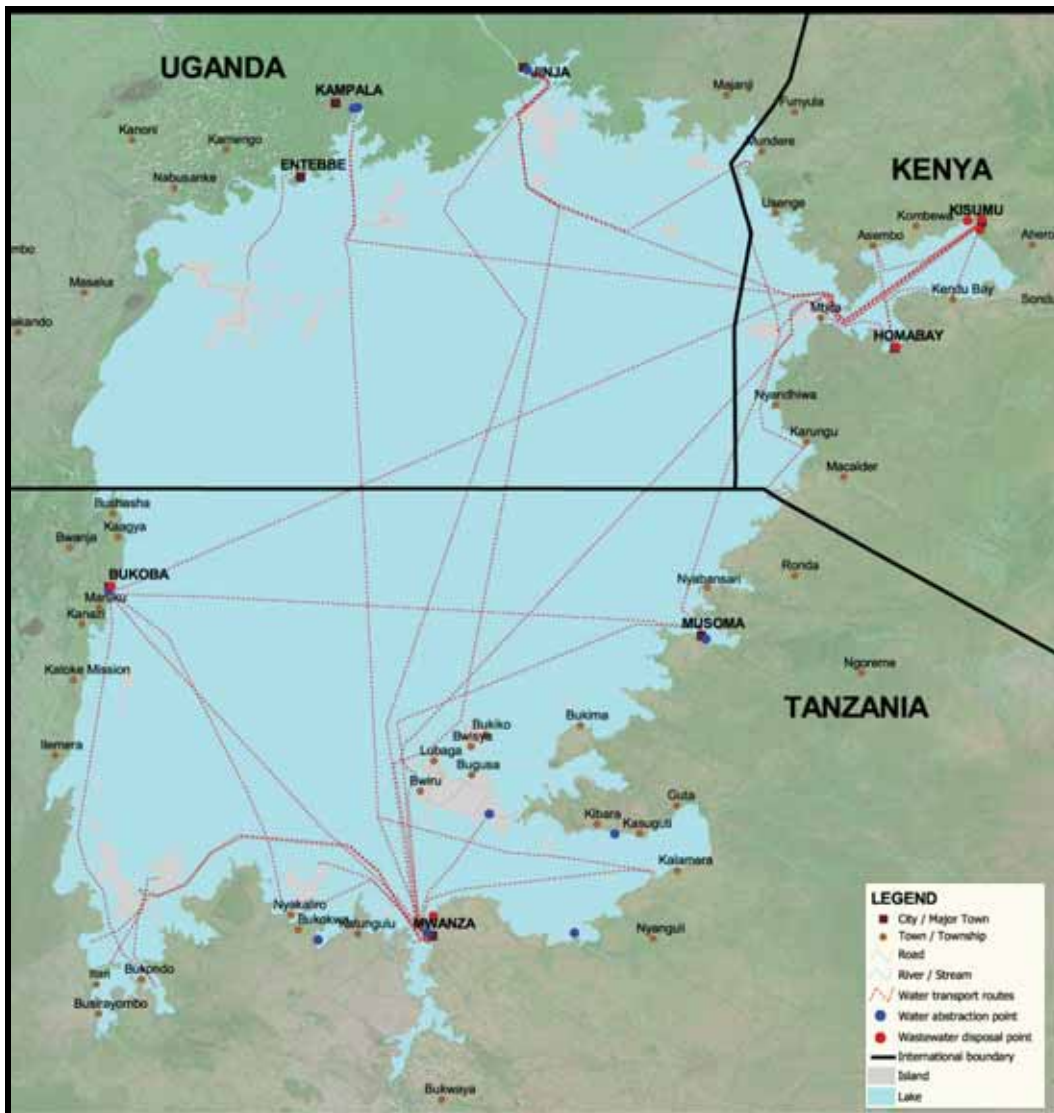


Figure 3.21 Map of transport routes, water abstraction points and wastewater disposal points

3.9. Cultural sites

A total of 42 cultural sites (23 in Kenya, 11 Uganda and 8 in Tanzania) were mapped in and around Lake Victoria. Overall 37 cultural sites were not gazetted while 3 in Uganda and one National park in Kenya were gazetted. There were 4 archaeological sites (2 in Kenya and 2 in Uganda); 10 folklore/myth sites (7 in Kenya, 1 in Uganda and 2 in Tanzania) while 23 were historical sites (13 in Kenya, 4 in Uganda and 6 in Tanzania). The rest were natural history sites (1 in Kenya and 4 in Uganda) (Figure 3.22).



Figure 3.22 Mapped cultural sites and use in and around Lake Victoria.

3.10. Important bird areas

A total of 15 important bird areas were mapped in and around Lake Victoria (5 in Kenya, 4 in Uganda and 6 in Tanzania). Ten (10) of the IBAs are Ramsar sites (4 in Uganda and 6 in Tanzania) while the 5 in Kenya are not yet gazetted but are recommended Ramsar sites (Figure 3.23).



Figure 3.23 Mapped important bird areas (IBAs) around Lake Victoria

4. THREATS TO ECOLOGICALLY SENSITIVE AREAS

There are diverse uses and services provided by ESAs as there are threats to them. As an integrated system, the Lake Victoria ESAs provide water for various uses, maintain biodiversity at different levels, and contribute to air and water purification and moderate climate impacts. The sustainable use of the ESAs greatly depends on rationally focused development including managed solutions to societal needs such as farming, water and waste water reuse, environmentally planned settlements, transport routes and landscape patterns, “soft” tourism and recreational activities. The diverse threats to the Lake Victoria ESAs are illustrated under the following categories:

4.1. Threats to ecologically sensitive wetlands

Wetland habitats are among the most heavily impacted and degraded of all ecological systems. An increase in the human population has led to encroachment on wetlands through their conversion for agriculture, urban infrastructure and industrial schemes which have contributed to dramatic alterations in landscapes and ecosystem functioning. The unwise use of wetlands reduces their ability to perform useful functions such as water retention, flood control, silt and nutrient retention from run-off, and supply of other ecological services and valuable products. Pollution in wetlands is a growing concern, affecting drinking water sources and biological diversity. In spite of the benefits accruing from their presence, wetlands are increasingly under threats both in the urban and rural areas around Lake Victoria.

The threats to Lake Victoria wetlands from direct human activities include:

- (i) Uncontrolled fishing, especially the over-harvesting of *Clarias gariepinus* fingerlings (commonly referred to as “Nyapus” in Kenya) for use as bait in the Nile perch long line fishery of Lake Victoria is a threat to fisheries productivity.
- (ii) Unsustainable harvesting of plant biomass, through removal of the predominant vegetation, which provides structure to an element of the natural heritage system, e.g. *C. papyrus* (common Papyrus) for hand crafts (mats, baskets, fences), and house thatching materials; *V. cuspidata* (Hippo grass) for animal fodder; *Aeschynomene elaphroxylon* (Orindi/Ambatch tree) for firewood and construction of fishing rafts, *Typha domingensis* (cat tail) and *P. australis* (reeds) for roofing purposes. Clearing of macrophyte beds renders them less suitable for habitation by several biota.
- (iii) Wetland fires normally set during the dry season create new growth for use by domestic animals e.g. cattle. Periodical fires lead to succession with different vegetations.
- (iv) Wetland reclamation to allow agriculture activities such as cultivation, dairy farming and other economic activities, lakeshore settlements, and development of lake side hotels and recreation facilities.
- (v) Flower farms along the shores of the lake and use of agrochemicals are likely to have negative impacts on wetlands and the receiving waters.
- (vi) Planting of unsuitable plant species in the wetland areas e.g. the *Eucalyptus grandis* (Blue gum).
- (vii) Sand and clay mining, and brick making; pits left behind accumulate water used as breeding grounds for different disease vectors. The pits are also serve as dumping grounds for solid wastes.

- (viii) Hunting of wetland animals, e.g. mammals like *Tragelaphus spekii* (the Sitatunga) and birds such as the Shoebill and white pelican have degraded biodiversity of wetlands.
- (ix) Poor agricultural practices in the catchment which enhance soil erosion, siltation and sedimentation with negative impacts on wetlands.
- (x) Urbanization and industrial development where wetlands are viewed as free or cheap areas for infrastructure development. Several portions of wetlands have been converted to industrial use, and access roads, and some have gradually been taken over by semi-slum residential housing like in many places around Kampala, Kisumu and Mwanza.
- (xi) The growth of industries has resulted into increased amounts of wastes that are discharged into wetlands.
- (xii) Hydrological changes in wetlands due to infrastructure construction and excessive extraction of water for irrigation and other uses are indirect results of human activities.
- (xiii) Other threats to Lake Victoria wetlands include invasive plant species, especially water hyacinth, *Eichhornia crassipes*; which impact on biodiversity.

The principal drivers of continued shrinkage of wetland coverage include increasing population levels, lack of employment, limited livelihood options, and lack of enabling policies or their enforcement. Rapid human population growth has increased scarcity of available land and has led to over-extraction of wetland resources. In the rural areas, small but continuous nibbling at the edges has reduced wetlands areas. Seasonal wetlands deemed suitable for rice and sugarcane cultivation have been converted to these uses, and in some parts, large areas of wetlands have been converted to dairy farms and cultivation. High dependence on natural resources due to limited livelihood options and lack of employment opportunities has led to encroachment and over-exploitation of wetland resources. Loss of wetlands has contributed to increasing levels of siltation of Lake Victoria in recent years (Figure 4.1).

Other factors which have promoted loss of wetland coverage include: Sectoral and uncoordinated policies, Land tenure systems which do not guarantee ownership or render wetlands a common property; limited knowledge of the value and complexity of ecological function of wetlands; poor and sometimes inappropriate technology used in resource use; undefined wetland boundaries; ineffective political support for wetland protection; greed and temptations to exploit potential resources.

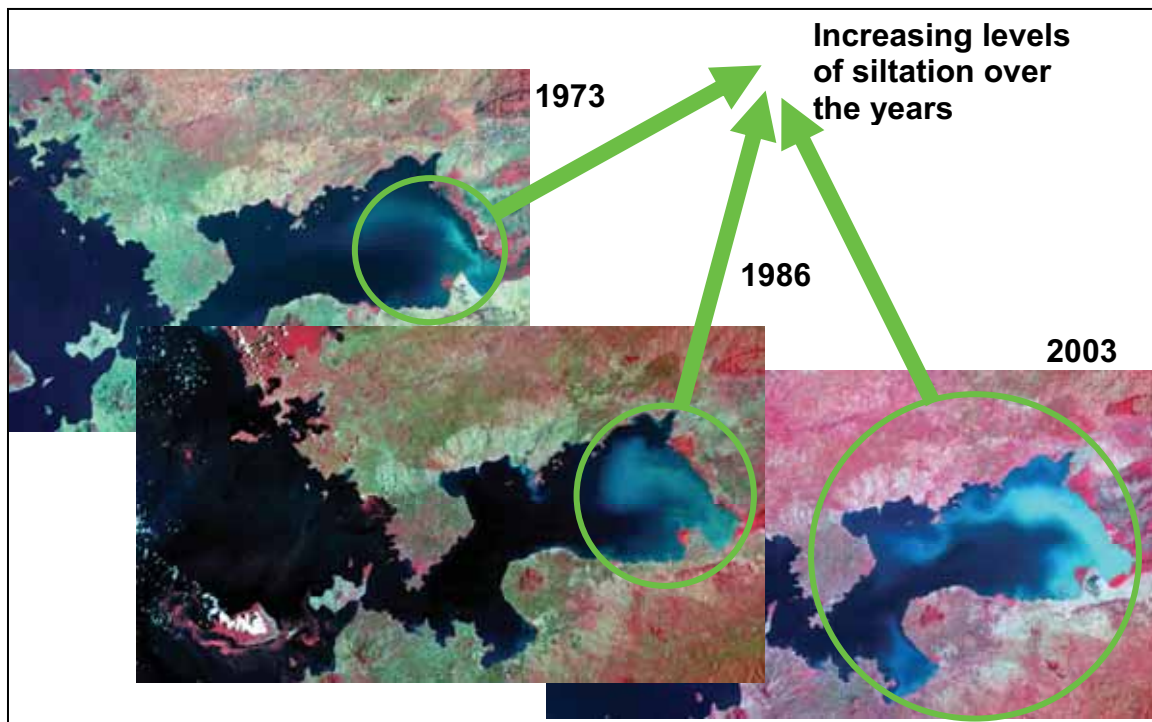


Figure 4.1 Increasing siltation levels in Nyanza Gulf, Lake Victoria Kenya.

4.2. Threats to ecologically sensitive forests

Forest and woodland habitats provide home for a variety of terrestrial flora and fauna and have many ecological functions. Most forests around Lake Victoria are typical rain forests characterised by high biological diversity but are heavily threatened with destruction from human activities. Unlike natural damage which may be occasional, human destruction from subsistence activities on a local level is unrelenting, thorough and serves no long-term purpose. Many of the effects from human-induced destruction of the tropical forests are mostly irreversible.

The main activities that are contributing to further degradation of Lake Victoria forests are extractive and subsistence in nature. They include logging for timber, cattle grazing, hunting and poaching, collection of fuel wood, charcoal burning and building materials. These extractive practices promote the development of short term booms that encourage permanent settlement, which can attract large numbers of poor people seeking a better life by clearing more forest land for agriculture and livestock. Simultaneously the forest resource becomes rapidly depleted with little consideration for the long-term consequences. This scenario has recently occurred in the South Busoga forest reserve bordering Lake Victoria in Eastern Uganda where almost the whole forest reserve has been transformed into maize and cassava gardens in less than ten years. Many forest areas around Lake Victoria are not demarcated and protected instead they are open-access resources managed as common property with no formal property rights.

Other threats to forests surrounding Lake Victoria include change of land use to commercial agriculture (Plate 4.1). For example on Bugala Island, Kalangala, Uganda large areas previously under natural forest have been converted into palm oil plantations that do not share all the ecological attributes of natural forest. Power lines and road construction projects also create wide corridors that can impact the integrity of forests and disrupt wildlife populations. However, the fundamental driver of deforestation around Lake Victoria is population growth.



Plate 4.1. A lakeside forest being opened up for agriculture

4.3 Threats to river mouths

Despite their generally small dimensions, river mouths have a wide range of habitats occupied by a variety of fauna and flora and are centres of high biodiversity. Consequently river mouths have high levels of endemism, are important for critical stages in the life cycle of threatened species (e.g. anadromous fishes) and are important for maintaining ecosystem functions. Rivers and river mouths are the main stays for *Labeo victorinus*, *Barbus altianalis* and *Clarias gariepinus* fisheries as these fishes seasonally migrate upstream from the lake to spawn.

Nutrient richness of river mouths favours riparian macrophyte growth which, in turn, supports faunal diversity. Where there are extensive macrophytes, other wetland functions such as filtration of excessive nutrients are also performed at river mouths. The most developed wetlands occur around river mouths where they are important in trapping river sediments that would otherwise be washed into the lake. Threats to river mouths in Lake Victoria include:

- (i) Uncontrolled sand mining;
- (ii) Farming of bananas, sugarcane, rice, coco yams, maize and other crops in the nutrient rich alluvial sediments;
- (iii) Harvesting of *C. gariepinus* fingerlings for use as bait in the Nile perch long line fishery;
- (iv) Unsustainable fishing methods such as use of illegal gears, e.g. beach seines and monofilament nets; and catch of gravid anadromous fishes like *Labeo victorinus*;
- (v) High concentration of indigenous fishing gears like fencing and basket traps
- (vi) Invasive plant species e.g. *Eichhornia crassipes* (Water hyacinth); and
- (vii) Urban and agricultural chemical substances and silt transported by rivers to estuarine lagoons at the river mouths and the near shore lacustrine environment.

4.4 Threats to rocky outcrops

In Lake Victoria, rocky shores, offshore rocky islands and small isolated rocky reefs provide suitable habitats for fish refugia and survival of rare species. They harbour the highest densities and diversity of cichlid species dominated by rocky haplochromine species (Kaufman and Ochumba, 1993).

Several unique populations of fish, amphibians and reptiles are known to exist on isolated rocky outcrops. The complexity of rocky habitats in terms of crevices, water levels and water clarity provides for the unique biodiversity associated with these habitats. Field consultations identified rocky outcrops which are not only home for haplochromines but also refugia and nurseries for tilapiines and other native species. Given the small size of the respective outcrops some of the populations are extremely small and endemic to one or only a few areas. Interfering with such populations may deplete whole populations or even whole species. Threats to these rocky ESAs include:

- (i) Change in water levels and siltation;
- (ii) The currently rampant practice of fishers collecting large numbers of rock dwelling haplochromines for ornamental practices and for bait in the Nile perch long line fishery (Plate 4.2). The matter is worsened by lack of sufficient information on lake wide distribution of such populations and species. Transfer of rock-restricted cichlids from one population to another could also result in hybridization and consequent loss of haplochromines species diversity;
- (iii) Disturbance of vegetation by fishermen anchoring to harvest fish using hook and line (angling) as well as surrounding the rocky outcrop with monofilament nets to catch fish which use rocky outcrops as refugia; and
- (iv) Invasive plant species e.g. *E. crassipes* (Water hyacinth).



Plate 4.2 Fishers catching rock dwelling haplochromines for use as bait in the Nile perch long line fishery

4.5 Threats to sheltered bays

Lake Victoria has a highly indented shoreline making it rich in bays and gulfs. Sheltered bays provide calm environment conducive for reptiles, fish breeding and bird roosting and nesting. The sheltered bays are the most important fishing grounds for tilapia. They are also suited for floating and rooted aquatic vegetation, which, in turn, serve as anchoring substrate for aquatic invertebrates serving as food and hideouts for near shore fauna. Threats to sheltered bays include:

- (i) Unsustainable fishing methods- Use of illegal gears and fishing practices e.g. beach seines and monofilament gillnets, and fishing in river mouths during the breeding period of the anadromous fishes;
- (ii) Invasive plant species e.g. Water hyacinth (*E. crassipes*); and
- (iii) Sand mining.

4.6 Threats to islands

Lake Victoria is endowed with a multitude of islands varying in size from less than one acre to several square kilometres. Virtually all islands serve as fishing bases (Plate 4.3) or transport stages during bad weather.



Plate 4.3. Misingo Island, approx. one acre in size but supports a large fishing fleet in the deep offshore waters of Lake Victoria

The main threats to ESAs on islands include:

- (i) Human settlements on islands most of which are fish landing sites and characterised by poor sanitation which results in pollution of surrounding waters from human and animal wastes.
- (ii) Concentration of many people at landing sites exposes the surrounding areas to unsustainable harvesting of plant biomass, e.g. Orindi/Ambatch tree *A. elaphroxylon* for firewood and rafts

making and other indigenous plants e.g. Croton for firewood and construction of houses and sale as timber.

- (iii) Agricultural activities that use fertilizers and pesticides to boost crop production at least on the larger islands, pollute the water in the vicinity of the island
- (iv) Farming on steep slopes of islands result in soil erosion and siltation
- (v) Large livestock numbers (Goats, Sheep and cattle) causing overgrazing and soil erosion
- (vi) Invasive plant species e.g. *E. crassipes* (Water hyacinth) and *E. grandis* (Blue gum)

4.7 Threats to Heritage/Cultural sites

Cultural sites were traditionally revered and worshipped. As a result, the sites remained modestly pristine and supported a high diversity of plants and harboured threatened wildlife. Threats to these sites include:

- (i) Encroachment by settlements (high population density and lack awareness are the basis of extensive degradation of the Lake Victoria Basin (LVB) including sacred sites on the landscape);
- (ii) Illegal extraction of plants for medicinal purposes; and
- (iii) Illegal poaching of wild animals.

4.8 Crosscutting threats to ESAs

- (i) Climate change on sensitive areas: Warming temperatures are projected to cause more frequent and more intense extreme weather events, such as heavy rain storms, flooding, fires, hurricanes, tropical storms and El Niño events. Drought is becoming a common natural cause for the change or loss of wetlands in the lake basin. Receding in lake levels during dry spells has made the marginal wetlands of Lake Victoria more susceptible to reclamation for agriculture. Such phenomena of drastic changes in water levels are likely to become more common with climate change and could lead to more destructive impacts to the lake's wetlands and fisheries. Climate change is expected to significantly alter aquatic biodiversity as species struggle to adapt to changing conditions.
- (ii) Lack of sufficient protection by existing legislations e.g. Lack of a wetland policy in Kenya, Conflicting sectoral policies e.g. in Kenya the agricultural policy advocates for the clearance of wetlands to create land for agriculture while the EMCA act advocates for conservation of wetlands;
- (iii) Atmospheric deposition (of particulate pollutants) facilitated by wind regimes can result into transported trans-boundary pollution affecting ESAs;
- (iv) Noise and Green house gas emissions. In ecologically sensitive areas, emissions from transport (including noise) can lead to a change in living conditions and even extinction of specific animals or plants. Fragmentation of land through road transport and continuous traffic (Transport on land /lake is also a growing source of greenhouse gas emissions)
- (v) Oil spills. The risk of oil spill increases with increase of traffic both on the lake and road network around the lake.
- (vi) Vessels plying the lake's transport routes release bilge and waste water into the lake which lead to pollution. The vessels can also disperse invasive species to new areas in the lake.
- (vii) In the process of moving, docking and disembarking from ports, vessels can cause considerable disturbance to benthic organisms in localised areas.

- (viii) Localised nutrient enrichment is associated with waste disposal points for municipal sewage, depending on the degree of treatment, and can result in frequent algal blooms and general poor water quality.

5. CURRENT REGULATORY ENVIRONMENT ON LAKE VICTORIA ESAs: INSTRUMENTS, POLICIES AND LEGAL FRAMEWORK

5.1 Introduction

Sustainable development, management and protection of Lake Victoria ESAs from diverse threats should be viewed from historical, global, regional and national perspectives in the riparian countries. Ecologically Sensitive Areas were historically conserved through age old traditions and customs. For example, in Lake Victoria, forested or rocky landscapes used to be and some are still associated with some form of deity (god) or spirits. Some species of animals are protected through assumed human-animal relationships (totems). In this way, the *Sitatunga* or marshbuck (*Tragelaphus speki*) and the lung fish (*Protopterus aethiopicus*) are not eaten by certain tribes around the lake especially by women.

Lake Victoria as a whole used to be associated with a god (“Nalubaale” in Uganda). In case of rivers especially the inflowing rivers (e.g. Nzoia, Yala in Kenya), the Luo fishers had sustainable methods of fishing for anadromous (migratory) species of fish such as *Labeo victorianus* and *Barbus altianalis*. Through self regulatory practices and a small human population, it was possible to inherently protect Ecologically Sensitive Areas in most parts of Lake Victoria. The period when the EAC Partner States were under colonial administration (1900-1965) saw the establishment of Legal Frameworks often built on tradition but aimed at protecting some aspects of the ecosystems (e.g. The Forestry Acts, Nature Reserve Acts, Fishing Regulations) in relation to an increasing population and emerging socio-economic demands (e.g. transport infrastructure including rail, road, water), urban infrastructure and plantations. With independence during 1960s, the countries respective constitutions entrenched the protection of natural resources for the benefits of the people. However, as elsewhere in the world, the human population, technology and consumption have continuously eroded the natural resource base ultimately impacting Ecologically Sensitive Areas.

5.2 Global Focus

There are international policies mostly in form of Declarations, Conventions, Codes of Conduct and Practices that are relevant for the protection and conservation of Lake Victoria ESAs. For example from the Earth Summit United Nations Conference on Environment and Development (UNCED, 1992) to the UN Convention on Biological Diversity (UNEP, 1992) to the UN Millennium Development Goals (2005), there are principles and action plans applicable to Lake Victoria ESAs (Table 5.1).

Table 5.1. **Major International Instruments of relevance to Lake Victoria ESAs**

Instrument	Objective(s)	Reason for applicability to Lake Victoria ESAs
UNCED; Rio Declaration, 1992	Principles, scenarios and action agenda for reversing environmental degradation and conservation of biological diversity within Agenda 21	Regulation of human activity in ESAs.
Johannesburg Declaration on Sustainable Development; The Johannesburg Plan of Implementation 2002.	Identifies Key issues of global concern and required actions.	Provides fundamental principles and required programs of actions by signatories to achieve sustainable development which can be applied.
UN Millennium Development Goals (MDGs) 2005	Goal 7: Ensure environmental sustainability by setting targets to be achieved by 2010 – 2020.	Target 7a-d with indicators on country policies, reduction of biodiversity losses (forest, fish stocks, protected areas), drinking water, livelihood improvements of slum dwellers; has reporting requirements.
UN Convention on Biological Diversity, 1993	<ul style="list-style-type: none"> - Conservation of biological diversity - Sustainable use of the components of biological biodiversity, - Fewer and equitable sharing of the benefits from utilization of genetic resources. 	Reason for applicability to Lake Victoria ESAs provides a strategic plan to half the loss of biodiversity from the species level to ecosystems; has reporting requirements.

Some International conventions/agreements are more specific with respect to habitats and species. These include:

The Ramsar Convention on Wetlands (1971). Originally designed to protect wetlands of international importance for water fowl, the instrument has also been elaborated to provide protection of wetlands ecological services and values.

In East Africa, some wetlands including small water bodies have been declared Ramsar Sites and are protected by Wetland Policies. In Lake Victoria, Lutembe and Sango bays, and the Nabugabo lakes (Uganda) are designated Ramsar Sites as they are considered Important Bird Areas (IBAs). However, such protection is also conferred to other rare species of fish and amphibians in their habitats.

The UNESCO World Heritage Convention (1972)

The World Cultural and Natural Heritage Convention provides for protection of ecosystems and habitats of global scientific value. Lake Victoria is considered a World Heritage site due to its high biodiversity and scientific value especially the large number of endemic fish species.

The FAO Code of Conduct for Responsible Fisheries (CCRF) 1995

The Code of Conduct for Responsible Fisheries is used as a basis for fisheries management, along with associated international instruments such as the International Plan of Action on Illegal, Unregulated, and Unreported (IUU) fishing, which aims at combating IUU fishing. A regional plan to combat IUU fishing on Lake Victoria has been prepared but implementation has not been agreed.

UN Convention on International Trade in Endangered Species (CITES), 1975.

This agreement provides the East African countries with possibilities to ban international trade in endangered species and thus avoid over-exploitation through protection of species habitats. In the case of Lake Victoria, endangered or threatened species need to be identified.

5.3 Regional Regulatory Frameworks

The EAC Partner States have legal instruments and Action Plans (Table 5.2) applicable to the protection of Lake Victoria ESAs.

Table 5.2. Regional legal instruments and action plans applicable to protection of ESAs for sustainable development

Legal instrument/Action plan	Objective	Reasons for Applicability
1. Convention for Establishment of Lake Victoria Fisheries Organization (1994).	Harmonization of measures for the sustainable development and management of the living resources of Lake Victoria	Direct
2. Treaty for the Establishment of the East African Community (2004)	Provides, for sustainable utilisation of the natural resources through taking measures that protect the environment	Direct
3. The Protocol for Sustainable Development of Lake Victoria Basin (Nov 2003).	includes provisions for protection and conservation of the basin and its ecosystem, sustainable development of natural resources including fisheries and prevention of pollution	Direct
4. The Protocol on Environment and Natural Resources Management (2006).	provides for cooperation in management of the environment and natural resources including water resources, biological diversity, wetland resources, forest resources, wildlife, fisheries, genetic resources	Direct
5. The Regional Plan of Action for Management of Illegal Unreported, Unregulated (RPOA-IUU) fishing in Lake Victoria (2004).	provides for management measures to prevent, deter and eliminate IUU fishing, to conserve the fish species, protect the environment in the LVB	Direct

Legal instrument/Action plan	Objective	Reasons for Applicability
6. The Regional Plan of Action for Management of Fishing Capacity (RPOA-Capacity) in Lake Victoria (2007).	provides for ensuring rational and sustainable use of fisheries resources through control of fishing capacity	Direct

RPOA-IUU provides for management measures to prevent, deter and eliminate IUU fishing, to conserve the fish species, protect the environment in the LVB. RPOA-Capacity aims at control of fishing capacity. The mechanism for allocation of fishing capacity among the Partner States has not been agreed upon. Consequently, fishing capacity has continued to increase and commercial fish stocks have continued to decline. There is need to implement the agreed plan of action.

These legal instruments and action plans are covered in The National constitutions, the National Environment Management Acts, the Water Acts, the Fisheries Acts and the Wildlife Conservation Acts.

5.4 National Focus

The National Constitutions provide for measures to protect and preserve the environment. The other cross-cutting national legal instruments are those for management of the environment and associated environmental impact assessment (EIA) regulations. The environmental regulations provides for conservation and sustainable management of the environment including lakes, rivers, water, wetlands, forests, biodiversity, genetic resources, control of pollution, natural heritage sites, river banks and lake shores, soil, and air quality standards, EIA and audit, and protection of ozone layer.

Table 5.3. National legal instruments and action plans applicable to protection of ESAs for sustainable development

Legal instrument/Action plan	Country	Objective(s)	Reasons for Applicability
Environmental Management and Coordination Act, 1999, which established the National Environment Management Authority (NEMA)	Kenya	Promoting sustainable environmental management	The Act is intended to ensure that our activities do not compromise the capacity of the resource base to meet the needs of the present generation as well as those of future generations
National Water Policy 1999	Kenya	Water resources management, water and sewerage development, institutional framework and financing of the sector	Protects water quality in ESAs
The Water Act Cap 372, 2002	Kenya	to tackle the worsening water services experienced over the last decades	a framework for sustainable development and management of water resources in addition to water and sanitation
The Draft National Fisheries Policy,	Kenya	Control of fishing, optimal and sustainable exploitation,	

Legal instrument/Action plan	Country	Objective(s)	Reasons for Applicability
		management and development of fisheries	
The Fisheries Act Cap 378, 1991	Kenya	Control of fishing, optimal and sustainable exploitation, management and development of fisheries	
National Environment Management Act, 2004	Tanzania	Sustainable management of environment,	Gives powers to declare any area of land which is ecologically fragile or sensitive to be an Environmental Protected Area
The Water Policy, 2002	Tanzania	to develop a framework for beneficiary participation in planning, construction, operation, maintenance and management	a framework for sustainable development and management of water resources in addition to water and sanitation
The National Fisheries Policy, 1998	Tanzania	Control of fishing, optimal and sustainable exploitation, management and development of fisheries	Ensures protection of fish breeding and nursery areas.
The Fisheries Act , 2003	Tanzania	Control of fishing, optimal and sustainable exploitation, management and development of fisheries	Ensures sustainable fisheries
Forest Act, 2002	Tanzania	to enhance the contribution of the forest sector to the sustainable development and the conservation and management of natural resources	ensure ecosystem stability through conservation of forest biodiversity, water catchments and soil fertility
Wild life Policy, 1999	Tanzania	To address problems and obstacles that have plagued wildlife management in the past	Protects wildlife ESAs
National Environment Management Act, 1995	Uganda	Sustainable development	Integrates environment in development
National Constitution, Objective XXVII, 1995	Uganda	provide for measures to protect and preserve the environment and exploit natural resources in a sustainable manner	
National constitution, Land Act, section 45: Control of environmentally sensitive areas, 1998	Uganda	The Government/local governments holds in trust for the people and protect natural lakes, rivers, groundwater, natural ponds, natural streams, wetlands, forest reserves, national parks, and other land reserved for the ecological and touristic purposes for the common good of all Ugandans	preservation and maintenance of the ecological integrity of the environment
NEMA Statutory Instrument No.3, 2000	Uganda	Management Regulations for wetlands, river banks	Ensures water catchment conservation,

Legal instrument/Action plan	Country	Objective(s)	Reasons for Applicability
		and lake shores	flood control and wise use of wetlands and their resources.
The Water Statute, 1995	Uganda	provide for planning, use, protection and management of water resources and supply; water permits; waste discharge; effluent discharges; control of water abstraction; water quality monitoring, pollution control; water supply and sewerage treatment and contain water quality standards for different uses	Protects water abstraction points
The National Water and Sewerage Corporation Statute, 1995	Uganda	to operate and provide water and sewerage services in areas entrusted to it under the Water Act and manage the water resources in ways which are most beneficial to the people of Uganda	Ensures waste water does not reach ESAs
The National Fisheries Policy, 2004	Uganda	Control of fishing, optimal and sustainable exploitation, management and development of fisheries	Ensures sustainable fisheries
The Fish Act Cap 197, 1967;	Uganda	Control of fishing, optimal and sustainable exploitation, management and development of fisheries	Imposes restrictions on fishing to enhance fisheries sustainability
Forest Act, Cap 246	Uganda	Provides for protection of forests	Creation of forest reserves in which human activity is strictly controlled
The draft National Biodiversity Strategy and Action Plan	Uganda	Enhance biodiversity conservation, management and sustainable utilisation	
Wetland Policy, 1995	Uganda	promote conservation of wetlands sustain their values	Protects wetland ESAs

The legal instruments on water management provide for: planning, use, protection and management of water resources and supply; water permits; waste discharge; effluent discharges; control of water abstraction; water quality monitoring, pollution control; water supply and sewerage treatment and contain water quality standards for different uses. The water quality standards are difficult to adhere to especially in rural areas.

There are national legal instruments for fisheries management such as: The National Fisheries Policy, Uganda; The National Fisheries Policy, Tanzania; The Draft National Fisheries Policy, Kenya; The Fish Act cap 197, 1967; The Fisheries Act cap 378, 1991 for the Republic of Kenya; and The Fisheries Act No. 22 of 2003 of the United Republic of Tanzania. The Fisheries Acts are supported by a number of regulations, statutory instruments, and gazette notices.

The Fisheries Policies and Acts provide for: Control of fishing, optimal and sustainable exploitation, management and development of fisheries. Most of the Acts are not clear in conservation and

sustainable use of fish species diversity. The main focus of both the policies and regulations are on commercially exploited fishes.

Some organisms that are not covered specifically under sector specific regulations such as the Fisheries Acts are covered under Wildlife regulations by the Partner states. These provide for sustainable management of wildlife covering wild plants and animals. They provide for setting up of wildlife conservation and protected areas, their management, protected species, wild life user rights and International trade in wildlife. These regulations can therefore be used for those aquatic organisms not covered by other acts such as the Fish Acts.

In Uganda, a Ministry of Water, Environment and Natural Resource (MWENR) identified wetland degradation as one of the key environmental issues. The National Wetlands Programme (NWP) was established in 1989 to develop a wetlands policy and methodologies to sustain the biophysical and socio-economic values of wetlands for present and future generations. On February 1st 2001, a Wetland Sector Strategic Plan - WSSP - (2001-2010) was launched.

Although Tanzania is endowed with abundant wetland resources, there has been no systematic national programme for monitoring, development and management of the wetland resources. Tanzanian accessioned to the Ramsar Convention on Wetlands in 1999 and approved the Malagarasi-Muyovozi wetlands as the first Ramsar site. In 2003, the Government of Tanzania established the National Wetland Steering Committee (NAWESCO), represented by 8 ministries to provide high-level coordination on policy and management issues related to wetlands. A five year Sustainable Wetlands Management Component began in 2004 and forms part of the Danish Environment Support Programme.

The management of wetlands in Kenya is currently under various institutions, whose mandates and activities are not only sectoral but also uncoordinated and sometimes overlapping. Kenya Wildlife Service (KWS), being the national focal point for the Bonn Convention on Migratory Species and the Ramsar Convention on Wetlands, has the mandate of conserving Kenya's natural resources including wetlands within the gazetted protected areas, which are the national parks and game reserves.

6. CHALLENGES

One of the constraints to conservation of ESAs and sustainable use of their components is lack of a central database to guide management decisions. This is partly caused by the way the limited data available is managed by the institutions and experts, the limited infrastructure and human resources capacity in the institutions. The available data is recorded and stored in different formats which complicate creation of databases. There is also lack of clear policies for sharing information and data between institutions and experts.

Application of the different international, regional and national legal instruments has generally been weak resulting in continued deterioration of ecosystems, species and genetic resources. There is therefore need to strengthen enforcement of legal instruments including user communities involvement.

7. CONCLUSIONS AND RECOMMENDATIONS

7.1 Conclusions

The Protocol for Sustainable Development of the Lake Victoria Basin ratified by the EAC Partner States empowers the Lake Victoria Basin Commission to actively engage the Partner States to protect and conserve Ecologically Sensitive Areas (ESAs) in Lake Victoria. Limited progress is being made by the Partner States to address threats to ESAs that are primarily a result of human activities. Five key areas (Governance, Capacity Building, Scientific Monitoring, Legal and Policy interventions, and Sustainable Utilization of ESAs) require LVBC's action through a systematic elaboration of the human, Institutional and financial resources that need to be mobilised to protect and conserve ESAs.

Due to eutrophication (nutrient enrichment) and associated water quality deterioration in comparison to other large lakes in the region, Lake Victoria as an Ecologically Sensitive Area falls under the second sensitivity class (Highly Degraded and Least to Moderately Threatened). Therefore, Lake Victoria is "most sensitive" in comparison to the lakes in the region. However, within the lake, the diverse ESAs that support fisheries, important bird areas, potential tourist and cultural sites are Moderately Degraded and Least to Moderately Degraded. Within the ESAs, the Most Highly Degraded and Highly Threatened are those within and near urban centres with the most affected being wetlands and water service points.

Community perception of ESAs and the associated services as well as threats to ESAs is generally high. Therefore, the perceived causes of ESA degradation including lack of awareness, leading to negative attitudes, limited law enforcement and corruption have to be addressed through community focussed socio economic policies (e.g. social services), governance (to eliminate corruption) and effective policies that are community owned but continuous sensitisation seems to be an essential component of these efforts.

Despite a common historical legal framework, the Partner States are at different stages of customising and implementing the required policies and strategies for protecting and conserving ESAs in Lake Victoria. A similar status extends to regionally and internationally agreed Conventions and Protocols.

The ToRs for the current assignment underestimated the scope and duration of work that needed to be undertaken. Lake Victoria is a relatively large ecosystem in comparison to other ecosystems of lake based ESAs in the world where similar work has been carried out. There are far too many diverse ESAs (e.g. wetlands, sheltered bays, rocky outcrops and forests) in Lake Victoria that have never been studied to the level of detail that is associated with studies in other parts of the developed world.

The current study that was designed to focus on the main lake as bench mark did not have the level of data requirements that compares with similar data in other parts of the world. Moreover, Lake Victoria lies within the larger Lake Victoria Basin which with the attendant human activities impacts the Lake Victoria ESAs. The basin wide ESAs (e.g. the wetlands, satellite lakes) and seasonally varying patterns in the ESAs require field assessments to map biotic and physico chemical markers related to prevailing human activities and their impacts on the goods and services (e.g. fish breeding, fish and bird migration, wetland buffering) in the LVB as a whole.

Despite similar macro economic policies, Lake Victoria ESAs are not being sustainably utilised for the benefit of the current generation without jeopardising the benefits of future generations.

7.2 Actionable Recommendations to protect and conserve Lake Victoria ESAs

The Protocol for Sustainable Development of the LakeVictoria Basin ratified by the EAC Partner States provides a firm foundation togenerate Actionable Recommendations on Lake Victoria's Ecologically

Sensitive Areas (ESAs). In particular, the Protocol entrusts the Partner States with active participation of all stakeholders to protect, conserve and where necessary rehabilitate the Lake Victoria Basin and its ecosystems by; Protecting and improving water quantity and quality within the basin; Preventing the introduction of species, alien or new, into the basin's water resources which may have effects detrimental to the ecosystems of the lake; Identifying the components of and developing strategies for protecting and conserving biological diversity within the basin; Conserving migratory species of wild animals; Conserving endangered species of wild fauna and flora; Protection and conserving wetlands within the basin; Restoring and rehabilitating degraded natural resources; and Conserving fisheries Resources.

The Protocol commits the Partner States to build the technical and human capacity of local and national institutions for water quality and environmental scientific research. It also requires Environmental Impact Assessments (EIAs) and Audits for development activities that are likely to have adverse environmental impacts. Furthermore it calls for facilitation of research and exchange of data and information among the Partner States on the state of the riparian environment. It obliges the Partner States to manage, develop and utilize the natural resources of the Basin in a sustainable manner. The protocol also calls for promotion of stakeholders' participation in sustainable development of natural resources. In particular it commits the Partner States to develop a collective and coordinated approach for promotion and marketing of sustainable tourism.

Based on the Protocol and results generated from the ESA study, Actionable Recommendations require specific interventions by the LVBC in five key areas:

- i. Governance
- ii. Capacity building
- iii. Scientific monitoring
- iv. Legal and Policy interventions
- v. Sustainable utilization of ESAs.

As a first specific step in addressing the identified Actionable Recommendations, the LVBC should vigorously disseminate the outputs of this study to: Partner States and particularly, relevant institutions, organisations and the private sector ranging from and including resource users and managers, conservationists, research, policy makers, international agencies and private developers with a stake in what has been defined as ESAs in this study. A short (five page) popular version of this Report should be made available to Policy Organs of the LVBC and the main Report and Popular Version (with translation into major local languages around Lake Victoria) should be posted to the LVBC website whose management should also seek out to establish direct links into other user websites.

The LVBC mandate includes coordinating conservation and sustainable utilization of many natural resources such as water, fisheries, wetlands, forestry and wildlife in the LVB and the study mapped ESAs with those attributes and community perception in mind. By identifying diverse threats and levels of distribution to the ESAs, the urgency to protect some critical ESAs and reverse their further degradation have been used to prioritise Actionable Recommendations in time frames as Short term/immediate (2011 – 2012), Medium term (2013 – 2015) and Long term (2015 – 2020) and beyond). In this part of the Report, the five LVBC intervention areas for the identified ESA categories are initially provided a brief basis that justifies the recommendations on specific actions. This is followed by a matrix summarising for each intervention area, the issues, the required Actions and Time Frame. In turn, the LVBC should seek feed back from key agencies that have jurisdiction over impacts on the identified threats to ESAs and their current level of attention to the five areas recommended for action.

After owning the report, this intervention area need not take more than five months to receive feed backs.

To enhance the effectiveness of the required actions, it is essential that an Economic Valuation of ESAs should be undertaken alongside the short-term Recommended Action Areas, with short-term implying prioritised actions.

A. Governance

This ESA study found out that the identified fall under different sectors leading to jurisdiction and implementation in deficiencies among Government Departments/Ministries. The different sectoral jurisdictions are under separate Departments/Ministries such as Environment, Water, Forestry, Fisheries, Wildlife, Culture and Social Services, and Agriculture. These sectors often have contrasting interests, objectives and priorities for ESAs which complicates development of common management strategies. The main governance concerns are: Uncoordinated and selective sectoral approaches to management of ESAs; Undefined property rights status of some ESAs; Lack of community based institutional structures for management of ESAs; Lack of well defined institutional arrangements for management of cross border ESAs; Inadequate enforcement of laws and by laws; and failure to take corrective actions to restore degraded ESAs . The following are therefore recommended;

- **In the short term**, the LVBC should collate the deficiencies in sectoral approaches to ESA management within and among Partner States through analyses of the primary issues of interest to the different sectors (Environment, Water, Fisheries, Agriculture, Wildlife and Tourism, Culture and Social Services). In turn, the Partner States should establish inter sectoral fora at district/county level to coordinate government interventions on ESAs. The forum should be convened by the Department responsible for Environment and have representation of key stakeholder departments, including Water, Fisheries, Forestry, Wildlife, Agriculture and wetlands.
- The Partner States should clearly define the property rights status of all ESAs to remove ambiguity in rights of ownership, access rights/use and responsibility between the central government, local government and community institutions.
- At village/ beach level, ESAs should be effectively managed through a broad based co management framework involving all stakeholders, with greater participation of local communities. The current BMU framework for fisheries should be used as an example and options could be made to use the BMUs as the basis for broader community participation. Despite ratifying a Regional Plan of Action (RPOA) to eliminate Illegal, Underreported and Unrecorded (IUU) fishing through mediation of the FAO, no concrete steps have made to implement the required activities and initially, the LVBC should work more closely with Fisheries Authorities to strengthen the BMU roles and effectiveness.
- The Partner States, with support of LVBC, should in the short term develop an action programme to be implemented by grassroots level stakeholders (e.g. BMUs), NGOs and local Government with support of the national Governments to undertake the conservation of the ESAs. For ESAs located near landing sites the existing co management structures for fisheries (BMUs) should extend and be strengthened to include protecting the ESA. For remote ESAs without BMU structures, thus the Partner States should facilitate the formation of a viable co management framework.

- There are several legal provisions already in place for the protection of ESAs, however, many of these are not adequately enforced. Such laws and various by laws of the local authorities should be fully implemented to forestall further degradation of ESAs. The following management actions are recommended in the short term:
- The Municipal and Town Councils around the lake should be required to allocate resources to ensure immediate enforcement of by laws prohibiting washing cars, clothes, bathing and disposal of untreated waste and domestic effluents in towns like Kisumu, Mwanza, Homa bay, Jinja, as well as landing sites among others
- The Partner States should commit adequate resources through the Lake Victoria Fisheries Organization for immediate implementation of RPOA IUU strategy in Lake Victoria to prevent, deter, and eliminate all illegal fishing and control fishing capacity. The Partner States should facilitate communities to acquire basic facilities for undertaking MCS operations of ESAs.
- A number of ESAs are already degraded through encroachment and anthropogenic activities and therefore cannot fully perform their ecosystem functions. Therefore:
 - Immediate appropriate corrective action should be taken to reverse the downward trends and restore them. The Partner States, with full participation of the local communities and with support of LVBC, should take steps in the short term to establish, demarcate including marking or fencing where critical and enforce appropriate natural reserves and marine parks in representative species rich sites and areas, to conserve fishes and other aquatic organisms.
 - In the medium term the LVBC should identify and promote institute targeted effort to restore highly degraded wetlands and forests and establish a listing of lake ecosystems targeted for restoration and methods for restoration.

B. Capacity Building

This study brought out weaknesses in Institutional Capacity for management of most ESAs in the Partner States. The capacity of Government institutions, Non Government Organizations (NGOs) and Community Based Organizations (CBOs) should be enhanced for the effective management of ESAs. The following are recommended;

- **In the short term**, the LVBC should draw up a Programme for Partner States and NGOs, with full participation of other community based organizations to regularly sensitize communities and other stakeholders on the ecological importance of ESAs and the benefits of protecting them for a healthy ecosystem.
- With the technical support of LVBC and other relevant international institutions, the Partner States should develop training programs for communities and other co management players on effective approaches and tools for management of ESAs.
- In the short term and through the LVBC, the Partner States should assess the capacity needs of local and national level institutions to generate, archive and disseminate multidisciplinary scientific information about ESAs. They should strengthen the technical and human capacity in these institutions by allocating adequate resources for specialized equipment and relevant training.

- The Partner States should, in their respective territories, establish water quality and quantity monitoring and surveillance stations and water quality and quantity control laboratories.

C. Scientific Monitoring

Lake Victoria ESAs should be managed using the best available scientific information. At the regional level, the Partner States through the LVBC and other stakeholder international bodies should facilitate capacity development for generation of the knowledge base and understanding of Lake Victoria ESAs. Therefore:

- The LVBC should develop mechanisms for cooperation and information exchange among national, regional and international institutions working on ESAs.
- The LVBC should facilitate the formation of a network of Scientists for Lake Victoria Basin ESAs, as well as organize regular fora to review the status of ESAs.
- In the face of inadequate data and information, the Precautionary Principle should apply to avoid their complete degradation.

To understand whether management interventions put in place are having positive impacts it will be necessary to assess how ESAs perform in the short term and also monitor changes over time. The short term assessment should be based on broad and general targeted indicators of achievements developed with the input of communities. Long term changes in ESAs ecosystem should be monitored through continuous generation and analysis of scientific information.

This study has generated useful information on the current status of ESAs within the precincts of the lake, including their geographical scope (size and positioning), physical parameters, ecological attributes and related socio economic issues. However, this was largely based on a rapid survey and remote sensing without in depth quantification of certain parameters which will be required to fully quantify the status of ESAs.

An ecosystem is a delicately and intricately linked structure which should ideally be addressed across the entire resource chain. A major shortcoming of this assignment was to focus the problems of ESAs at the lake without considering the situation in the wider catchment. The status of an ESA at the lakeside, for example a river mouth is directly affected by the conditions at the water tower.

In this regard, mechanisms should be put in place to follow up this study with assessment and mapping all critical ESAs in the wider LVB for their protection.

- **In the short term**, LVBC should identify the required funding to prioritise specific field studies on satellite lakes, wetlands and rivers as unique ESAs with limited scientific and socio economic data.
- Economic valuation of ESAs should be undertaken as part of the initial priority interventions against which sustainability of the ESAs can be measured.
- In the short term LVBC in liaison with relevant structures in the Partner States (e.g. LVFO, LVEMP, Ministries for: Regional Cooperation, Environment, Agriculture) should facilitate detailed studies, which will be carried out by the relevant riparian research institutes, to generate baseline quantified scientific information on some of the critical ESAs identified in this report. The priority studies will focus on:

- a. Detailed field assessment of physico chemical, biotic, environmental and socio economic indicators of ESAs.
 - b. Quantification of intrinsic attributes e.g. numbers of species, habitat and other diversity indices; Identify migratory species and their status to guide their protection; Assess trade in endangered and threatened wild flora and fauna to guide their placement on the CITES lists.
 - c. Build an inventory of different forms coverage, numbers, density and seasonality of plant and animal genetic resources within ESAs, giving priority to those under threat of extinction with the view of *in situ* protection.
- **In the short term** LVBC in liaison with the Partner States should put in place a framework and facilitate assessment of impacts of management interventions on ESAs arising out of this study. This should be conducted through participatory methods to ensure the involvement of community players and other stakeholders.
 - In the short to long term LVBC in liaison with the Partner States should facilitate monitoring changes in ESAs ecosystem through seasonal scientific studies with respect to the impacts of human activity and trends (e.g. fish breeding and migration, wetland buffering capacity at critical points, bird nesting, and associated transport routes and water intake infrastructure with respect to water level changes).
 - The studies to be carried out should be undertaken by the relevant riparian research institutions in a 5 year monitoring plan, which matches the normal strategic planning of the riparian governments and is also a reasonable time frame to capture envisaged changes.
 - In the medium to long term, LVBC in liaison with the Partner States should undertake identification and mapping of all critical ESAs in the wider Lake Victoria catchment.

D. Legal and Policy interventions

Lake Victoria ESAs are critical habitats, with some already internationally recognised as Ramsar Sites, Important Bird Areas, habitats of species on IUCN Red List and World Heritage Sites. Many other ESAs in Lake Victoria are not yet classified but are of high potential for global ecological accolade. Their conservation is therefore of local, regional and international interest. In this regard, international protocols, conventions and legal instruments for conservation and management of habitats, species and genes generally apply to most ESAs. Some of these have been domesticated by the Partner States, who have in addition developed policies, national legislation and strategic plans broadly for environmental and natural resources management. Despite these efforts, there are policy and legislative gaps as well as weaknesses in effective implementation strategies that need to be addressed for sustainable management of ESAs. The following actions are therefore recommended:

- i. **In the short term**, the Partner States should put practical efforts for domestication and implementation of relevant internationally agreed protocols and conventions for the management of ESAs.
- ii. Most of the protocols and conventions need international and regional intervention to be affective because their causes and effects go beyond national jurisdictions. Therefore,

the LVBC should forge stronger partnerships with the international bodies such as FAO, Ramsar Bureau, IUCN, CITES, to access the required support in implementing such legal instruments.

- iii. LVBC in liaison with the Partner States and international agencies should in the short term establish a framework for identifying aquatic ecosystems for potential inclusion in the World Heritage Catalogue and to put in place legal frameworks to manage them. Wetlands qualified as Ramsar sites or IBAs should be identified and protected.
- iv. Partner States have prepared national biodiversity strategies and action plans but these have not been fully implemented. In the short term the Partner States should integrate these plans into appropriate sectoral strategies and policies to hasten their implementation and monitoring.
- v. LVBC in liaison with the Partner States should in the short and medium term develop policies and institutional framework for effective management of cross border and trans boundary ESAs, including, rivers and river mouths (such as Kagera, Mara, Sio), bays, wetlands and forests such as Mabira, Ssesse Island, Minziro, Mau, Ukerewe etc, some of them located a distance from the lake but play a part in stabilising trans boundary climate of the basin.
- vi. **In the short** and medium term the LVBC should engage Partner States, to implement national and regional policies that provide incentives to local people for the use and transfer of environment friendly technologies and to undertake conservation and regenerative measures.

E. Sustainable utilization of ESAs for socio economic benefits

The goods and services from ESAs include; fisheries, water and sanitation, source of construction materials, pastures, medicinal materials; cultural, heritage and tourism values. Uncontrolled extraction of biota from ESAs can lead to their eventual degradation, which is contrary to the primary objective of sustainable utilization for socio economic benefits.

However, the tourism potential of ESAs may be extrinsically developed towards diversifying lakeside economies without compromising conservation efforts.

This study recommends integrated management of ESAs, which incorporates efforts to harness and develop their eco tourism potential as follows:

- i. **In the short** and medium term the Partner States and local governments should improve the physical infrastructure and services such as roads, electricity, sanitation, telecommunication, maritime safety and security in the lake basin so as to attract private sector investment in land and maritime transport and hospitality industry for the development of eco tourism. There is a ring road running almost the entire lakeside in Kenya which joins most landing sites while in Tanzania and Uganda there are also road networks linking some of the landing sites. The Partner States in liaison with the EAC should extend the shoreline road network to link up all beaches and open up ESAs for ecotourism, which will also support trade and diversify economic opportunities.

- ii. The LVBC should complete the maritime transport route mapping in Lake Victoria to promote tourism and ecologically safe navigation. The routing should avoid disrupting ESAs in the lake (e.g. rocky and shallow bays) through pollution.
- iii. The Partner States with support from EAC/LVBC should in the short and medium term form a regional intergovernmental agency to package and market the tourism potential of the Lake basin and develop promotional packages tailor made for ESAs as eco tourist sites. Among other tasks, the agency should define a lake wide tourist circuit and attract the private sector such as tour agencies and hotels to invest in this emerging economic sector. Furthermore it should run public campaigns to popularize domestic eco tourism.
- iv. In the medium to long term the relevant government departments and agencies in each Partner State should establish an education program to heighten awareness of East Africans and tourists regarding the importance and fragility of Lake Victoria ESAs and engage NGOs and Governments to provide training on community level conservation.
- v. Through appropriate channels, e.g. the LVBC Council of Ministers and other EAC Organs, the LVBC should devise a strategy that brings out the need to incorporate ESAs in general in the primary and secondary school curricula and establish a training and certificate program for lake eco tour companies and guides to increase awareness on ESAs.

8 BIBLIOGRAPHIES

- Babiit, K.J. Tanner G.W., 1998. Effects of cover and predator size on survival and development of *Rana utricularia* tadpoles. *Oecologia* 114: 258 264.
- Balirwa, J.S., 1998. Lake Victoria Wetlands and Ecology of the Nile tilapia, *Oreochromis niloticus* Linne. Ph.D Thesis. 247 pp. Wageningen Agricultural Univ., Wageningen, NL.
- Barel C.N.D., R. Dorit, P.H. Greenwood, G. Fryer, N. Hughes, P.B.N. Jackson, H. Kawanabe, R.H. Lowe McConnell, M. Nagoshi, A.J. Ribbink, E. Trewavas, F. Witte & K. Yamaoka., 1985. Destruction of fisheries in Africa's lakes. *Nature* 315 (6014): 19 20.
- Chapman, L.J., Chapman C.A., and Chandler M. (1996). Wetland ecotones as refugia for endangered fishes. *Biological Conservation* 78:263 270.
- Chapman, L.J., C.A. Chapman, F.G. Nordlie & A.E. Rosenberger, 2002. Physiological refugia, swamps, hypoxia tolerance and maintenance of fish biodiversity in the Lake Victoria region. *Comp. Biochem. Physiol. A* 133: 421 437.
- Crowder L.B. and Cooper W.E. 1982. Habitat structural complexity and the interaction between bluegills and their prey. *Ecology*, 63: 1802 1813.
- Crul, R.C.M. (1995). Limnology and hydrology of Lake Victoria, Comprehensive and comparative study of great Lakes. UNESCO/IHP IV Project M 5.1 UNESCO Publishing, Paris, 79p.
- Graham, M., 1929. The Victoria, Nyanza and its Fisheries. A report on the Survey of Lake Victoria 1927 28 and appendices Crown Agents for Colonies, London 255 pp.
- Harrabin, R. (2003). EU faces ship clean up call. BBC News. Retrieved November 1, 2006.
- Hecky, R.E. and F.W.B. Bugenyi., 1992. Hydrology and chemistry of the African Great Lakes and water quality issues: Problems and solutions, In R.H. Lowe McConnell, R.C.M. Crul and F.C. Roest (eds.) Proceedings of the International Symposium on Resource Use and Conservation of the African Great Lakes, 29 November 2 December 1989, Bujumbura. SIL Mitteilungen No. 23, 45 54.
- Kaufman, L. and Ochumba P. (1993). Evolutionally and conservation biology of cichlid fishes as revealed by faunal remnants in northern Lake Victoria. *Conserv. Biol.* 7: 719 730.
- Kaufman, L. (1992). Catastrophic change in species rich freshwater ecosystems: the lessons of Lake Victoria. *Bioscience* 42: 846 858.
- Lowe McConnell, R.H. (1982). Tilapias in fish communities. In: Pullin, R.S.V. and R.H. Lowe McConnell (eds.). The biology and culture of tilapias. ICLARM Conference Proceedings 7: 83 113. International Centre for Living Aquatic Resources Management, Manila, Philippines. 432p.
- Mugo, J. and Tweddle, 1999. Preliminary surveys of the fish and fisheries of the Nzoia, Nyando and Sondu Miriu rivers in Kenya, LVFRP publication.
- Murdoch W.W. and Oaten A., 1975. Predation and population stability. *Advances in Ecological Research* 9: 1 131.
- National Research Council, Committee on the Ocean's Role in Human Health (NRCCORH), Ocean Studies Board, Commission on Geosciences, Environment, and Resources, (1999). *From monsoons to microbes: understanding the ocean's role in human health*. Washington, D.C.: National Academy Press.
- Ogutu Ohwayo, R. 1988 Reproductive potential of the Nile perch, *Lates niloticus* L. and the establishment of the species in Lakes Kyoga and Victoria (East Africa). *Hydrobiologia* 162:193 200.
- Ojwang W.O., L. Kaufman, E. Sule & A.A. Asila 2007. Evidence of stenotopy and anthropogenic influence on carbon source for two major riverine fishes of the Lake Victoria watershed. *Journal of Fish Biology*, 70, 1430 1446.

- Ojwang, W. O. O, Ojuok, J. E and D. Mbabazi., 2010 Ubiquitous omnivory, trophic redundancy and the resiliency of Lake Victoria fish community. *Journal of Aquatic health and Ecosystem health and management* 13(3) 1 8
- Panetta, L. E., (2003). America's living oceans: charting a course for sea change [Electronic Version, CD] Pew Oceans Commission.
- Philippe Holthof, (2009). 'SOx and CO2 Emissions once again Hot Topic at Ferry Shipping Conference', Ferry Shipping Conference 08: Building Bridges in the Industry, p. 3.
- Pronab, S., 2000. Report of the Committee on identifying parameters for designating Ecologically Sensitive Areas in India. Ministry of Environment & Forests (Government of India) New Delhi – 110 003 September 2000. 87pp.
- Thompson, K., D. Perleberg, and S. Loso. 2009. Final report on the sensitive lakeshore survey for Ada Lake (11 0250 00), Cass County, MN. Division of Ecological Resources, Minnesota Department of Natural Resources. 74 pp.
- Schofield, P.J. & L.J. Chapman, 1999. Interactions between Nile perch, *Lates niloticus*, and other fishes in Lake Nabugabo, Uganda. *Environmental Biology of Fishes* 55: 343 358.
- Seehausen, O., 1996. *Lake Victoria Rock Cichlids: Taxonomy, Ecology and Distribution*. Verduyn Cichlids, Zevenhuizen, pp. 1 304.
- Seehausen, O., Lippitsch, E., Bouton, N., Zwennes, H. 1998. Mbipi, the rock dwelling cichlids of Lake Victoria: description of three new genera and fifteen new species (Teleostei). *Ichthyological Exploration of Freshwaters* 9(2): 129 228p.
- Seehausen, O., van Alphen J.J.M and Witte F. (1997). Cichlid fish diversity threatened by eutrophication that curbs sexual selection. *Science* 277: 1808 1811.
- Seehausen, O., Witte, F., Katunzi, E.F., Smits and Bouton N. (1997). Pattern of the Remnant Cichlid Fauna in Southern Lake Victoria. *Conserv. Biol.* 11: 890 904.
- Seehausen, O., 1999. A reconsideration of the ecological composition of the Lake Victoria cichlid species flock before and after the Nile perch upsurge. Pp 281 293 In W.L.T. van Densen and M.G. Morris, (eds). *Fish and fisheries of lakes and reservoirs in Southeast Asia and Africa*. Westbury Publishing, Otley, United Kingdom.
- UN, 1992. The Convention on Biological Diversity, UNEP, 17 pp
- Witte, F. T. Goldshmidt, P.C. Goudswaard, W. Ligtoet, M.J.P. van Oijen & J.H. Wanink, 1992. Species extinction and concomitant ecological changes in Lake Victoria. Netherlands, *Journal Zoology* 42: (2 3) 214 232.

Appendix I List of experts, their institutions and roles

	Expert(s)	Institution	Input/Main Role
01	Dr John Balirwa	NaFIRRI	Team Leader/Wetland ecology
02	Dr William Ojwang	KMFRI	Fish Biology/ecology/ Coordinator Kenya
03	Dr Dismas Mbabazi,	NaFIRRI	Fish biology/ecology/Coordinator Uganda
04	Dr Levi Muhoozi	NaFIRRI	Fisheries/Overall coordinator
05	Dr Stephen Sekiranda	NaFIRRI	Aquatic Ecology / GIS mapping
06	Dr John Gichuki	KMFRI	Aquatic Ecology
07	Dr Richard Abila	KMFRI	Socio economics
08	Mr Erick Khamala	RCMRCD	Remote sensing & mapping
09	Mr Egid Katunzi	TAFIRI	Fish biology
10	Mr Hillary Mrosso	TAFIRI	Fish biology/GGIS

Appendix II: Terms of Reference

EAST AFRICAN COMMUNITY LAKE VICTORIA BASIN COMMISSION

REQUEST FOR PROPOSALS (RFP) FOR CONSULTANCY SERVICES TERMS OF REFERENCE FOR THE IDENTIFICATION AND MAPPING OF ECOLOGICALLY SENSITIVE AREAS (ESAs)

Introduction

The Lake Victoria Basin Commission (LVBC), an apex institution of the East African Community (EAC), has received funds from the Lake Victoria Basin Partnership Fund, to facilitate a study to identify and map ecologically sensitive areas (ESA) in Lake Victoria.

Background to the Study

In the last two decades, there has been an increased interest in the vast resources of the Lake Victoria and its Basin. A study by the EAC on the socio economic potentials revealed vast potential in almost all sectors of development. This led to the decision by the Council of Ministers to designate Lake Victoria Basin a regional economic growth zone to be exploited jointly by the Partner States for socio economic benefits of the people. As a result, there have been increased economic activities in the basin ranging from fish processing, mining, water supplies, lake transport and tourism among others in the Lake. Unfortunately, these socio economic activities have been developed with minimum or no concern on their impacts on the rich biodiversity and ecologically sensitive sites in the lake.

More than 35 million people who depend on the lake are feeling the consequences of these changes in the biota and the lake environment. In Lake Victoria, as elsewhere, human welfare is intimately linked to concerns for species conservation and ecosystem integrity. At the moment many fauna and flora of Lake Victoria are being intensively exploited to meet escalating needs for human well being but their ecological and conservation status is not clearly known. This has prompted a Council of Ministers' directive to the Lake Victoria Basin Commission to facilitate the enactment of legislation that would ultimately lead to enforcement of laws protecting the ecologically sensitive areas in the Lake.

This study is expected to address the current status of the ecologically sensitive areas vis à vis the threats from the current socio economic development activities taking place in the region which has direct or indirect effect to the sustainable development of the lake. The overall objective of this study is to identify and map the ecologically sensitive areas (ESA) in Lake Victoria. The output of this study will provide basis for decisions by the Council of Ministers on the preparation and eventual enactment of legislation that will place such sites under protection.

The Need for Identification and Mapping of ESAs

Preliminary indications are that no institution or organization has carried out a lake wide identification and mapping of these ecologically sensitive areas which are vital to the sustenance of the Lake's ecological resources. Due to the complexity of the study and the vastness of the lake, the proposed study will focus on the ecologically sensitive areas with respect to fisheries, water services, tourism, lake transport routes and cultural/heritage sites. Beneficiaries The Study is expected to benefit Partner States and particularly institutions, organizations, private sector and individuals across the LVB. The main beneficiaries will include:

1. Partner States;
2. Lake Victoria Basin Commission and affiliate institutions;
3. Resource users;
4. Resource Managers;
5. Conservationists;
6. Research Organizations;
7. International Research Organizations, UNEP, UNESCO and UN Habitat);
8. Policy Makers;
9. Institutional of higher learning; and
10. Private Sector

Specific tasks

It is envisaged that the consultancy period, the following tasks will be undertaken:

- i) Review existing information on ESA and identify the ecologically sensitive areas within Lake Victoria;
- ii) Digitize and map these sites using GIS technology;
- iii) Process and analyse the acquired information;
- iv) Make recommendations based on the current status of the ESAs; and
- v) Produce a consultancy report.

Expected outputs

The main expected outputs for the proposed activities will include:

- i) Summary report on the status of ESAs;
- ii) Comprehensive information on the current threat to the ecologically sensitive areas in Lake Victoria;
- iii) Concrete and actionable recommendations that would guide formulation of laws and policies that would ensure protection of ESAs in Lake Victoria; and
- iv) Digitized map clearly showing the ESAs in Lake Victoria.

Qualifications

Institutions or registered firms may apply for this consultancy provided that they meet the following criteria:

1. Bidders should be institutions or firms or employees of firms where research or conservation of biodiversity is one of the principle functions;
2. Groups of institutions or firms may team up to enhance their capacity for the consultancy provided that the Expression of Interest is submitted in the name of one Lead Institution which will take responsibility for implementation, coordination and delivery of outputs;
3. The Lead Institution must be based in the Lake Victoria Basin and recognized for competence in ecosystem research or conservation;
4. Bidders should demonstrate that they have previously successfully undertaken similar assignment in the Lake Victoria Basin with proven performance record;
5. The Team Leader and key members of the bidding team should have at least 10 years experience in research and/or conservation;
6. Team composition should reflect a regional outlook, with at least one member from an institution based in an EAC country other than that of the Lead Institution;
7. Composition of the team members must have competency in the following areas of specialization with respect to biodiversity:
 - i) Fisheries and fish biology
 - ii) Socio economics
 - iii) Wetlands ecology
 - iv) Aquatic Science
 - v) GIS technology
 - vi) Mapping and remote sensing
8. All the Team Members MUST have a relevant PhD degree

Duration

The study is expected to take 30 working days

Submission

The Technical and Financial Proposals should be submitted in separate envelopes clearly marked: "Technical/Financial Proposals for Consultancy Services for Identification and Mapping of Ecologically Sensitive Areas" in Lake Victoria on or before 20th March 2009 and addressed to:

The Executive Secretary,
Lake Victoria Basin Commission,
P.O. Box 1510, 40100,
Re Insurance Plaza 6th Floor,
Kisumu, Kenya.

Appendix III List of Institutions and experts/persons consulted

Country	District	Institution	Expert/ person consulted	Position	Address Tel/Email
Kenya	Suba	Gender and Development		Gender and Development Officer	0727419010
	Suba	Water Dept.	Mr. Akuku and Kasim Mohamed	DETO	0725970275/0716865096
	Suba	Agriculture Dept.	Mr. William Owiti & Sewe Jaimbo	Forestry Officer	0721443815/0722258958
	Suba	Forestry Dept.	Mr. Otieno	Fisheries Officer	
	Suba	Fisheries Dept.	Mr. George Okoth	Environment Officer	
	Suba	NEMA	Mr. Fanuel Mosogo		
	Homa Bay	Fisheries Dept.	Beth Otieno & Rachael Onyango		
	Homa Bay	LBDA	G. Ouma	Anut. Officer	0726796325
	Homa Bay	NEMA	V.O. Lala	Environmental Officer	0722985326
	Homa Bay	KWS	Mr. Olengo	SGT	0723891221
	Homa Bay	Agriculture Dept.	Benard Kagunza	DAO	0722248618
	Homa Bay	Dept. of culture	Kennedy N. Nyachoti	District Culture Officer	0728341444
	Homa Bay	Forest Dept.	Mr. Vitalis Owiti		0714910043
	Migori	Fisheries Dept.	Mr. Okari		0723040992
	Migori	Fisheries Dept.	Richard Mosima	Asst. Zonal Manager	
	Nyando	Forest Dept.		DFO	0725835131
	Nyando	Fisheries Dept.	Mr. Isaiiah Moturi	District Water Officer	0722415902
	Nyando	Forest Dept.	Mr. David A. Augo	Asst. Zonal Manager	0729410596
	Nyando	Agriculture	Mrs Ogwai	DAO	0722471836
	Bondo	Fisheries Dept.	Mr. Maurice Onyango	Chief Fisheries Officer	
Bondo	Forest Dept.	Mr. James & Mr. Omare	Zonal Forest Manager		
Busia	Water Dept.	Mr. J.M. Olubero	District Water Officer	0721649818	
Busia	Forest Dept.	Mr. Were	Zonal Forest Manager	0726173761	
Busia	Agriculture Dept.	Mr. Kennedy Ochieng	Crops Officer	0721765748	
Busia	NEMA	Mr. Palapala Mutesh	District Environmental Officer	0722399541	
Kisumu	OSIENALA	Mr. Leonard Okwany	Programme Officer		
Tanzania	Rorya		Andrew Madundo	District Fisheries Officer	
	Geita		Hellen Eustace	District Environment Officer	
	Geita		Mgeta Magumba	Fisheries Officer	
	Bukoba Urban		Severin Mbena	Fisheries Officer	
	Bukoba Rular		Vitalis Mashiku	Fisheries Officer	
	Bunda		Bejamin Mafulu	District Fisheries Officer	
	Chato		Beda Mapunda	District Water Engineer	
	Chato		Romuald Shemkai	District Fisheries officer	
	Muleba		Edith Cornel	District Cultural Officer	
	Muleba		Isdory Rwabukinga	Forestry Officer	
	Muleba		Ezekiel Raphael	Game Officer	
	Muleba		Symphorian Ngaiza	Fisheries Officer	
	Magu		Justin Mugarula	District Fisheries Officer	
	Magu		Peter Magesa	District Cultural Officer	
	Magu		Joseph Nkunga	District Water Engineer	
	Musoma		Nelson Bwogi	District Fisheries Officer	
	Mwanza		Anna Mdamo	National Environmental Management Council	
	Mwanza		Omary Myanza	Ministry of Water and Irrigation	
	Mwanza		Bayona	Game Warden Tanzania National Park (TANAPA)	
	Mwanza		Edwin Sombe	Navigation Officer – TAFIRI	
Mwanza		Karoli Rute	Lake Victoria Basin Water Officer		
Mwanza		Samwel Mcharo	Marine Service Company LTD (T)		
Uganda	Wakiso	DFR	Mr Edward Nsimbe Bulega	Principal Fisheries Inspector	+256752699347 sfnsimbe@yahoo.com
	Wakiso	DFR	Mr Bakunda Aventino	Senior Fisheries Officer	+256 772 592 547 aventino_b@yahoo.com
	Wakiso	DFR	Mr Jimmy Etyang	Senior Fisheries	

				Inspector	
	Wakiso	DFR	Ms Joyce Ikwaput Nyeko	Senior Fisheries Officer	+256 772 482 599 joyikwaput@hotmail.com
	Kampala	NWSC	Mr Christopher Kanyesigye	Quality control Manager	+256 772 425 675; +256 717 315 258 christopher.kanyesigye@nwsc.co.ug; chriskanye@yahoo.com
	Kampala	NWSC	Dr Rose Kaggwa	Manager Research and external services	+256 772 425 019 rose.kaggwa@nwsc.co.ug
	Kampala	NEMA	Mr Fred Onyai	Internal monitoring and evaluation specialist	+256 772 517 303 fonyai@nemaug.org; fredonyai@yahoo.com
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	Kampala	Wetlands Inspection Division	Mr Vincent Barugahare	Ecologist	+256 774 434 969 vbarugahare@yahoo.com
	Kampala	Ministry of Works and Transport	Engineer Khabakha	Marine Engineer	+256 751 907 945 bn_khabakha@hotmail.com
	Kampala	Rift Valley Railways (U) Ltd	Mr. Elias Kajjuka	Marine Manager	+256 772 787 823 Elias.kajjuka@rvr.co.ug
	Kampala	Uganda Museums and Monuments	Ms Sarah Musalizi	Conservator	+256 772 183 601 saramussasarah@yahoo.com
	Kampala	Uganda Museums and Monuments	Ms Rose Nkaale Mwanja	Ag. Commissioner	+256 772 485 624 mumond@mtti.co.ug, mwanja@mtti.co.ug, mwanjankale@yahoo.com
	Kampala	Uganda Museums and Monuments	Mr. Leon Candia	Conservator	+256 775 267 608 lacidia@yahoo.com/candia.leon@gmail.com

Appendix IV: Questionnaire for Community level key informant interviews

NaFIRRI/KMFRI/TAFIRI

IDENTIFICATION AND MAPPING ECOLOGICALLY SENSITIVE AREAS IN L. VICTORIA

QUESTIONNAIRE FOR KEY INFORMANT INTERVIEWS COMMUNITY (FORMS 1A & 1B)

Note the following

- Respondents will be leaders of key community based stakeholder groups, such as BMU, Women groups, Youth Groups, Conservation Groups, Local Authorities and NGOs. At least three key informant respondents to be interviewed within the groups.
- Information will be provided on ecologically sensitive areas (ESAs) along Lake Victoria shoreline that measure at least 40,000 square metres (Approx. 200m x 200m).
- Form 1A is for capturing information about all ESAs in the community. Only 1 form will be filled for each community.
- Form 1B is for capturing detailed information on functions and characteristics of each ESA. Information will be provided for a maximum of 3 most important ESAs at each community.

FORM 1A: ONLY ONE FORM TO BE FILLED FOR EACH COMMUNITY

Form No. _____

- District _____
 - Community/ village _____
 - Name of respondent(s) _____ Position _____
_____ Position _____
_____ Position _____
- How many sites of each of the following types of ESAs are there in this community?
 - Wetland _____
 - Non wetland vegetated shoreline _____
 - Rocky outcrops and small islands _____
 - River mouth _____
 - Sheltered bay _____
 - Other pristine areas _____

IDENTIFICATION AND MAPPING ECOLOGICALLY SENSITIVE AREAS IN L. VICTORIA

FORM 1B: ONE FORM TO BE FILLED FOR EACH SELECTED ESA

(Information will be captured for a maximum of 3 most important ESAs in each community)

Form No. _____

Q1. ESA type _____ Q2. a) District
b) Community/ village/(s)/Beach(s) _____

Q3. Is this ESA a breeding/nursery area for fish?

1.Yes 2.No

(If Yes, answer questions 3a-3k. If No, go to Question 4a)

3a. Which fish species are found in the site?

.....

3b. Which months do you find young fish in the site?

.....

3c. Which months do you find fish ready to spawn in the site

.....

3d. Do the people fish in the site?

1.Yes 2.No

3e. If yes, which months do the local people fish at this site?

.....

3f. If yes, what fish do they catch at this site?

.....

3g. Has the amount of fish caught at this site been declining over the years?

1.Yes 2. No

3h. Is the average size of fish caught at the site been declining over the years?

1.Yes 2. No

3i. Are community members aware that the site is a breeding/nursery area?

1.Yes 2. No

3j. Does the community know the consequences of fishing in breeding/Nursery areas? 1. Yes

2. No

3k. If yes, how do they get information?

.....

Q4. Is this ESA a nesting area for birds/habitat for rare animals?

Yes No

(If Yes, answer questions 4a-4q. If No, go to Question 5a)

4a. Which birds spp are found in the site?

4b. In which months do you find birds in the site?

4c. Do people hunt birds in the site?

1. Yes 2. No
(If No, go to Q4f)

4d. Which birds do they hunt at this site?

4e. In which months do they hunt birds?

4f. Which rare animals are found in the site?

.....

4g. In which months do you find animals in the site?

4h. Do people hunt rare animals in the site?

1. Yes 2. No

4i. If yes, which animals do they hunt?

4j. If yes, which months do people hunt animals in the site?

.....

4k. Are there licensed hunters at the site?

1. Yes.

2. No

4l. Has the number of birds at the site declined over the years?

1. Yes.

2. No

4m Has the number of rare animals at the site declined over the years?

1. Yes.

2. No

4n Does the community know that it is a nesting site for birds/habitat for rare animals?

1. Yes

2. No

4p. Does the community know the consequences of hunting in the site?

1. Yes.

2. No.

4q. If yes, how do they get the information?

.....

.....

Q5. Does the ESA host rich diversity of indigenous plants?

1. Yes

2.No

(If Yes, answer questions 5a 5g. If No, go to Question 6a)

5a. Which plants found in the site are important to the community?

.....

5b. What are these plants used for?

.....

5c. Does the community harvest plants in the site?

1. Yes

2. No

5d. If yes, which plants are heavily harvested?

.....

.....

5e. Has the amount of these plants in the site been declining over the years?

1. Yes

2. No

5f. Does community know the consequences of uncontrolled harvesting of plants in the site?

1. Yes.

2. No

5g. If yes, how do they get information?

.....

.....

Q6. Is this ESA used as cultural sites?

1. Yes

2.No

(If Yes, answer questions 6a 6d. If No, go to Question 7a)

6a. Which cultural events are done in the area?

.....

.....

6b. Which months do cultural events take place in the area?

.....

.....

6c. Does the community know the value of this cultural site?

1. Yes.

2. No

6d How do they get this information?

.....

Q7 Is this site used as water extraction/ purification/ flood control etc.

1. Yes

2.No

(If Yes, answer questions 7a 7f. If No, go to Question 8a)

7a. Does the community get water for domestic use from the site?

1. Yes

2. No

7b. In which months does the community get water from the site?

.....

.....

7c Does the site help in flood control?

1. Yes

2.No

7d In which months does the site control floods?

.....
.....

7e. Does the community know that the site performs water extraction/ purification/ flood control?

1. Yes 2. No

7f. How does the community get the information?

.....

Q8. Does the site lie on maritime transport route?

1. Yes 2.No

(If Yes, answer questions 8a 8c. If No, go to Question 9a)

8a. If yes, what cargo passes through it?

.....
.....

8b. How is the site affected by maritime transport activities?

.....
.....

8c. Have there been oil spills near the site?

1.Yes 2.No

Q9. Is the ESA threatened by human activities?

1. Yes. 2. No.

9a. If Yes, which socio economic activities pose significant threat to the ESA? [e.g. fishing, water extraction, sand mining, cultivation, waste disposal, human settlement, tourism (Hotels & beaches), harvesting wetlands & forest, cultural practices]

.....
.....
.....

9b. Is the site protected?

1. Yes. 2. No

9c. If yes, who protects the site?

.....
.....

9d. What is the site protected against?

.....

9e. Is the site protection successful?

1. Yes. 2. No

9f. If yes, what are indicators of successful protection?

.....
.....

9g. If not successful, why?

.....
.....
.....

9h. What will happen to the local community if this area is completely protected?

.....
.....
.....

9i. What are the future prospects of this site?

.....
.....

9j. What can you recommend for sustainable utilization of this ESA?

.....
.....
.....

Appendix V A field form for capture of shoreline/habitat characteristics, biological resources, human use features of Lake Victoria ESAs

NaFIRRI/KMFRI/TAFIRI

IDENTIFICATION AND MAPPING ECOLOGICALLY SENSITIVE AREAS IN L. VICTORIA

A CHECKLIST OF INDICATORS TO BE USED IN SCORING ESAs ATTRIBUTES

ESA Category (A) Wetland (B) River mouth (C) Island (D) Rocky outcrops (E) Sheltered bay (F) Cultural/Heritage/Sacred site (G) Intact natural forest/wooded shoreline areas District name ESA name : Geo reference in DD: Lat. start: Long. Start:

Lat. end: Long. End: Altitude (m)

Photo reference Nos

Indicator	Range
1. Area	
2. Shoreline length	
3. Distance from the nearest similar ESA	(A) Far (>1km) (B) Near (<1km)
4. Habitat diversity	(A) High (B) Moderate (C)Low
5. Bird nests	(A) High (>20) (B) Moderate (10 20) (C) Low (<10)
6. Water clarity	(a) Turbid (B) Clear
7. Macrophytes/vegetation cover	(A) High (>50% cover) (B) Moderate (20 50% cover) (C) Low (<20% cover)
8. Rare and endangered species	(A) >5, (B) 1 5, (C) None
9. Exotics/invasive	>5, 1 5, None
10. Level of fragmentation /disturbance	(A) >75% (B) 50 75% (C) 25 50% (D) <25%
11. Species richness (invertebrates, birds, reptiles, fish, mammals, plants)	(A) High (B) Moderate (C) Low
12. Fish breeding/nursery	(A) High (B) Moderate (B) Low
13. Refugia	(A) High (B) Moderate (C) Low
14. Shoreline protection	(A) >200m (B)100 200m (C) <100m
15. Buffering capacity	(A) >75% (B) 50 75% (C) 25 50% (D) <25%
16. Gradient	(A) Steep (B) Moderate (C) Gentle
17. Rock size	(A) Large (B) Medium (C) Small
18. Discharge	(A) High (B) Moderate (C) Low
19. Substratum	(A) Muddy (B) Sandy (C) Rocky

Human use activities

Activity	Range
1. Ownership	(A) Private (B) Public
2. Protection status	(A) Protected (B) Partially protected (C) Unprotected
3. Fishing	(A) Intensive (B) Moderate (C) Low
4. Hunting	(A) Present (B) Absent
5. Harvesting of aquatic vegetation	(A) Intensive (B) Moderate (C) Low/absent
6. Cultivation	(A) Intensive (B) Moderate (C) Low/absent
7. Grazing	(A) Intensive (B) Moderate (C) Low/absent
8. Proximity to transport routes	(A) (< 1km) (B) 1 5 km (D) >5km
9. Proximity to Industrial activities	(A) (< 1km) (B) 1 5 km (D) >5km (Name & type of industries <5 km)
10. Proximity to urban centre	(A) (< 1km) (B) 1 5 km (D) >5km (Name of urban centre < 5km)
11. Cultural uses	(A) Spiritual (B) Medicinal (C) Aesthetic (D) Historical (Tick all applicable)
12. Level of Tourism	(A) High (B) Moderate (C) Low/absent
13. Animal watering points	(A) Present (B) Absent
14. Urban waste disposal points	(A) Present (B) Absent
15. Water abstraction points	(A) Present (B) Absent
16. Human settlements in the proximity < 1km	(A) >50 homesteads (B) 10 50 homesteads (C) <10

Appendix VI List of wetland ESAs in and around Lake Victoria by level of human disturbance (Sensitivity)

Country	Wetland name	Sensitivity Classes	Area Km ²
Kenya	Dunga	Highly Degraded and Highly Threatened	1.036
Kenya	Rota	Highly Degraded and Highly Threatened	0.340
Kenya	Kogony	Highly Degraded and Highly Threatened	3.069
Tanzania	Igundu Baumann Gulf	Highly Degraded and Highly Threatened	0.136
Tanzania	Igundu Baumann Gulf	Highly Degraded and Highly Threatened	0.153
Tanzania	Shinemba	Highly Degraded and Highly Threatened	6.218
Tanzania	Bulenda Bufwe Baumann Gulf	Highly Degraded and Highly Threatened	5.022
Tanzania	Nyarusurya Mara Bay	Highly Degraded and Highly Threatened	0.259
Tanzania	Mugubya	Highly Degraded and Highly Threatened	4.165
Tanzania	Igundu Baumann Gulf	Highly Degraded and Highly Threatened	1.044
Tanzania	Bwenyi Baumann Gul	Highly Degraded and Highly Threatened	0.272
Uganda	Mutungo swamp	Highly Degraded and Highly Threatened	0.018
Uganda	Kirinya swamp	Highly Degraded and Highly Threatened	0.105
Uganda	Kirinya swamp	Highly Degraded and Highly Threatened	0.272
Uganda	Munyonyo swamp	Highly Degraded and Highly Threatened	0.955
Uganda	Mutungo swamp	Highly Degraded and Highly Threatened	0.981
Uganda	Mutungo swamp	Highly Degraded and Highly Threatened	0.160
Uganda	Mutungo swamp	Highly Degraded and Highly Threatened	5.224
Uganda	Nakivubo swamp	Highly Degraded and Highly Threatened	7.239
Kenya	Wahaga	Highly Degraded and Least to Moderately Threatened	0.239
Kenya	Liunda	Highly Degraded and Least to Moderately Threatened	0.459
Kenya	Senye	Highly Degraded and Least to Moderately Threatened	0.048
Kenya	Tangache	Highly Degraded and Least to Moderately Threatened	0.445
Kenya	Karungu	Highly Degraded and Least to Moderately Threatened	0.127
Kenya	Sori	Highly Degraded and Least to Moderately Threatened	0.783
Kenya	Sori	Highly Degraded and Least to Moderately Threatened	1.026
Kenya	Okuodo B	Highly Degraded and Least to Moderately Threatened	0.068
Kenya	Okuodo A	Highly Degraded and Least to Moderately Threatened	0.064
Kenya	Mbita	Highly Degraded and Least to Moderately Threatened	0.263
Kenya	Mbita	Highly Degraded and Least to Moderately Threatened	0.272
Kenya	Luanda_Kanam	Highly Degraded and Least to Moderately Threatened	0.471
Kenya	Mainuga	Highly Degraded and Least to Moderately Threatened	0.239
Kenya	Usare B	Highly Degraded and Least to Moderately Threatened	0.251
Kenya	Paga/Kaloka	Highly Degraded and Least to Moderately Threatened	0.227
Kenya	Nyakagera	Highly Degraded and Least to Moderately Threatened	0.058
Kenya	Awach Asembo	Highly Degraded and Least to Moderately Threatened	0.111
Kenya	Awach Asembo	Highly Degraded and Least to Moderately Threatened	0.415
Kenya	Awach Asembo	Highly Degraded and Least to Moderately Threatened	0.100
Kenya	Kokise	Highly Degraded and Least to Moderately Threatened	0.346
Kenya	Rambura	Highly Degraded and Least to Moderately Threatened	0.166
Kenya	Achieng Oneko	Highly Degraded and Least to Moderately Threatened	0.547

Country	Wetland name	Sensitivity Classes	Area Km ²
Kenya	Mumbo	Highly Degraded and Least to Moderately Threatened	0.331
Kenya	Odhedhe/Kimira	Highly Degraded and Least to Moderately Threatened	1.012
Kenya	Usare A	Highly Degraded and Least to Moderately Threatened	0.433
Tanzania	Katoma 1	Highly Degraded and Least to Moderately Threatened	0.446
Tanzania	Rubambangwe Miila	Highly Degraded and Least to Moderately Threatened	1.806
Tanzania	Muranga Wetland Pilot Project	Highly Degraded and Least to Moderately Threatened	0.216
Tanzania	Kajungu	Highly Degraded and Least to Moderately Threatened	0.456
Tanzania	Kamissa	Highly Degraded and Least to Moderately Threatened	0.103
Tanzania	Kamissa	Highly Degraded and Least to Moderately Threatened	0.737
Tanzania	Budili	Highly Degraded and Least to Moderately Threatened	0.479
Tanzania	Budili	Highly Degraded and Least to Moderately Threatened	0.610
Tanzania	Muranga	Highly Degraded and Least to Moderately Threatened	0.141
Tanzania	Chigoga	Highly Degraded and Least to Moderately Threatened	5.512
Tanzania	Kakanshe	Highly Degraded and Least to Moderately Threatened	0.534
Tanzania	Kakanshe	Highly Degraded and Least to Moderately Threatened	0.312
Tanzania	Mkaseka	Highly Degraded and Least to Moderately Threatened	0.259
Tanzania	Bangwe	Highly Degraded and Least to Moderately Threatened	0.237
Tanzania	Bangwe	Highly Degraded and Least to Moderately Threatened	0.350
Tanzania	Bangwe	Highly Degraded and Least to Moderately Threatened	0.283
Tanzania	Kasheka	Highly Degraded and Least to Moderately Threatened	0.409
Tanzania	Busaiko South	Highly Degraded and Least to Moderately Threatened	0.385
Tanzania	Busaiko South	Highly Degraded and Least to Moderately Threatened	0.890
Tanzania	Karumo	Highly Degraded and Least to Moderately Threatened	0.506
Tanzania	Mitego	Highly Degraded and Least to Moderately Threatened	0.470
Tanzania	Mitego	Highly Degraded and Least to Moderately Threatened	0.543
Tanzania	Mitego	Highly Degraded and Least to Moderately Threatened	0.183
Tanzania	Nadi	Highly Degraded and Least to Moderately Threatened	4.847
Tanzania	Chole	Highly Degraded and Least to Moderately Threatened	1.044
Tanzania	Zinga South_1	Highly Degraded and Least to Moderately Threatened	0.979
Tanzania	Tetewa	Highly Degraded and Least to Moderately Threatened	0.083
Tanzania	Suguti	Highly Degraded and Least to Moderately Threatened	0.287
Tanzania	Suguti	Highly Degraded and Least to Moderately Threatened	0.169
Tanzania	Suguti	Highly Degraded and Least to Moderately Threatened	1.330
Tanzania	Masau East	Highly Degraded and Least to Moderately Threatened	0.724
Tanzania	Masau West	Highly Degraded and Least to Moderately Threatened	0.239
Tanzania	Isango	Highly Degraded and Least to Moderately Threatened	0.501
Tanzania	Kwisense	Highly Degraded and Least to Moderately Threatened	0.209
Tanzania	Katoma 1	Highly Degraded and Least to Moderately Threatened	1.923
Tanzania	Susi Grant Bay	Highly Degraded and Least to Moderately Threatened	0.029
Tanzania	Bugongolo	Highly Degraded and Least to Moderately Threatened	0.125
Tanzania	Bugongolo	Highly Degraded and Least to Moderately Threatened	0.483
Tanzania	Bugongolo	Highly Degraded and Least to Moderately Threatened	0.985
Tanzania	Kawaganga	Highly Degraded and Least to Moderately Threatened	0.340
Tanzania	Kawaganga	Highly Degraded and Least to Moderately Threatened	0.447

Country	Wetland name	Sensitivity Classes	Area Km²
Tanzania	Kawaganga	Highly Degraded and Least to Moderately Threatened	1.210
Tanzania	Kawaganga	Highly Degraded and Least to Moderately Threatened	0.269
Tanzania	Zinga North	Highly Degraded and Least to Moderately Threatened	0.302
Tanzania	Zinga South_1	Highly Degraded and Least to Moderately Threatened	0.276
Tanzania	Zinga East	Highly Degraded and Least to Moderately Threatened	0.179
Tanzania	Buroro	Highly Degraded and Least to Moderately Threatened	1.993
Tanzania	Susi Grant Bay	Highly Degraded and Least to Moderately Threatened	2.654
Tanzania	Magungu	Highly Degraded and Least to Moderately Threatened	0.779
Uganda	Bufumira swamp	Highly Degraded and Least to Moderately Threatened	0.105
Uganda	Bufumira swamp	Highly Degraded and Least to Moderately Threatened	0.034
Uganda	Bufumira swamp	Highly Degraded and Least to Moderately Threatened	0.024
Uganda	Bufumira swamp	Highly Degraded and Least to Moderately Threatened	0.016
Uganda	Lwanjaba swamp	Highly Degraded and Least to Moderately Threatened	0.022
Uganda	Namusenyi swamp	Highly Degraded and Least to Moderately Threatened	0.049
Uganda	Buluba	Highly Degraded and Least to Moderately Threatened	0.029
Uganda	Mundafwa	Highly Degraded and Least to Moderately Threatened	0.028
Uganda	Mundafwa	Highly Degraded and Least to Moderately Threatened	0.021
Uganda	Mundafwa	Highly Degraded and Least to Moderately Threatened	0.308
Uganda	Mundafwa	Highly Degraded and Least to Moderately Threatened	0.177
Uganda	Buliba swamp	Highly Degraded and Least to Moderately Threatened	0.120
Uganda	Bufumira swamp	Highly Degraded and Least to Moderately Threatened	0.302
Uganda	Kiggo swamp	Highly Degraded and Least to Moderately Threatened	0.484
Uganda	Busi swamp	Highly Degraded and Least to Moderately Threatened	0.171
Uganda	Bufumbe swamp	Highly Degraded and Least to Moderately Threatened	0.385
Uganda	Buliba swamp	Highly Degraded and Least to Moderately Threatened	0.432
Uganda	Nakitokota swamp	Highly Degraded and Least to Moderately Threatened	1.446
Uganda	Kirundu swamp	Highly Degraded and Least to Moderately Threatened	0.980
Uganda	Mbazi swamp	Highly Degraded and Least to Moderately Threatened	0.358
Uganda	Kyasira swamp	Highly Degraded and Least to Moderately Threatened	0.870
Uganda	Kyasira Nabinonya	Highly Degraded and Least to Moderately Threatened	0.213
Uganda	Garuga Phillip Bor	Highly Degraded and Least to Moderately Threatened	0.104
Uganda	Nalugala swamp	Highly Degraded and Least to Moderately Threatened	0.342
Uganda	Nalugala swamp	Highly Degraded and Least to Moderately Threatened	0.665
Uganda	Lwanjaba swamp	Highly Degraded and Least to Moderately Threatened	0.100
Uganda	Kyanvubu swamp	Highly Degraded and Least to Moderately Threatened	0.957
Uganda	Mukyondo swamp	Highly Degraded and Least to Moderately Threatened	2.162
Uganda	Bumeru	Highly Degraded and Least to Moderately Threatened	0.075
Uganda	Mpanga 2	Highly Degraded and Least to Moderately Threatened	0.147
Uganda	Kisumu Kubwa	Highly Degraded and Least to Moderately Threatened	0.239
Uganda	Namusenyi swamp	Highly Degraded and Least to Moderately Threatened	0.501
Uganda	Kazi swamp	Highly Degraded and Least to Moderately Threatened	0.131
Uganda	Kazi swamp	Highly Degraded and Least to Moderately Threatened	3.237
Uganda	Kiggo swamp	Highly Degraded and Least to Moderately Threatened	0.271
Uganda	Waburungu	Highly Degraded and Least to Moderately Threatened	0.508

Country	Wetland name	Sensitivity Classes	Area Km ²
Uganda	Nduwa	Highly Degraded and Least to Moderately Threatened	0.113
Uganda	Kipapi	Highly Degraded and Least to Moderately Threatened	0.235
Uganda	Misori	Highly Degraded and Least to Moderately Threatened	0.007
Uganda	Lugala	Highly Degraded and Least to Moderately Threatened	0.299
Uganda	Bucunya	Highly Degraded and Least to Moderately Threatened	0.560
Uganda	Bulosi	Highly Degraded and Least to Moderately Threatened	0.286
Uganda	Mundafwa	Highly Degraded and Least to Moderately Threatened	0.424
Uganda	Matolo	Highly Degraded and Least to Moderately Threatened	0.378
Tanzania	Simiyu Magu Bay	Least Degraded and Highly Threatened	186.194
Tanzania	Mara	Least Degraded and Highly Threatened	592.243
Uganda	Kakira swamp	Least Degraded and Highly Threatened	0.663
Uganda	Wairaka swamp	Least Degraded and Highly Threatened	0.198
Uganda	Wanyange swamp	Least Degraded and Highly Threatened	0.389
Uganda	Bidco swamp	Least Degraded and Highly Threatened	0.622
Uganda	Masese swamp	Least Degraded and Highly Threatened	0.670
Kenya	Yala	Least Degraded and Least to Moderately Threatened	0.656
Kenya	Sio	Least Degraded and Least to Moderately Threatened	50.920
Kenya	Yala	Least Degraded and Least to Moderately Threatened	156.779
Kenya	Nzoia	Least Degraded and Least to Moderately Threatened	13.874
Kenya	Nyando	Least Degraded and Least to Moderately Threatened	34.676
Kenya	Kuja	Least Degraded and Least to Moderately Threatened	55.426
Kenya	Ndere	Least Degraded and Least to Moderately Threatened	0.242
Kenya	Kenga/Kibos/Nyam	Least Degraded and Least to Moderately Threatened	28.301
Kenya	Sondu/Miri	Least Degraded and Least to Moderately Threatened	6.657
Kenya/Uganda	Sio swamp	Least Degraded and Least to Moderately Threatened	50.920
Tanzania	Mbalika	Least Degraded and Least to Moderately Threatened	0.101
Tanzania	Buyago	Least Degraded and Least to Moderately Threatened	1.379
Tanzania	Nyaruhwa	Least Degraded and Least to Moderately Threatened	98.885
Tanzania	Ng'walogwabagole	Least Degraded and Least to Moderately Threatened	0.477
Tanzania	Yerarumbo	Least Degraded and Least to Moderately Threatened	80.757
Tanzania	Luanso	Least Degraded and Least to Moderately Threatened	0.324
Tanzania	Luanso	Least Degraded and Least to Moderately Threatened	1.555
Tanzania	Ilalambogo	Least Degraded and Least to Moderately Threatened	79.033
Tanzania	Mbalika	Least Degraded and Least to Moderately Threatened	15.966
Tanzania	Nungwe	Least Degraded and Least to Moderately Threatened	86.448
Tanzania	Mori	Least Degraded and Least to Moderately Threatened	66.857
Tanzania	Ilalambogo	Least Degraded and Least to Moderately Threatened	3.623
Uganda	Kaazi swamp	Least Degraded and Least to Moderately Threatened	0.223
Uganda	Koja Bay	Least Degraded and Least to Moderately Threatened	0.021
Uganda	Ssese swamp	Least Degraded and Least to Moderately Threatened	0.922
Uganda	Ssese swamp	Least Degraded and Least to Moderately Threatened	0.388
Uganda	Buwoya swamp	Least Degraded and Least to Moderately Threatened	0.264
Uganda	Bukali swamp	Least Degraded and Least to Moderately Threatened	0.130
Uganda	Bukali swamp	Least Degraded and Least to Moderately Threatened	0.330

Country	Wetland name	Sensitivity Classes	Area Km ²
Uganda	Musatu swamp	Least Degraded and Least to Moderately Threatened	0.554
Uganda	Koja Bay	Least Degraded and Least to Moderately Threatened	0.190
Uganda	Njoga swamp	Least Degraded and Least to Moderately Threatened	0.146
Uganda	Bussi swamp	Least Degraded and Least to Moderately Threatened	1.003
Uganda	Bussi swamp	Least Degraded and Least to Moderately Threatened	1.110
Uganda	Burundira	Least Degraded and Least to Moderately Threatened	2.630
Uganda	Kibale/Bukeri	Least Degraded and Least to Moderately Threatened	0.440
Uganda	Nabweyo swamp	Least Degraded and Least to Moderately Threatened	0.153
Uganda	Nabweyo swamp	Least Degraded and Least to Moderately Threatened	0.189
Uganda	Nabweyo swamp	Least Degraded and Least to Moderately Threatened	0.087
Uganda	Sidome	Least Degraded and Least to Moderately Threatened	0.250
Uganda	Lutembe Bay	Least Degraded and Least to Moderately Threatened	0.340
Uganda	Lutembe Bay	Least Degraded and Least to Moderately Threatened	0.052
Uganda	Bugoma	Least Degraded and Least to Moderately Threatened	0.374
Uganda	Kibale/Bukeri	Least Degraded and Least to Moderately Threatened	3.149
Uganda	Gori swamp	Least Degraded and Least to Moderately Threatened	0.410
Uganda	Ssesse swamp	Least Degraded and Least to Moderately Threatened	1.352
Uganda	Buwoya swamp	Least Degraded and Least to Moderately Threatened	0.702
Uganda	Bukabale swamp	Least Degraded and Least to Moderately Threatened	0.706
Uganda	Bukali swamp	Least Degraded and Least to Moderately Threatened	0.605
Uganda	Musatu swamp	Least Degraded and Least to Moderately Threatened	0.680
Uganda	Mumukaga swamp	Least Degraded and Least to Moderately Threatened	1.053
Uganda	Koja Bay	Least Degraded and Least to Moderately Threatened	0.583
Uganda	Busiri 2 swamp	Least Degraded and Least to Moderately Threatened	0.197
Uganda	Busiri 1 swamp	Least Degraded and Least to Moderately Threatened	0.134
Uganda	Kissu swamp	Least Degraded and Least to Moderately Threatened	0.263
Uganda	Kissu swamp	Least Degraded and Least to Moderately Threatened	2.543
Uganda	Njoga swamp	Least Degraded and Least to Moderately Threatened	2.696
Uganda	Busagazi swamp	Least Degraded and Least to Moderately Threatened	1.270
Uganda	Kasirye 1 swamp	Least Degraded and Least to Moderately Threatened	1.469
Uganda	Kasirye 2 swamp	Least Degraded and Least to Moderately Threatened	0.864
Uganda	Way 1 swamp	Least Degraded and Least to Moderately Threatened	27.112
Uganda	Bukakata swamp	Least Degraded and Least to Moderately Threatened	7.396
Uganda	Sango Bay	Least Degraded and Least to Moderately Threatened	108.168
Uganda	Bukoba	Least Degraded and Least to Moderately Threatened	2.074
Uganda	Nalyoba swamp	Least Degraded and Least to Moderately Threatened	2.364
Uganda	Nabweyo swamp	Least Degraded and Least to Moderately Threatened	6.705
Uganda	Buduma Jerandogo	Least Degraded and Least to Moderately Threatened	0.650
Uganda	Bunage	Least Degraded and Least to Moderately Threatened	0.933
Uganda	Lutembe Bay	Least Degraded and Least to Moderately Threatened	3.810
Uganda	Nabugabo swamp	Least Degraded and Least to Moderately Threatened	217.019
Uganda	Bussi swamp	Least Degraded and Least to Moderately Threatened	128.676
Uganda	Bussi swamp	Least Degraded and Least to Moderately Threatened	109.820
Uganda	Bukasero/Kabere swamp	Least Degraded and Least to Moderately Threatened	6.779

Country	Wetland name	Sensitivity Classes	Area Km ²
Uganda	Bukalenzi swamp	Least Degraded and Least to Moderately Threatened	1.699
Uganda	Naguru/Namatu swam	Least Degraded and Least to Moderately Threatened	13.508
Uganda	Sityohe	Least Degraded and Least to Moderately Threatened	1.723
Uganda	Sidome	Least Degraded and Least to Moderately Threatened	4.118
Uganda	Koja Bay	Least Degraded and Least to Moderately Threatened	0.197
Uganda	Buyiri swamp	Least Degraded and Least to Moderately Threatened	11.289
Uganda	Kaazi swamp	Least Degraded and Least to Moderately Threatened	14.123
Uganda	Katonga swamp	Least Degraded and Least to Moderately Threatened	1003.770
Tanzania	Sola Bauman Gulf	Moderately Degraded and Highly Threatened	11.733
Tanzania	Sola Bauman Gulf	Moderately Degraded and Highly Threatened	0.680
Tanzania	Mkuyuni	Moderately Degraded and Highly Threatened	0.272
Tanzania	Duma Magu Bay	Moderately Degraded and Highly Threatened	2.176
Tanzania	Lamadi	Moderately Degraded and Highly Threatened	2.322
Tanzania	Rubana	Moderately Degraded and Highly Threatened	16.773
Tanzania	Kaluokekele Bauman Gulf	Moderately Degraded and Highly Threatened	22.488
Tanzania	Bujige Baumann Gul	Moderately Degraded and Highly Threatened	0.180
Tanzania	Bujige Baumann Gul	Moderately Degraded and Highly Threatened	0.449
Tanzania	Hamkoko	Moderately Degraded and Highly Threatened	1.741
Tanzania	Hamkungu Grant Bay	Moderately Degraded and Highly Threatened	0.396
Tanzania	Mhalamba	Moderately Degraded and Highly Threatened	14.930
Kenya	Olambwe	Moderately Degraded and Least to Moderately Threatened	1.140
Kenya	Mirunda	Moderately Degraded and Least to Moderately Threatened	0.027
Kenya	Mirunda	Moderately Degraded and Least to Moderately Threatened	0.024
Kenya	Mirunda	Moderately Degraded and Least to Moderately Threatened	0.179
Kenya	Mirunda Cont.	Moderately Degraded and Least to Moderately Threatened	0.237
Kenya	Mirunda	Moderately Degraded and Least to Moderately Threatened	0.994
Kenya	Samunyi	Moderately Degraded and Least to Moderately Threatened	0.946
Kenya	Oluch Kimira Con	Moderately Degraded and Least to Moderately Threatened	0.428
Kenya	Oluch Kimira	Moderately Degraded and Least to Moderately Threatened	4.103
Kenya	Luanda	Moderately Degraded and Least to Moderately Threatened	3.659
Kenya	Sirongo	Moderately Degraded and Least to Moderately Threatened	0.496
Kenya	Utonga_Warinda	Moderately Degraded and Least to Moderately Threatened	3.967
Kenya	Oele	Moderately Degraded and Least to Moderately Threatened	0.234
Kenya	Uwaria	Moderately Degraded and Least to Moderately Threatened	0.402
Kenya	Kadimo_Kanyibok	Moderately Degraded and Least to Moderately Threatened	0.878
Kenya	Usenge	Moderately Degraded and Least to Moderately Threatened	0.183
Kenya	Olambwe	Moderately Degraded and Least to Moderately Threatened	0.441
Kenya	Mirunda	Moderately Degraded and Least to Moderately Threatened	0.046
Kenya	Akech	Moderately Degraded and Least to Moderately Threatened	0.119
Kenya	Asembo	Moderately Degraded and Least to Moderately Threatened	1.963
Kenya	Kabonyo	Moderately Degraded and Least to Moderately Threatened	7.322
Kenya	Awach_Kendu	Moderately Degraded and Least to Moderately Threatened	1.994
Kenya	Pala	Moderately Degraded and Least to Moderately Threatened	0.881
Tanzania	Nungwe	Moderately Degraded and Least to Moderately Threatened	1.558

Country	Wetland name	Sensitivity Classes	Area Km ²
Tanzania	Nungwe	Moderately Degraded and Least to Moderately Threatened	0.371
Tanzania	Rubafu	Moderately Degraded and Least to Moderately Threatened	8.061
Tanzania	Ngono	Moderately Degraded and Least to Moderately Threatened	93.372
Tanzania	unnamed	Moderately Degraded and Least to Moderately Threatened	0.048
Tanzania	Itare	Moderately Degraded and Least to Moderately Threatened	2.696
Tanzania	Kasamwa	Moderately Degraded and Least to Moderately Threatened	3.458
Tanzania	Busaka	Moderately Degraded and Least to Moderately Threatened	2.432
Tanzania	Bukingo	Moderately Degraded and Least to Moderately Threatened	1.878
Tanzania	Kavivi	Moderately Degraded and Least to Moderately Threatened	0.253
Tanzania	Kissenda North West	Moderately Degraded and Least to Moderately Threatened	1.100
Tanzania	Kissenda South	Moderately Degraded and Least to Moderately Threatened	0.376
Tanzania	Nyamahuna	Moderately Degraded and Least to Moderately Threatened	0.246
Tanzania	Nyarwambu	Moderately Degraded and Least to Moderately Threatened	0.093
Tanzania	Nyashishi	Moderately Degraded and Least to Moderately Threatened	6.882
Tanzania	Kilimo	Moderately Degraded and Least to Moderately Threatened	0.249
Tanzania	Baraki	Moderately Degraded and Least to Moderately Threatened	0.458
Tanzania	Buchenzi	Moderately Degraded and Least to Moderately Threatened	3.419
Tanzania	Nyamirembe	Moderately Degraded and Least to Moderately Threatened	5.058
Tanzania	Nyamisera	Moderately Degraded and Least to Moderately Threatened	0.912
Tanzania	Muranda	Moderately Degraded and Least to Moderately Threatened	0.386
Tanzania	Muranda	Moderately Degraded and Least to Moderately Threatened	2.419
Tanzania	Mashoro South	Moderately Degraded and Least to Moderately Threatened	1.725
Tanzania	Mashoro North	Moderately Degraded and Least to Moderately Threatened	1.139
Tanzania	Luchili	Moderately Degraded and Least to Moderately Threatened	0.098
Tanzania	Luchili	Moderately Degraded and Least to Moderately Threatened	0.210
Tanzania	Luchili	Moderately Degraded and Least to Moderately Threatened	0.564
Tanzania	Luchili	Moderately Degraded and Least to Moderately Threatened	0.662
Tanzania	Luchili	Moderately Degraded and Least to Moderately Threatened	1.449
Tanzania	Ruiga	Moderately Degraded and Least to Moderately Threatened	26.623
Tanzania	Chanika	Moderately Degraded and Least to Moderately Threatened	7.548
Tanzania	Bugonde	Moderately Degraded and Least to Moderately Threatened	5.397
Tanzania	Luhorongoma	Moderately Degraded and Least to Moderately Threatened	32.217
Tanzania	Mori	Moderately Degraded and Least to Moderately Threatened	0.595
Tanzania	Burere	Moderately Degraded and Least to Moderately Threatened	1.180
Tanzania	Yerarumbo	Moderately Degraded and Least to Moderately Threatened	0.981
Tanzania	Yerarumbo	Moderately Degraded and Least to Moderately Threatened	0.156
Tanzania	Yerarumbo	Moderately Degraded and Least to Moderately Threatened	0.364
Tanzania	Bukingo	Moderately Degraded and Least to Moderately Threatened	0.091
Tanzania	Nyarwambu	Moderately Degraded and Least to Moderately Threatened	0.392
Tanzania	Nyarwambu	Moderately Degraded and Least to Moderately Threatened	0.172
Tanzania	Nyakakarango	Moderately Degraded and Least to Moderately Threatened	0.544
Tanzania	Busaka North	Moderately Degraded and Least to Moderately Threatened	0.241
Tanzania	Busaka North	Moderately Degraded and Least to Moderately Threatened	0.366
Tanzania	Katoma 2	Moderately Degraded and Least to Moderately Threatened	0.492

Country	Wetland name	Sensitivity Classes	Area Km ²
Tanzania	Luhorongoma	Moderately Degraded and Least to Moderately Threatened	0.272
Tanzania	Buchenzi	Moderately Degraded and Least to Moderately Threatened	1.641
Tanzania	Buchenzi	Moderately Degraded and Least to Moderately Threatened	1.029
Tanzania	Kissenda South	Moderately Degraded and Least to Moderately Threatened	0.185
Tanzania	Kanaga	Moderately Degraded and Least to Moderately Threatened	2.523
Tanzania	Kivula	Moderately Degraded and Least to Moderately Threatened	0.972
Tanzania	Kivula	Moderately Degraded and Least to Moderately Threatened	1.667
Tanzania	Busaiko	Moderately Degraded and Least to Moderately Threatened	1.733
Tanzania	Hamkoko South East	Moderately Degraded and Least to Moderately Threatened	0.631
Tanzania	Ng'walogwabagole	Moderately Degraded and Least to Moderately Threatened	31.245
Tanzania	Ishuka	Moderately Degraded and Least to Moderately Threatened	0.000
Tanzania	Ishuka	Moderately Degraded and Least to Moderately Threatened	4.525
Tanzania	Kigongo	Moderately Degraded and Least to Moderately Threatened	0.366
Tanzania/Uganda	Kagera/Ruzinga	Moderately Degraded and Least to Moderately Threatened	360.786
Uganda	Bubinge	Moderately Degraded and Least to Moderately Threatened	0.040
Uganda	Bubinge	Moderately Degraded and Least to Moderately Threatened	0.066
Uganda	Bubinge	Moderately Degraded and Least to Moderately Threatened	0.035
Uganda	Buigi swamp	Moderately Degraded and Least to Moderately Threatened	0.090
Uganda	Buigi swamp	Moderately Degraded and Least to Moderately Threatened	0.240
Uganda	Mugango swamp	Moderately Degraded and Least to Moderately Threatened	0.079
Uganda	Mugango swamp	Moderately Degraded and Least to Moderately Threatened	0.040
Uganda	Kitosi swamp	Moderately Degraded and Least to Moderately Threatened	0.028
Uganda	Kitosi swamp	Moderately Degraded and Least to Moderately Threatened	0.024
Uganda	Rwamukyanga	Moderately Degraded and Least to Moderately Threatened	0.017
Uganda	Rwamukyanga	Moderately Degraded and Least to Moderately Threatened	0.015
Uganda	Buigi swamp	Moderately Degraded and Least to Moderately Threatened	0.227
Uganda	Kasambya Ndogo	Moderately Degraded and Least to Moderately Threatened	0.378
Uganda	Naguru/Namatu swam	Moderately Degraded and Least to Moderately Threatened	0.161
Uganda	Naguru/Namatu swam	Moderately Degraded and Least to Moderately Threatened	0.059
Uganda	Naguru/Namatu swam	Moderately Degraded and Least to Moderately Threatened	0.025
Uganda	Naguru/Namatu swam	Moderately Degraded and Least to Moderately Threatened	0.022
Uganda	Namone swamp	Moderately Degraded and Least to Moderately Threatened	0.031
Uganda	Namone swamp	Moderately Degraded and Least to Moderately Threatened	0.233
Uganda	Namone swamp	Moderately Degraded and Least to Moderately Threatened	0.415
Uganda	Namone swamp	Moderately Degraded and Least to Moderately Threatened	0.116
Uganda	Namone swamp	Moderately Degraded and Least to Moderately Threatened	0.068
Uganda	Namadhi swamp	Moderately Degraded and Least to Moderately Threatened	3.132
Uganda	Namadhi swamp	Moderately Degraded and Least to Moderately Threatened	0.161
Uganda	Namadhi swamp	Moderately Degraded and Least to Moderately Threatened	0.142
Uganda	Danger	Moderately Degraded and Least to Moderately Threatened	0.317
Uganda	Kaparuko swamp	Moderately Degraded and Least to Moderately Threatened	0.069
Uganda	Lwanika swamp	Moderately Degraded and Least to Moderately Threatened	0.105
Uganda	Lwanika swamp	Moderately Degraded and Least to Moderately Threatened	0.016
Uganda	Walumbe swamp	Moderately Degraded and Least to Moderately Threatened	0.152

Country	Wetland name	Sensitivity Classes	Area Km ²
Uganda	Somoko	Moderately Degraded and Least to Moderately Threatened	0.633
Uganda	Nyanama swamp	Moderately Degraded and Least to Moderately Threatened	0.479
Uganda	Maala swamp	Moderately Degraded and Least to Moderately Threatened	0.247
Uganda	Kalyambuzi swamp	Moderately Degraded and Least to Moderately Threatened	0.574
Uganda	Kakeka swamp	Moderately Degraded and Least to Moderately Threatened	0.328
Uganda	Busiro swamp	Moderately Degraded and Least to Moderately Threatened	1.936
Uganda	Zingola swamp	Moderately Degraded and Least to Moderately Threatened	0.545
Uganda	Kitosi swamp	Moderately Degraded and Least to Moderately Threatened	0.468
Uganda	Bungo swamp	Moderately Degraded and Least to Moderately Threatened	4.682
Uganda	Buigi swamp	Moderately Degraded and Least to Moderately Threatened	0.258
Uganda	Buwera swamp	Moderately Degraded and Least to Moderately Threatened	0.866
Uganda	Katosi swamp	Moderately Degraded and Least to Moderately Threatened	1.036
Uganda	Mugango swamp	Moderately Degraded and Least to Moderately Threatened	11.540
Uganda	Mugango swamp	Moderately Degraded and Least to Moderately Threatened	2.279
Uganda	Nabinonya 2 swamp	Moderately Degraded and Least to Moderately Threatened	0.253
Uganda	Nabinonya 2 swamp	Moderately Degraded and Least to Moderately Threatened	0.766
Uganda	Kigungu swamp	Moderately Degraded and Least to Moderately Threatened	2.153
Uganda	Nakiwogo swamp	Moderately Degraded and Least to Moderately Threatened	2.813
Uganda	Way 2 swamp	Moderately Degraded and Least to Moderately Threatened	9.994
Uganda	Nabugabo swamp	Moderately Degraded and Least to Moderately Threatened	3.065
Uganda	Busime	Moderately Degraded and Least to Moderately Threatened	2.950
Uganda	Lugaga	Moderately Degraded and Least to Moderately Threatened	0.202
Uganda	Lubango	Moderately Degraded and Least to Moderately Threatened	0.091
Uganda	Musikimi	Moderately Degraded and Least to Moderately Threatened	0.438
Uganda	Nabyagi Buyugu	Moderately Degraded and Least to Moderately Threatened	0.257
Uganda	Kitumbezi	Moderately Degraded and Least to Moderately Threatened	1.094
Uganda	Bugoto swamp	Moderately Degraded and Least to Moderately Threatened	1.671
Uganda	Kafu swamp	Moderately Degraded and Least to Moderately Threatened	4.019
Uganda	Bwembe swamp	Moderately Degraded and Least to Moderately Threatened	0.131
Uganda	Bukoba swamp	Moderately Degraded and Least to Moderately Threatened	0.352
Uganda	Danger	Moderately Degraded and Least to Moderately Threatened	0.451
Uganda	Kaparuko swamp	Moderately Degraded and Least to Moderately Threatened	0.344
Uganda	Nakalanga swamp 3	Moderately Degraded and Least to Moderately Threatened	0.348
Uganda	Kachanga swamp	Moderately Degraded and Least to Moderately Threatened	0.229
Uganda	Nakalanga swamp 1	Moderately Degraded and Least to Moderately Threatened	0.082
Uganda	Kasambya Kubwa	Moderately Degraded and Least to Moderately Threatened	0.312
Uganda	Fidrot	Moderately Degraded and Least to Moderately Threatened	0.204
Uganda	Nkombe	Moderately Degraded and Least to Moderately Threatened	0.669
Uganda	Namagera	Moderately Degraded and Least to Moderately Threatened	0.370
Uganda	Namagera	Moderately Degraded and Least to Moderately Threatened	0.775
Uganda	Kafunda	Moderately Degraded and Least to Moderately Threatened	0.765
Uganda	Kigugwo swamp	Moderately Degraded and Least to Moderately Threatened	5.888
Uganda	Namazina swamp	Moderately Degraded and Least to Moderately Threatened	1.353
Uganda	Nsonga swamp	Moderately Degraded and Least to Moderately Threatened	5.789

Country	Wetland name	Sensitivity Classes	Area Km ²
Uganda	Bubanzi swamp	Moderately Degraded and Least to Moderately Threatened	4.106
Uganda	Nkone swamp	Moderately Degraded and Least to Moderately Threatened	0.989
Uganda	Mawembe	Moderately Degraded and Least to Moderately Threatened	4.766
Uganda	Mugango swamp	Moderately Degraded and Least to Moderately Threatened	1.887
Uganda	Mugango swamp	Moderately Degraded and Least to Moderately Threatened	0.480
Uganda	Mugango swamp	Moderately Degraded and Least to Moderately Threatened	2.509
Uganda	Mugango swamp	Moderately Degraded and Least to Moderately Threatened	0.185
Uganda	Mugango swamp	Moderately Degraded and Least to Moderately Threatened	3.635
Uganda	Mugango swamp	Moderately Degraded and Least to Moderately Threatened	0.431
Uganda	Bule Kyagwe swamp	Moderately Degraded and Least to Moderately Threatened	0.396
Uganda	Mulugezi swamp	Moderately Degraded and Least to Moderately Threatened	2.163
Uganda	Nabugabo swamp	Moderately Degraded and Least to Moderately Threatened	1.144
Uganda	Bule Kyagwe swamp	Moderately Degraded and Least to Moderately Threatened	52.401
Uganda	Buluba	Moderately Degraded and Least to Moderately Threatened	2.636
Uganda	Namugongo	Moderately Degraded and Least to Moderately Threatened	0.096
Uganda	Lwanika swamp	Moderately Degraded and Least to Moderately Threatened	1.518
Uganda	Bukoba swamp	Moderately Degraded and Least to Moderately Threatened	0.992
Uganda	Nakavule swamp	Moderately Degraded and Least to Moderately Threatened	3.821
Uganda	Namone swamp	Moderately Degraded and Least to Moderately Threatened	2.436
Uganda	Buluta swamp	Moderately Degraded and Least to Moderately Threatened	1.719
Uganda	Kichori Masaka	Moderately Degraded and Least to Moderately Threatened	0.189
Uganda	Kayanja Kato	Moderately Degraded and Least to Moderately Threatened	0.058
Uganda	Kabuka	Moderately Degraded and Least to Moderately Threatened	0.031
Uganda	Kabondo	Moderately Degraded and Least to Moderately Threatened	0.249
Uganda	Bubinge	Moderately Degraded and Least to Moderately Threatened	3.757
Uganda	Kayanja Kato	Moderately Degraded and Least to Moderately Threatened	0.588
Uganda	Mpanga 1	Moderately Degraded and Least to Moderately Threatened	0.311
Uganda	Bukana	Moderately Degraded and Least to Moderately Threatened	0.111
Uganda	Mumbita	Moderately Degraded and Least to Moderately Threatened	0.061

Appendix VII List of forest ESAs in and around Lake Victoria by level of human disturbance (sensitivity)

Country	Forest name	Sensitivity classes	Area in Km ²
Kenya	Senye	Highly Degraded and Least to Moderately Threatened Forest	0.213
Uganda	Kibanga 1	Highly Degraded and Least to Moderately Threatened Forest	0.629
Tanzania	Biharamulo Game Reserve	Least Degraded and Highly Threatened	25.754
Tanzania	Kasamwa	Least Degraded and Highly Threatened	0.136
Tanzania	Ishuka	Least Degraded and Highly Threatened	0.481
Kenya	Awiti	Least Degraded and Least to Moderately Threatened	0.014
Kenya	Samasa	Least Degraded and Least to Moderately Threatened	0.031
Kenya	Khanete/Nambulak	Least Degraded and Least to Moderately Threatened	0.032
Kenya	Ndere 1	Least Degraded and Least to Moderately Threatened	1.325
Kenya	Ndere 2	Least Degraded and Least to Moderately Threatened	0.103
Tanzania	Ito	Least Degraded and Least to Moderately Threatened	1.020
Tanzania	Singo	Least Degraded and Least to Moderately Threatened	0.033
Tanzania	Mijo	Least Degraded and Least to Moderately Threatened	0.850
Tanzania	Kishaka	Least Degraded and Least to Moderately Threatened	1.381
Tanzania	Rubondo	Least Degraded and Least to Moderately Threatened	194.336
Tanzania	Maisome	Least Degraded and Least to Moderately Threatened	0.032
Tanzania	Kasima	Least Degraded and Least to Moderately Threatened	0.303
Tanzania	Miganiko	Least Degraded and Least to Moderately Threatened	0.250
Tanzania	Kawaganga	Least Degraded and Least to Moderately Threatened	0.587
Tanzania	Ikuru	Least Degraded and Least to Moderately Threatened	3.144
Tanzania	Buzumu	Least Degraded and Least to Moderately Threatened	0.252
Tanzania	Kasankara	Least Degraded and Least to Moderately Threatened	0.094
Tanzania	Masanje	Least Degraded and Least to Moderately Threatened	0.547
Tanzania	Iriga	Least Degraded and Least to Moderately Threatened	0.181
Tanzania	Ndarwa	Least Degraded and Least to Moderately Threatened	0.193
Tanzania	Rubya	Least Degraded and Least to Moderately Threatened	16.724
Tanzania	Ilangala	Least Degraded and Least to Moderately Threatened	1.271
Tanzania	Buhama	Least Degraded and Least to Moderately Threatened	17.600
Tanzania	Mlote West	Least Degraded and Least to Moderately Threatened	1.108
Tanzania	Maisome	Least Degraded and Least to Moderately Threatened	88.127
Tanzania	Nyakatoke	Least Degraded and Least to Moderately Threatened	2.122
Tanzania	Zumacheri	Least Degraded and Least to Moderately Threatened	6.365
Tanzania	Bugambwa 1	Least Degraded and Least to Moderately Threatened	0.307
Tanzania	Bugambwa 2	Least Degraded and Least to Moderately Threatened	0.133
Tanzania	Bugambwa 3	Least Degraded and Least to Moderately Threatened	0.046
Tanzania	Kuriro	Least Degraded and Least to Moderately Threatened	0.042
Tanzania	Mugasiro	Least Degraded and Least to Moderately Threatened	0.065
Tanzania	Bushengere	Least Degraded and Least to Moderately Threatened	0.150
Tanzania	Makobe	Least Degraded and Least to Moderately Threatened	0.045
Tanzania	Makobe	Least Degraded and Least to Moderately Threatened	0.028
Uganda	Nabanga 1	Least Degraded and Least to Moderately Threatened	3.247
Uganda	Buuka	Least Degraded and Least to Moderately Threatened	0.000
Uganda	Damba	Least Degraded and Least to Moderately Threatened	0.000
Uganda	Vuga	Least Degraded and Least to Moderately Threatened	0.196
Uganda	Busiri 3	Least Degraded and Least to Moderately Threatened	1.204
Uganda	Mwema 2	Least Degraded and Least to Moderately Threatened	0.297
Uganda	Mwema 3	Least Degraded and Least to Moderately Threatened	0.584
Uganda	Kuzito 2	Least Degraded and Least to Moderately Threatened	1.352

Country	Forest name	Sensitivity classes	Area in Km ²
Uganda	Mwema 4	Least Degraded and Least to Moderately Threatened	0.000
Uganda	Lukolo 2	Least Degraded and Least to Moderately Threatened	1.406
Uganda	Kisasa	Least Degraded and Least to Moderately Threatened	0.000
Uganda	Jubiya	Least Degraded and Least to Moderately Threatened	0.228
Uganda	Nkogwe 2	Least Degraded and Least to Moderately Threatened	2.206
Uganda	Nimu 2	Least Degraded and Least to Moderately Threatened	0.640
Uganda	Manene	Least Degraded and Least to Moderately Threatened	0.353
Uganda	Bufumira	Least Degraded and Least to Moderately Threatened	7.382
Uganda	Bugabo	Least Degraded and Least to Moderately Threatened	9.438
Uganda	Bunyama	Least Degraded and Least to Moderately Threatened	12.137
Uganda	Mbugwe	Least Degraded and Least to Moderately Threatened	1.257
Uganda	Buyovu 1	Least Degraded and Least to Moderately Threatened	12.162
Uganda	Fumwe	Least Degraded and Least to Moderately Threatened	9.661
Uganda	Bwigi	Least Degraded and Least to Moderately Threatened	0.541
Uganda	Karambuli	Least Degraded and Least to Moderately Threatened	0.176
Uganda	Kasigirilo 1	Least Degraded and Least to Moderately Threatened	0.253
Uganda	Kasigirilo 2	Least Degraded and Least to Moderately Threatened	0.197
Uganda	Buturume	Least Degraded and Least to Moderately Threatened	1.152
Uganda	Linga	Least Degraded and Least to Moderately Threatened	0.358
Uganda	Kamengo	Least Degraded and Least to Moderately Threatened	13.111
Uganda	Kome 1	Least Degraded and Least to Moderately Threatened	47.783
Uganda	Kome 2	Least Degraded and Least to Moderately Threatened	1.151
Uganda	Kome 3	Least Degraded and Least to Moderately Threatened	1.382
Uganda	Ngamba	Least Degraded and Least to Moderately Threatened	0.533
Uganda	Kome 4	Least Degraded and Least to Moderately Threatened	0.167
Uganda	Jana	Least Degraded and Least to Moderately Threatened	0.417
Uganda	Kuye	Least Degraded and Least to Moderately Threatened	2.699
Uganda	Kirugu	Least Degraded and Least to Moderately Threatened	2.760
Uganda	Buguye	Least Degraded and Least to Moderately Threatened	2.858
Uganda	Mujuzi 1	Least Degraded and Least to Moderately Threatened	52.490
Uganda	Mujuzi 2	Least Degraded and Least to Moderately Threatened	1.246
Uganda	Mujuzi 3	Least Degraded and Least to Moderately Threatened	1.721
Uganda	Jubiya	Least Degraded and Least to Moderately Threatened	42.837
Uganda	Jubiya	Least Degraded and Least to Moderately Threatened	4.298
Uganda	Luwafu	Least Degraded and Least to Moderately Threatened	23.691
Uganda	Lukolo 1	Least Degraded and Least to Moderately Threatened	3.618
Uganda	Nabanga 2	Least Degraded and Least to Moderately Threatened	0.850
Uganda	Nakalanga 2	Least Degraded and Least to Moderately Threatened	6.893
Uganda	Nakalanga 1	Least Degraded and Least to Moderately Threatened	5.714
Uganda	Namatiwa 2	Least Degraded and Least to Moderately Threatened	0.360
Uganda	Kibibi Buikwe	Least Degraded and Least to Moderately Threatened	1.316
Uganda	Damba	Least Degraded and Least to Moderately Threatened	21.092
Uganda	Mwema 1	Least Degraded and Least to Moderately Threatened	4.615
Uganda	Kibibi	Least Degraded and Least to Moderately Threatened	0.285
Uganda	Bunjazi	Least Degraded and Least to Moderately Threatened	5.065
Uganda	Bubeke 1	Least Degraded and Least to Moderately Threatened	4.407
Uganda	Bubeke 2	Least Degraded and Least to Moderately Threatened	0.374
Uganda	Buyange	Least Degraded and Least to Moderately Threatened	0.895
Uganda	Buganna	Least Degraded and Least to Moderately Threatened	3.344
Uganda	Bukassa	Least Degraded and Least to Moderately Threatened	26.330
Uganda	Buyovu 2	Least Degraded and Least to Moderately Threatened	0.443

Country	Forest name	Sensitivity classes	Area in Km ²
Uganda	Buyovu 3	Least Degraded and Least to Moderately Threatened	0.247
Uganda	Dsiru	Least Degraded and Least to Moderately Threatened	0.299
Uganda	Nkose	Least Degraded and Least to Moderately Threatened	1.054
Uganda	Bugalla 4	Least Degraded and Least to Moderately Threatened	13.224
Uganda	Bugalla 6	Least Degraded and Least to Moderately Threatened	2.703
Uganda	Bugalla 9	Least Degraded and Least to Moderately Threatened	2.452
Uganda	Mukaranga	Least Degraded and Least to Moderately Threatened	0.888
Uganda	Bugalla 10	Least Degraded and Least to Moderately Threatened	1.340
Uganda	Bugalla 11	Least Degraded and Least to Moderately Threatened	0.439
Uganda	Bugalla 12	Least Degraded and Least to Moderately Threatened	0.392
Uganda	Bugalla 13	Least Degraded and Least to Moderately Threatened	9.053
Uganda	Bugalla 14	Least Degraded and Least to Moderately Threatened	3.835
Uganda	Bugalla 15	Least Degraded and Least to Moderately Threatened	0.272
Uganda	Kasanje	Least Degraded and Least to Moderately Threatened	8.510
Uganda	Kafangalo	Least Degraded and Least to Moderately Threatened	2.199
Uganda	Buuka	Least Degraded and Least to Moderately Threatened	2.677
Uganda	Namatiwa 1	Least Degraded and Least to Moderately Threatened	7.119
Uganda	Nyenda	Least Degraded and Least to Moderately Threatened	0.800
Uganda	Bubembe	Least Degraded and Least to Moderately Threatened	6.670
Tanzania	Mgara	Moderately Degraded and Highly Threatened	0.086
Tanzania	Igundu	Moderately Degraded and Highly Threatened	0.275
Uganda	Buvuma 2	Moderately Degraded and Highly Threatened	0.706
Uganda	Buvuma 3	Moderately Degraded and Highly Threatened	0.255
Uganda	Buvuma 4	Moderately Degraded and Highly Threatened	1.817
Uganda	Kerenge	Moderately Degraded and Highly Threatened	0.184
Uganda	Dwanga Muto	Moderately Degraded and Highly Threatened	0.278
Uganda	Dwanga Mukulu	Moderately Degraded and Highly Threatened	0.461
Uganda	Zirimukulu	Moderately Degraded and Highly Threatened	0.248
Uganda	Lujabwa	Moderately Degraded and Highly Threatened	0.425
Uganda	Imanyiro	Moderately Degraded and Highly Threatened	6.664
Uganda	Buvuma 1	Moderately Degraded and Highly Threatened	92.458
Uganda	Sigulu 1	Moderately Degraded and Highly Threatened	6.833
Uganda	Sigulu=2	Moderately Degraded and Highly Threatened	0.441
Uganda	Nsazi	Moderately Degraded and Highly Threatened	3.605
Kenya	Akeyo	Moderately Degraded and Least to Moderately Threatened	0.019
Kenya	Aliech	Moderately Degraded and Least to Moderately Threatened	0.008
Kenya	Awange	Moderately Degraded and Least to Moderately Threatened	0.006
Kenya	Maugo Small	Moderately Degraded and Least to Moderately Threatened	0.046
Kenya	Maugo Big	Moderately Degraded and Least to Moderately Threatened	0.060
Kenya	Soklo	Moderately Degraded and Least to Moderately Threatened	0.208
Kenya	Ruri	Moderately Degraded and Least to Moderately Threatened	0.138
Kenya	Ruri	Moderately Degraded and Least to Moderately Threatened	0.060
Kenya	Rambungu	Moderately Degraded and Least to Moderately Threatened	0.097
Kenya	Ogera	Moderately Degraded and Least to Moderately Threatened	0.102
Kenya	Imra_Osope	Moderately Degraded and Least to Moderately Threatened	0.009
Kenya	Imra_Osope 1	Moderately Degraded and Least to Moderately Threatened	0.076
Kenya	Imra_Osope 2	Moderately Degraded and Least to Moderately Threatened	0.016
Kenya	Imra_Osope 3	Moderately Degraded and Least to Moderately Threatened	0.014
Kenya	Maboko/Karonga	Moderately Degraded and Least to Moderately Threatened	0.339
Kenya	Sikri	Moderately Degraded and Least to Moderately Threatened	0.119
Tanzania	Nafuba West rock	Moderately Degraded and Least to Moderately Threatened	0.036

Country	Forest name	Sensitivity classes	Area in Km ²
Tanzania	Ijurambo	Moderately Degraded and Least to Moderately Threatened	0.684
Tanzania	Karaba	Moderately Degraded and Least to Moderately Threatened	0.055
Tanzania	Shumba	Moderately Degraded and Least to Moderately Threatened	0.098
Tanzania	Small Island Between Mazinga and Kivumba	Moderately Degraded and Least to Moderately Threatened	0.074
Tanzania	Nihumbu	Moderately Degraded and Least to Moderately Threatened	0.045
Tanzania	Kanyabangwa	Moderately Degraded and Least to Moderately Threatened	0.253
Tanzania	Nyaburu	Moderately Degraded and Least to Moderately Threatened	0.202
Tanzania	Majunwa	Moderately Degraded and Least to Moderately Threatened	0.201
Tanzania	Runenke	Moderately Degraded and Least to Moderately Threatened	0.651
Tanzania	Itemuzi	Moderately Degraded and Least to Moderately Threatened	0.244
Tanzania	Lukando	Moderately Degraded and Least to Moderately Threatened	0.077
Tanzania	Izugwankoko	Moderately Degraded and Least to Moderately Threatened	0.037
Tanzania	Rubiso2	Moderately Degraded and Least to Moderately Threatened	0.027
Tanzania	Rubiso	Moderately Degraded and Least to Moderately Threatened	0.615
Tanzania	Nyamago	Moderately Degraded and Least to Moderately Threatened	0.065
Tanzania	Nansimo	Moderately Degraded and Least to Moderately Threatened	0.491
Tanzania	Chabuga	Moderately Degraded and Least to Moderately Threatened	0.130
Tanzania	Susi	Moderately Degraded and Least to Moderately Threatened	0.068
Tanzania	Luchili	Moderately Degraded and Least to Moderately Threatened	0.975
Tanzania	Lamadi	Moderately Degraded and Least to Moderately Threatened	2.955
Tanzania	Kamusoma Majita	Moderately Degraded and Least to Moderately Threatened	0.185
Tanzania	Luhorongoma	Moderately Degraded and Least to Moderately Threatened	0.347
Tanzania	Luhorongoma	Moderately Degraded and Least to Moderately Threatened	0.340
Tanzania	Magungu	Moderately Degraded and Least to Moderately Threatened	0.931
Tanzania	Ikondo	Moderately Degraded and Least to Moderately Threatened	0.080
Tanzania	Ikuza	Moderately Degraded and Least to Moderately Threatened	6.753
Tanzania	Kivumba	Moderately Degraded and Least to Moderately Threatened	1.287
Tanzania	Mazinga	Moderately Degraded and Least to Moderately Threatened	1.043
Tanzania	Iroba	Moderately Degraded and Least to Moderately Threatened	1.339
Tanzania	Iramba	Moderately Degraded and Least to Moderately Threatened	0.626
Tanzania	Kitua	Moderately Degraded and Least to Moderately Threatened	1.850
Tanzania	Bumbile	Moderately Degraded and Least to Moderately Threatened	11.475
Tanzania	Misuri Point	Moderately Degraded and Least to Moderately Threatened	0.036
Tanzania	Zilagula	Moderately Degraded and Least to Moderately Threatened	0.150
Tanzania	Kasaraji	Moderately Degraded and Least to Moderately Threatened	0.440
Tanzania	Gabuziwa	Moderately Degraded and Least to Moderately Threatened	0.099
Tanzania	Soswa	Moderately Degraded and Least to Moderately Threatened	0.680
Tanzania	Msalala	Moderately Degraded and Least to Moderately Threatened	1.247
Tanzania	Chakazimbwe	Moderately Degraded and Least to Moderately Threatened	0.066
Uganda	Nkogwe 1	Moderately Degraded and Least to Moderately Threatened	11.161
Uganda	Nakiza 2	Moderately Degraded and Least to Moderately Threatened	1.281
Uganda	Bukone 2	Moderately Degraded and Least to Moderately Threatened	3.273
Uganda	Kamera 2	Moderately Degraded and Least to Moderately Threatened	0.708
Uganda	Busiri 4	Moderately Degraded and Least to Moderately Threatened	0.771
Uganda	Busiri 1	Moderately Degraded and Least to Moderately Threatened	1.035
Uganda	Busiri 2	Moderately Degraded and Least to Moderately Threatened	2.590
Uganda	Yempaita	Moderately Degraded and Least to Moderately Threatened	2.761
Uganda	Sindiri	Moderately Degraded and Least to Moderately Threatened	0.577
Uganda	Bukone 1	Moderately Degraded and Least to Moderately Threatened	3.555
Uganda	Bukone 3	Moderately Degraded and Least to Moderately Threatened	0.424
Uganda	Kamera 1	Moderately Degraded and Least to Moderately Threatened	1.006

Country	Forest name	Sensitivity classes	Area in Km ²
Uganda	Kigona	Moderately Degraded and Least to Moderately Threatened	0.624
Uganda	Nimu 1	Moderately Degraded and Least to Moderately Threatened	8.715
Uganda	Kuzito 1	Moderately Degraded and Least to Moderately Threatened	9.534
Uganda	Lwaji	Moderately Degraded and Least to Moderately Threatened	4.687
Uganda	Bugalla 1	Moderately Degraded and Least to Moderately Threatened	13.287
Uganda	Bugalla 2	Moderately Degraded and Least to Moderately Threatened	1.214
Uganda	Bugalla 3	Moderately Degraded and Least to Moderately Threatened	27.921
Uganda	Bugalla 5	Moderately Degraded and Least to Moderately Threatened	22.780
Uganda	Bugalla 7	Moderately Degraded and Least to Moderately Threatened	10.531
Uganda	Bugalla 8	Moderately Degraded and Least to Moderately Threatened	3.988
Uganda	Mwola 1	Moderately Degraded and Least to Moderately Threatened	4.254
Uganda	Mwola 2	Moderately Degraded and Least to Moderately Threatened	0.284
Uganda	Kibanga 2	Moderately Degraded and Least to Moderately Threatened	0.938
Uganda	Nakiza 1	Moderately Degraded and Least to Moderately Threatened	17.629
Uganda	Luleka	Moderately Degraded and Least to Moderately Threatened	5.163
Uganda	Kisisita	Moderately Degraded and Least to Moderately Threatened	13.600
Uganda	Kisisita 2	Moderately Degraded and Least to Moderately Threatened	0.874
Uganda	Kisisita 3	Moderately Degraded and Least to Moderately Threatened	0.431
Uganda	Koko	Moderately Degraded and Least to Moderately Threatened	2.244
Uganda	Kafumbi	Moderately Degraded and Least to Moderately Threatened	1.867
Uganda	Bugaya	Moderately Degraded and Least to Moderately Threatened	6.488

Appendix VIII List of River mouths around Lake and their level of human disturbance (Sensitivity)

Country	Name of river Mouth	Sensitivity classes
Tanzania	Mirongo	Highly Degraded and Highly Threatened River Mouth
Kenya	Iditto	Highly Degraded and Least to Moderately Threatened River Mouth
Kenya	Ratieng	Highly Degraded and Least to Moderately Threatened River Mouth
Tanzania	Luchili	Highly Degraded and Least to Moderately Threatened River Mouth
Tanzania	Bukingo	Highly Degraded and Least to Moderately Threatened River Mouth
Tanzania	Kavivi	Highly Degraded and Least to Moderately Threatened River Mouth
Tanzania	Kaluokekele	Highly Degraded and Least to Moderately Threatened River Mouth
Tanzania	Chigoga	Highly Degraded and Least to Moderately Threatened River Mouth
Tanzania	Nisuiga	Highly Degraded and Least to Moderately Threatened River Mouth
Kenya	Samunyi	Least Degraded and Highly Threatened River Mouth
Tanzania	Rubana	Least Degraded and Highly Threatened River Mouth
Tanzania	Simiyu Magu Bay	Least Degraded and Highly Threatened River Mouth
Uganda	Kiryowa	Least Degraded and Highly Threatened River Mouth
Kenya	Yala	Least Degraded and Least to Moderately Threatened River Mouth
Kenya	Nzoia	Least Degraded and Least to Moderately Threatened River Mouth
Kenya	Sio	Least Degraded and Least to Moderately Threatened River Mouth
Kenya	Kibos/Nyamasaria	Least Degraded and Least to Moderately Threatened River Mouth
Kenya	Saka/Kogony/Nawa	Least Degraded and Least to Moderately Threatened River Mouth
Kenya	Lwanda	Least Degraded and Least to Moderately Threatened River Mouth
Kenya	Olambwe	Least Degraded and Least to Moderately Threatened River Mouth
Kenya	Nyando	Least Degraded and Least to Moderately Threatened River Mouth
Kenya	Kuja	Least Degraded and Least to Moderately Threatened River Mouth
Kenya	Oluch	Least Degraded and Least to Moderately Threatened River Mouth
Kenya	Sondu Miriu	Least Degraded and Least to Moderately Threatened River Mouth
Kenya	Awach Kendu	Least Degraded and Least to Moderately Threatened River Mouth
Kenya	Miho	Least Degraded and Least to Moderately Threatened River Mouth
Kenya	Kamgwa	Least Degraded and Least to Moderately Threatened River Mouth
Uganda	Kabere river	Least Degraded and Least to Moderately Threatened River Mouth
Uganda	Nakavule river	Least Degraded and Least to Moderately Threatened River Mouth
Uganda	Bunage	Least Degraded and Least to Moderately Threatened River Mouth
Uganda	Kafu river	Least Degraded and Least to Moderately Threatened River Mouth
Uganda	Busimo	Least Degraded and Least to Moderately Threatened River Mouth
Uganda	Kirongo	Least Degraded and Least to Moderately Threatened River Mouth
Uganda	Kayanja Kato	Least Degraded and Least to Moderately Threatened River Mouth
Uganda	Lwenge Idohwe	Least Degraded and Least to Moderately Threatened River Mouth
Uganda	Burundira	Least Degraded and Least to Moderately Threatened River Mouth
Uganda	Nakudi	Least Degraded and Least to Moderately Threatened River Mouth
Uganda	River Sio	Least Degraded and Least to Moderately Threatened River Mouth
Uganda	Hone	Least Degraded and Least to Moderately Threatened River Mouth
Uganda	Nalyoba river	Least Degraded and Least to Moderately Threatened River Mouth
Uganda	Bukola river	Least Degraded and Least to Moderately Threatened River Mouth
Tanzania	Lamadi	Moderately Degraded and Highly Threatened River Mouth
Tanzania	Ikungu	Moderately Degraded and Highly Threatened River Mouth
Tanzania	Mara	Moderately Degraded and Highly Threatened River Mouth
Tanzania	Suguti	Moderately Degraded and Highly Threatened River Mouth
Tanzania	Mori	Moderately Degraded and Highly Threatened River Mouth
Kenya	Kisian	Moderately Degraded and Least to Moderately Threatened River Mouth

Country	Name of river Mouth	Sensitivity classes
Kenya	Mugruk	Moderately Degraded and Least to Moderately Threatened River Mouth
Kenya	Awach	Moderately Degraded and Least to Moderately Threatened River Mouth
Kenya	Akech	Moderately Degraded and Least to Moderately Threatened River Mouth
Kenya	Odhedhe	Moderately Degraded and Least to Moderately Threatened River Mouth
Kenya	Nyandiwa	Moderately Degraded and Least to Moderately Threatened River Mouth
Kenya	Wasaki	Moderately Degraded and Least to Moderately Threatened River Mouth
Tanzania	Nyamirembe	Moderately Degraded and Least to Moderately Threatened River Mouth
Tanzania	Isanga	Moderately Degraded and Least to Moderately Threatened River Mouth
Tanzania	Nyashishi	Moderately Degraded and Least to Moderately Threatened River Mouth
Tanzania	Yerarumbo	Moderately Degraded and Least to Moderately Threatened River Mouth
Tanzania	Nungwe	Moderately Degraded and Least to Moderately Threatened River Mouth
Tanzania	Luhorongoma	Moderately Degraded and Least to Moderately Threatened River Mouth
Uganda	Kayanja Kato	Moderately Degraded and Least to Moderately Threatened River Mouth
Uganda	Katonga River	Moderately Degraded and Least to Moderately Threatened River Mouth
Uganda	Kigona river	Moderately Degraded and Least to Moderately Threatened River Mouth
Uganda	Ambacho	Moderately Degraded and Least to Moderately Threatened River Mouth
Uganda	Kagera river	Moderately Degraded and Least to Moderately Threatened River Mouth
Uganda	Muduzi river	Moderately Degraded and Least to Moderately Threatened River Mouth
Uganda	Namirembe river	Moderately Degraded and Least to Moderately Threatened River Mouth

Appendix IX List of Rocky outcrops ESAs in and around Lake Victoria and their level of human disturbance (Sensitivity)

Country	Name of Rocky outcrop	Sensitivity classes
Kenya	Uhanya outcrops	Highly Degraded and Highly Threatened
Kenya	Nyenye	Highly Degraded and Highly Threatened
Kenya	Sirongo	Highly Degraded and Highly Threatened
Kenya	Morache	Highly Degraded and Highly Threatened
Kenya	Nyatike I	Highly Degraded and Highly Threatened
Kenya	Sumba	Highly Degraded and Highly Threatened
Kenya	Wikwang	Highly Degraded and Highly Threatened
Tanzania	BISMACK	Highly Degraded and Highly Threatened
Tanzania	BWIRU POINT	Highly Degraded and Highly Threatened
Tanzania	CAPRI POINT	Highly Degraded and Highly Threatened
Tanzania	Rocks South of Mpum	Highly Degraded and Highly Threatened
Uganda	Mpigi	Highly Degraded and Highly Threatened
Uganda	Kamutenga Island (Highly Degraded and Highly Threatened
Uganda	Mutungo Outcrop	Highly Degraded and Highly Threatened
Uganda	Mutungo Outcrop	Highly Degraded and Highly Threatened
Kenya	Sirongo II	Highly Degraded and Least to Moderately Threatened
Kenya	Port Victoria	Highly Degraded and Least to Moderately Threatened
Kenya	Nachaila	Highly Degraded and Least to Moderately Threatened
Kenya	Gumba	Highly Degraded and Least to Moderately Threatened
Kenya	Sawiny	Highly Degraded and Least to Moderately Threatened
Kenya	Kit Rachar	Highly Degraded and Least to Moderately Threatened
Kenya	Rachar	Highly Degraded and Least to Moderately Threatened
Kenya	Ranundu	Highly Degraded and Least to Moderately Threatened
Tanzania	Bwiru rock	Highly Degraded and Least to Moderately Threatened
Tanzania	Mafunke Rocks	Highly Degraded and Least to Moderately Threatened
Tanzania	Galinizila Rocks	Highly Degraded and Least to Moderately Threatened
Tanzania	Bihiru South Rocks2	Highly Degraded and Least to Moderately Threatened
Tanzania	Bihiru South Rocks3	Highly Degraded and Least to Moderately Threatened
Tanzania	Bihiru South Rocks4	Highly Degraded and Least to Moderately Threatened
Uganda	Bububi	Highly Degraded and Least to Moderately Threatened
Uganda	Malinga	Highly Degraded and Least to Moderately Threatened
Uganda	Singa	Highly Degraded and Least to Moderately Threatened
Uganda	Buyanga	Highly Degraded and Least to Moderately Threatened
Uganda	Buyanga Hawaki	Highly Degraded and Least to Moderately Threatened
Uganda	Hawaki Bugoma	Highly Degraded and Least to Moderately Threatened
Uganda	Bugoma	Highly Degraded and Least to Moderately Threatened
Uganda	Nkombe	Highly Degraded and Least to Moderately Threatened
Uganda	Back of airstripe	Highly Degraded and Least to Moderately Threatened
Uganda		Highly Degraded and Least to Moderately Threatened
Uganda	Lwamunyi	Highly Degraded and Least to Moderately Threatened
Uganda	Near_Mpigi Outcrop	Highly Degraded and Least to Moderately Threatened
Uganda	Mutula (Opposite K	Highly Degraded and Least to Moderately Threatened
Uganda	Serinya Out Crop	Highly Degraded and Least to Moderately Threatened
Uganda	Kisima Outcrop	Highly Degraded and Least to Moderately Threatened
Kenya	Sirongo I	Least Degraded and Highly Threatened
Tanzania	NDARWA POINT	Least Degraded and Highly Threatened
Tanzania	Makobe Rocks	Least Degraded and Highly Threatened
Tanzania	Goziba Rock	Least Degraded and Highly Threatened

Country	Name of Rocky outcrop	Sensitivity classes
Tanzania	BUYAGO	Least Degraded and Least to Moderately Threatened
Tanzania	Mabibi Rock1	Least Degraded and Least to Moderately Threatened
Tanzania	Mabibi Rock2	Least Degraded and Least to Moderately Threatened
Tanzania	Mabibi Rock3	Least Degraded and Least to Moderately Threatened
Tanzania	Mabibi Rock5	Least Degraded and Least to Moderately Threatened
Tanzania	Ndarwa Rock	Least Degraded and Least to Moderately Threatened
Uganda	Muyobo	Least Degraded and Least to Moderately Threatened
Uganda	Danger	Least Degraded and Least to Moderately Threatened
Uganda	Waburungu	Least Degraded and Least to Moderately Threatened
Uganda	Bwembe/Kichori	Least Degraded and Least to Moderately Threatened
Uganda	Waluboro rocks (Ma	Least Degraded and Least to Moderately Threatened
Uganda	Lugaga	Least Degraded and Least to Moderately Threatened
Uganda	Nambewa	Least Degraded and Least to Moderately Threatened
Uganda	Madwa	Least Degraded and Least to Moderately Threatened
Uganda	Mbiru Buziba	Least Degraded and Least to Moderately Threatened
Uganda	Kizito	Least Degraded and Least to Moderately Threatened
Uganda	Fica outcrop Islan	Least Degraded and Least to Moderately Threatened
Uganda	Masoove	Least Degraded and Least to Moderately Threatened
Uganda	Sentwa Muto	Least Degraded and Least to Moderately Threatened
Uganda	Sentwa Bigger	Least Degraded and Least to Moderately Threatened
Uganda	Bigger Outcrop eas	Least Degraded and Least to Moderately Threatened
Uganda	Damba (Mala Outcro	Least Degraded and Least to Moderately Threatened
Uganda	Rwabana island (La	Least Degraded and Least to Moderately Threatened
Uganda	Musambwa island	Least Degraded and Least to Moderately Threatened
Kenya	Uhanya	Moderately Degraded and Highly Threatened
Kenya	Bondo I	Moderately Degraded and Highly Threatened
Kenya	Osieko	Moderately Degraded and Highly Threatened
Kenya	Gusa	Moderately Degraded and Highly Threatened
Kenya	Sirongo	Moderately Degraded and Highly Threatened
Kenya	Haurege	Moderately Degraded and Highly Threatened
Kenya	Amin Rock	Moderately Degraded and Highly Threatened
Kenya	Near Aneko	Moderately Degraded and Highly Threatened
Kenya	Pawrege	Moderately Degraded and Highly Threatened
Kenya	Sio	Moderately Degraded and Highly Threatened
Kenya	Nambudo	Moderately Degraded and Highly Threatened
Kenya	Sio	Moderately Degraded and Highly Threatened
Kenya	Nyalsis	Moderately Degraded and Highly Threatened
Kenya	Hongwe	Moderately Degraded and Highly Threatened
Kenya	Lwanda Kotieno II	Moderately Degraded and Highly Threatened
Kenya	Gull Rock	Moderately Degraded and Highly Threatened
Tanzania	Butimba north rocks	Moderately Degraded and Highly Threatened
Tanzania	Nyaburebeka Ukara I	Moderately Degraded and Highly Threatened
Tanzania	Ruti	Moderately Degraded and Highly Threatened
Uganda	Bwondha	Moderately Degraded and Highly Threatened
Uganda	Naguru Wakawaka	Moderately Degraded and Highly Threatened
Uganda	Namugongo	Moderately Degraded and Highly Threatened
Uganda	Goro (Lwalalo)	Moderately Degraded and Highly Threatened
Uganda	Bubeke island	Moderately Degraded and Highly Threatened
Uganda	Dimo rock	Moderately Degraded and Highly Threatened
Uganda	Nkose	Moderately Degraded and Highly Threatened
Uganda	Number emu	Moderately Degraded and Highly Threatened

Country	Name of Rocky outcrop	Sensitivity classes
Kenya	Utonga	Moderately Degraded and Least to Moderately Threatened
Kenya	Utonga	Moderately Degraded and Least to Moderately Threatened
Kenya	Ugambe	Moderately Degraded and Least to Moderately Threatened
Kenya	Mageta & Hama	Moderately Degraded and Least to Moderately Threatened
Kenya	Luorkana	Moderately Degraded and Least to Moderately Threatened
Kenya	Osope	Moderately Degraded and Least to Moderately Threatened
Kenya	Mageta & Hama	Moderately Degraded and Least to Moderately Threatened
Kenya	Mahanga	Moderately Degraded and Least to Moderately Threatened
Kenya	Mahanga beach	Moderately Degraded and Least to Moderately Threatened
Kenya	Jella Rock	Moderately Degraded and Least to Moderately Threatened
Kenya	Oyamo	Moderately Degraded and Least to Moderately Threatened
Kenya	Port Victoria	Moderately Degraded and Least to Moderately Threatened
Kenya	Bunyala I	Moderately Degraded and Least to Moderately Threatened
Kenya	Sio	Moderately Degraded and Least to Moderately Threatened
Kenya	Uchodha	Moderately Degraded and Least to Moderately Threatened
Kenya	Samasa	Moderately Degraded and Least to Moderately Threatened
Kenya	Kaloo	Moderately Degraded and Least to Moderately Threatened
Kenya	Kit Masa	Moderately Degraded and Least to Moderately Threatened
Kenya	Matare	Moderately Degraded and Least to Moderately Threatened
Kenya	Mbita I	Moderately Degraded and Least to Moderately Threatened
Kenya	Mbita II	Moderately Degraded and Least to Moderately Threatened
Kenya	Sukru	Moderately Degraded and Least to Moderately Threatened
Kenya	Tambasa	Moderately Degraded and Least to Moderately Threatened
Kenya	Gingra Rock	Moderately Degraded and Least to Moderately Threatened
Kenya	Lwanda Kotieno I	Moderately Degraded and Least to Moderately Threatened
Tanzania	Butimba South Rocks	Moderately Degraded and Least to Moderately Threatened
Tanzania	Nyegezi North Rocks	Moderately Degraded and Least to Moderately Threatened
Tanzania	Nyegezi South Rocks	Moderately Degraded and Least to Moderately Threatened
Tanzania	Ruti Rock 2	Moderately Degraded and Least to Moderately Threatened
Tanzania	Ruti Rock 1	Moderately Degraded and Least to Moderately Threatened
Tanzania	Mabibi Rock 4	Moderately Degraded and Least to Moderately Threatened
Tanzania	Rock of Juma Island	Moderately Degraded and Least to Moderately Threatened
Tanzania	Rocks North of Cham	Moderately Degraded and Least to Moderately Threatened
Tanzania	Bihiru South Rocks 1	Moderately Degraded and Least to Moderately Threatened
Tanzania	Bihiru North Rocks 1	Moderately Degraded and Least to Moderately Threatened
Tanzania	Bihiru North Rocks 2	Moderately Degraded and Least to Moderately Threatened
Tanzania	Miendere Rocks	Moderately Degraded and Least to Moderately Threatened
Tanzania	Mlole West Rocks 1	Moderately Degraded and Least to Moderately Threatened
Tanzania	Mlole West Rocks 2	Moderately Degraded and Least to Moderately Threatened
Tanzania	Kawaganga South Rock	Moderately Degraded and Least to Moderately Threatened
Tanzania	Rocks far North of	Moderately Degraded and Least to Moderately Threatened
Tanzania	Ikondo West Rocks	Moderately Degraded and Least to Moderately Threatened
Tanzania	Budili Point Rocks	Moderately Degraded and Least to Moderately Threatened
Tanzania	Chinu Rock	Moderately Degraded and Least to Moderately Threatened
Tanzania	Kinagi South East Rock	Moderately Degraded and Least to Moderately Threatened
Tanzania	Kinagi North West Rock	Moderately Degraded and Least to Moderately Threatened
Uganda	Wambogo	Moderately Degraded and Least to Moderately Threatened
Uganda		Moderately Degraded and Least to Moderately Threatened
Uganda	Malongo B Malong	Moderately Degraded and Least to Moderately Threatened
Uganda	Kayanja Masaka LS	Moderately Degraded and Least to Moderately Threatened
Uganda	Masaka Bay	Moderately Degraded and Least to Moderately Threatened

Country	Name of Rocky outcrop	Sensitivity classes
Uganda	Bugoma	Moderately Degraded and Least to Moderately Threatened
Uganda		Moderately Degraded and Least to Moderately Threatened
Uganda	Kabondo Bwagu	Moderately Degraded and Least to Moderately Threatened
Uganda	Nduwa	Moderately Degraded and Least to Moderately Threatened
Uganda	Kifurusi	Moderately Degraded and Least to Moderately Threatened
Uganda	Musubi Kitumbezi	Moderately Degraded and Least to Moderately Threatened
Uganda	Kitumbezi Nabyagi	Moderately Degraded and Least to Moderately Threatened
Uganda	Buyugu	Moderately Degraded and Least to Moderately Threatened
Uganda	Mpanga bay	Moderately Degraded and Least to Moderately Threatened
Uganda	Mpanga	Moderately Degraded and Least to Moderately Threatened
Uganda	Nabinyonyi	Moderately Degraded and Least to Moderately Threatened
Uganda	Matiko 2	Moderately Degraded and Least to Moderately Threatened
Uganda	Matiko 1	Moderately Degraded and Least to Moderately Threatened
Uganda	Chifunja	Moderately Degraded and Least to Moderately Threatened
Uganda	Musikimi	Moderately Degraded and Least to Moderately Threatened
Uganda	Bumeru A	Moderately Degraded and Least to Moderately Threatened
Uganda	Murwanda	Moderately Degraded and Least to Moderately Threatened
Uganda	Murwanda	Moderately Degraded and Least to Moderately Threatened
Uganda	Lubango	Moderately Degraded and Least to Moderately Threatened
Uganda		Moderately Degraded and Least to Moderately Threatened
Uganda	Murumbi	Moderately Degraded and Least to Moderately Threatened
Uganda	Lufudu Husiema	Moderately Degraded and Least to Moderately Threatened
Uganda	Bukana Simase	Moderately Degraded and Least to Moderately Threatened
Uganda	Mumbita	Moderately Degraded and Least to Moderately Threatened
Uganda	Buduma	Moderately Degraded and Least to Moderately Threatened
Uganda	Buyundo	Moderately Degraded and Least to Moderately Threatened
Uganda	Bugoma	Moderately Degraded and Least to Moderately Threatened
Uganda	Off Bugoma	Moderately Degraded and Least to Moderately Threatened
Uganda	Matolo	Moderately Degraded and Least to Moderately Threatened
Uganda	Bulosi	Moderately Degraded and Least to Moderately Threatened
Uganda		Moderately Degraded and Least to Moderately Threatened
Uganda	Lugala	Moderately Degraded and Least to Moderately Threatened
Uganda	Lugala	Moderately Degraded and Least to Moderately Threatened
Uganda		Moderately Degraded and Least to Moderately Threatened
Uganda	Nkuzi Island	Moderately Degraded and Least to Moderately Threatened
Uganda		Moderately Degraded and Least to Moderately Threatened
Uganda	North of Makusa Is	Moderately Degraded and Least to Moderately Threatened
Uganda	Kalungi	Moderately Degraded and Least to Moderately Threatened
Uganda	Luwafu	Moderately Degraded and Least to Moderately Threatened
Uganda	Next to Changu Lit	Moderately Degraded and Least to Moderately Threatened
Uganda	Changu Lite House	Moderately Degraded and Least to Moderately Threatened
Uganda	Kagolomolo	Moderately Degraded and Least to Moderately Threatened
Uganda	Kikoko 1	Moderately Degraded and Least to Moderately Threatened
Uganda	Kikoko II	Moderately Degraded and Least to Moderately Threatened
Uganda	Kikoko III	Moderately Degraded and Least to Moderately Threatened
Uganda	Kitufu	Moderately Degraded and Least to Moderately Threatened
Uganda	Close to Kavenyanj	Moderately Degraded and Least to Moderately Threatened
Uganda	Kakyanga	Moderately Degraded and Least to Moderately Threatened
Uganda	Mukulu	Moderately Degraded and Least to Moderately Threatened
Uganda	Near_Kamutenga Isl	Moderately Degraded and Least to Moderately Threatened
Uganda	Namilyango	Moderately Degraded and Least to Moderately Threatened

Country	Name of Rocky outcrop	Sensitivity classes
Uganda	Nsenyi (1) Bigger	Moderately Degraded and Least to Moderately Threatened
Uganda	Nsenyi (2)	Moderately Degraded and Least to Moderately Threatened
Uganda	Busabala (Mponerwa	Moderately Degraded and Least to Moderately Threatened
Uganda	Busabala (Mponerwa	Moderately Degraded and Least to Moderately Threatened
Uganda	Kairo 1	Moderately Degraded and Least to Moderately Threatened
Uganda	Kairo 2	Moderately Degraded and Least to Moderately Threatened
Uganda	Mukulu	Moderately Degraded and Least to Moderately Threatened
Uganda	Kumezza	Moderately Degraded and Least to Moderately Threatened
Uganda		Moderately Degraded and Least to Moderately Threatened
Uganda	Namawala	Moderately Degraded and Least to Moderately Threatened
Uganda	Large outcrop next	Moderately Degraded and Least to Moderately Threatened
Uganda	Small outcrop next	Moderately Degraded and Least to Moderately Threatened
Uganda		Moderately Degraded and Least to Moderately Threatened
Uganda		Moderately Degraded and Least to Moderately Threatened
Uganda	Muyibwe	Moderately Degraded and Least to Moderately Threatened
Uganda	Senyi Outcrops	Moderately Degraded and Least to Moderately Threatened
Uganda	Katene	Moderately Degraded and Least to Moderately Threatened
Uganda	Nalumuli	Moderately Degraded and Least to Moderately Threatened
Uganda	Sentwa Smaller	Moderately Degraded and Least to Moderately Threatened
Uganda	Outcrop nearest to	Moderately Degraded and Least to Moderately Threatened
Uganda	Smaller Outcrop ea	Moderately Degraded and Least to Moderately Threatened
Uganda	Lukalu Outcrop	Moderately Degraded and Least to Moderately Threatened
Uganda	Zigunga	Moderately Degraded and Least to Moderately Threatened
Uganda	Damba Outcrop 1	Moderately Degraded and Least to Moderately Threatened
Uganda	Damba Outcrop 2	Moderately Degraded and Least to Moderately Threatened
Uganda	Damba Outcrop 3	Moderately Degraded and Least to Moderately Threatened
Uganda	Damba (Nambu Outcr	Moderately Degraded and Least to Moderately Threatened
Uganda	Kome Outcrop	Moderately Degraded and Least to Moderately Threatened
Uganda	Zillu	Moderately Degraded and Least to Moderately Threatened
Uganda	Outcrop near Musen	Moderately Degraded and Least to Moderately Threatened

Appendix X List of Sub bays in and around Lake Victoria and level of human disturbance (sensitivity)

Country	Sub bay name	Sensitivity classes
Kenya	Kisumu	Highly Degraded and Highly Threatened
Tanzania	Musoma North Bay	Highly Degraded and Highly Threatened
Tanzania	Musoma South Bay	Highly Degraded and Highly Threatened
Tanzania	Kirumba Bay	Highly Degraded and Highly Threatened
Tanzania	Mwanza South Bay	Highly Degraded and Highly Threatened
Uganda	Luzira Portbell	Highly Degraded and Highly Threatened
Uganda	Mutungo 1	Highly Degraded and Highly Threatened
Uganda	Mutungo 2	Highly Degraded and Highly Threatened
Uganda	Kitubulu 1	Highly Degraded and Highly Threatened
Uganda	Kitubulu 2	Highly Degraded and Highly Threatened
Kenya	Luore	Highly Degraded and Least to Moderately Threatened
Kenya	Ugasu	Highly Degraded and Least to Moderately Threatened
Kenya	Obenge	Highly Degraded and Least to Moderately Threatened
Kenya	Osindo	Highly Degraded and Least to Moderately Threatened
Kenya	Misori	Highly Degraded and Least to Moderately Threatened
Kenya	Mayange	Highly Degraded and Least to Moderately Threatened
Kenya	Kopiata	Highly Degraded and Least to Moderately Threatened
Kenya	Kaloka	Highly Degraded and Least to Moderately Threatened
Kenya	Ogal	Highly Degraded and Least to Moderately Threatened
Kenya	Mawembe	Highly Degraded and Least to Moderately Threatened
Kenya	Rare	Highly Degraded and Least to Moderately Threatened
Kenya	Lambwe 2	Highly Degraded and Least to Moderately Threatened
Kenya	Rangwe	Highly Degraded and Least to Moderately Threatened
Kenya	Mungery	Highly Degraded and Least to Moderately Threatened
Kenya	Ngwena1	Highly Degraded and Least to Moderately Threatened
Kenya	Gudwa	Highly Degraded and Least to Moderately Threatened
Kenya	Naya	Highly Degraded and Least to Moderately Threatened
Kenya	Wikwang'	Highly Degraded and Least to Moderately Threatened
Kenya	Port Victoria	Highly Degraded and Least to Moderately Threatened
Kenya	Mwinane 2	Highly Degraded and Least to Moderately Threatened
Tanzania	Namaungu North Bay	Highly Degraded and Least to Moderately Threatened
Tanzania	Kavivi South Bay	Highly Degraded and Least to Moderately Threatened
Tanzania	Kavivi East Bay	Highly Degraded and Least to Moderately Threatened
Tanzania	Nungwe Entrance	Highly Degraded and Least to Moderately Threatened
Uganda	Busuyi	Highly Degraded and Least to Moderately Threatened
Kenya	Ruri	Least Degraded and Highly Threatened
Kenya	Usenge	Least Degraded and Highly Threatened
Tanzania	Mara River Entrance	Least Degraded and Highly Threatened
Tanzania	Mkuyuni Bay	Least Degraded and Highly Threatened
Uganda	Itome	Least Degraded and Highly Threatened
Uganda	Lutoboka	Least Degraded and Highly Threatened
Uganda	Bomangi	Least Degraded and Highly Threatened
Uganda	Fielding Bay	Least Degraded and Highly Threatened
Uganda	Tongolo	Least Degraded and Highly Threatened
Uganda	Kirinya	Least Degraded and Highly Threatened
Uganda	Masese	Least Degraded and Highly Threatened
Uganda	Kigaya	Least Degraded and Highly Threatened

Country	Sub bay name	Sensitivity classes
Uganda	Lutembe	Least Degraded and Highly Threatened
Uganda	Busisi	Least Degraded and Highly Threatened
Uganda	Kiwulwe	Least Degraded and Highly Threatened
Uganda	Kigga	Least Degraded and Highly Threatened
Kenya	Lwanda	Least Degraded and Least to Moderately Threatened
Kenya	Ndere 1	Least Degraded and Least to Moderately Threatened
Kenya	Ndere 2	Least Degraded and Least to Moderately Threatened
Kenya	Kendu Bay	Least Degraded and Least to Moderately Threatened
Kenya	Nyamonye 2	Least Degraded and Least to Moderately Threatened
Kenya	Nyamonye 5	Least Degraded and Least to Moderately Threatened
Kenya	Lambwe 1	Least Degraded and Least to Moderately Threatened
Kenya	Mirunda 2	Least Degraded and Least to Moderately Threatened
Kenya	Mirunda 3	Least Degraded and Least to Moderately Threatened
Kenya	Asembo	Least Degraded and Least to Moderately Threatened
Tanzania	Suguti Bay	Least Degraded and Least to Moderately Threatened
Tanzania	Rubafu Bay1	Least Degraded and Least to Moderately Threatened
Tanzania	Rubafu Bay2	Least Degraded and Least to Moderately Threatened
Tanzania	Itare Bay	Least Degraded and Least to Moderately Threatened
Tanzania	Yerarumbo North West Bay	Least Degraded and Least to Moderately Threatened
Tanzania	Yerarumbo South Bay	Least Degraded and Least to Moderately Threatened
Tanzania	Kasamwa Bay	Least Degraded and Least to Moderately Threatened
Tanzania	Busaka South Bay	Least Degraded and Least to Moderately Threatened
Tanzania	Chanika Bay	Least Degraded and Least to Moderately Threatened
Tanzania	Nyakararo Bay	Least Degraded and Least to Moderately Threatened
Tanzania	Miganiko Bay	Least Degraded and Least to Moderately Threatened
Tanzania	Luhorongoma Bay1	Least Degraded and Least to Moderately Threatened
Tanzania	Luhorongoma Bay2	Least Degraded and Least to Moderately Threatened
Tanzania	Bukingo Tip	Least Degraded and Least to Moderately Threatened
Tanzania	Bukense Bay	Least Degraded and Least to Moderately Threatened
Tanzania	Nyaruhwa Bay	Least Degraded and Least to Moderately Threatened
Tanzania	Isanga Bay	Least Degraded and Least to Moderately Threatened
Tanzania	Nadi Bay	Least Degraded and Least to Moderately Threatened
Tanzania	Stuhlmann Sound Bay Tip1	Least Degraded and Least to Moderately Threatened
Tanzania	Shinemba Bay	Least Degraded and Least to Moderately Threatened
Tanzania	Bulenda Bufwe Bay	Least Degraded and Least to Moderately Threatened
Tanzania	Kaluokeke Bay	Least Degraded and Least to Moderately Threatened
Tanzania	Rusoli Bay	Least Degraded and Least to Moderately Threatened
Tanzania	Baraki Bay	Least Degraded and Least to Moderately Threatened
Tanzania	Mori River Entrance	Least Degraded and Least to Moderately Threatened
Tanzania	Nyamisera1	Least Degraded and Least to Moderately Threatened
Tanzania	Nyamisera2	Least Degraded and Least to Moderately Threatened
Tanzania	Nyamisera3	Least Degraded and Least to Moderately Threatened
Tanzania	Nyamisera4	Least Degraded and Least to Moderately Threatened
Tanzania	Ishaka Bay	Least Degraded and Least to Moderately Threatened
Tanzania	Busangu Mubu Bay	Least Degraded and Least to Moderately Threatened
Tanzania	Inner Kiwano Bay	Least Degraded and Least to Moderately Threatened
Tanzania	Inner Kasenyi Bay	Least Degraded and Least to Moderately Threatened
Tanzania	Inner Ruiga Bay	Least Degraded and Least to Moderately Threatened
Tanzania	Inner Nyakatoke Bay	Least Degraded and Least to Moderately Threatened
Tanzania	North Grant Bay	Least Degraded and Least to Moderately Threatened
Tanzania	Hamkoko Bay	Least Degraded and Least to Moderately Threatened

Country	Sub bay name	Sensitivity classes
Tanzania	Baumann Gulf1	Least Degraded and Least to Moderately Threatened
Tanzania	Baumann Gulf2	Least Degraded and Least to Moderately Threatened
Tanzania	Baumann Gulf3	Least Degraded and Least to Moderately Threatened
Tanzania	Inner Ikungu Bay	Least Degraded and Least to Moderately Threatened
Tanzania	Duma Bay	Least Degraded and Least to Moderately Threatened
Tanzania	Nyashishi Entrance	Least Degraded and Least to Moderately Threatened
Tanzania	Stuhlmann Sound Bay Tip2	Least Degraded and Least to Moderately Threatened
Tanzania	Ng'walogwabagole	Least Degraded and Least to Moderately Threatened
Tanzania	Sumi Bay	Least Degraded and Least to Moderately Threatened
Tanzania	Isanga River Entrance	Least Degraded and Least to Moderately Threatened
Tanzania	Buyago Bay	Least Degraded and Least to Moderately Threatened
Tanzania	Kanaga Bay	Least Degraded and Least to Moderately Threatened
Tanzania	Kivula Bay	Least Degraded and Least to Moderately Threatened
Tanzania	Muranda Bay3	Least Degraded and Least to Moderately Threatened
Tanzania	Muranda Bay2	Least Degraded and Least to Moderately Threatened
Tanzania	Muranda Bay1	Least Degraded and Least to Moderately Threatened
Tanzania	Mashoro North Bay	Least Degraded and Least to Moderately Threatened
Tanzania	Mashoro South Bay	Least Degraded and Least to Moderately Threatened
Tanzania	Kissenda South Bay	Least Degraded and Least to Moderately Threatened
Tanzania	Nungwe Tip1	Least Degraded and Least to Moderately Threatened
Tanzania	Nungwe Tip2	Least Degraded and Least to Moderately Threatened
Tanzania	Nungwe Tip3	Least Degraded and Least to Moderately Threatened
Tanzania	Busaka North Bay	Least Degraded and Least to Moderately Threatened
Uganda	Koja	Least Degraded and Least to Moderately Threatened
Uganda	Bukali	Least Degraded and Least to Moderately Threatened
Uganda	Bukabale	Least Degraded and Least to Moderately Threatened
Uganda	Ssese	Least Degraded and Least to Moderately Threatened
Uganda	Buwoya	Least Degraded and Least to Moderately Threatened
Uganda	Mawanga	Least Degraded and Least to Moderately Threatened
Uganda	Busi	Least Degraded and Least to Moderately Threatened
Uganda	Buyiri	Least Degraded and Least to Moderately Threatened
Uganda	Bidco 3	Least Degraded and Least to Moderately Threatened
Uganda	Bidco 1	Least Degraded and Least to Moderately Threatened
Uganda	Bidco 2	Least Degraded and Least to Moderately Threatened
Uganda	Majanji	Least Degraded and Least to Moderately Threatened
Uganda	Nalyoba	Least Degraded and Least to Moderately Threatened
Uganda	Busiro	Least Degraded and Least to Moderately Threatened
Uganda	Naguru Siniguna	Least Degraded and Least to Moderately Threatened
Uganda	Kitumbezi	Least Degraded and Least to Moderately Threatened
Uganda	Bugoto 1	Least Degraded and Least to Moderately Threatened
Uganda	Buyengo	Least Degraded and Least to Moderately Threatened
Uganda	Bwembe/Kichori	Least Degraded and Least to Moderately Threatened
Uganda	Masaka	Least Degraded and Least to Moderately Threatened
Uganda	Lwanika	Least Degraded and Least to Moderately Threatened
Uganda	Walumbe	Least Degraded and Least to Moderately Threatened
Uganda	Wind Bay	Least Degraded and Least to Moderately Threatened
Uganda	Kasirye	Least Degraded and Least to Moderately Threatened
Uganda	Bukafu	Least Degraded and Least to Moderately Threatened
Uganda	Gobero 2	Least Degraded and Least to Moderately Threatened
Uganda	Kisare 1	Least Degraded and Least to Moderately Threatened
Uganda	Gobero 1	Least Degraded and Least to Moderately Threatened

Country	Sub bay name	Sensitivity classes
Uganda	Kisare 2	Least Degraded and Least to Moderately Threatened
Uganda	Nkone	Least Degraded and Least to Moderately Threatened
Uganda	Miti	Least Degraded and Least to Moderately Threatened
Uganda	Namirembe	Least Degraded and Least to Moderately Threatened
Uganda	Nakkiga 3	Least Degraded and Least to Moderately Threatened
Uganda	Nakkiga 2	Least Degraded and Least to Moderately Threatened
Uganda	Sango Bay	Least Degraded and Least to Moderately Threatened
Uganda	Lugaga	Least Degraded and Least to Moderately Threatened
Uganda	Bugali 1	Least Degraded and Least to Moderately Threatened
Uganda	Bugali 2	Least Degraded and Least to Moderately Threatened
Uganda	Burundira	Least Degraded and Least to Moderately Threatened
Uganda	Bukoba	Least Degraded and Least to Moderately Threatened
Uganda	Namadhi	Least Degraded and Least to Moderately Threatened
Uganda	Namavundu	Least Degraded and Least to Moderately Threatened
Uganda	Ekunu 1	Least Degraded and Least to Moderately Threatened
Uganda	Ekunu 2	Least Degraded and Least to Moderately Threatened
Uganda	Buluba	Least Degraded and Least to Moderately Threatened
Uganda	Kijjiko	Least Degraded and Least to Moderately Threatened
Uganda	Nsonga	Least Degraded and Least to Moderately Threatened
Uganda	Lunkuru	Least Degraded and Least to Moderately Threatened
Uganda	Kabwo	Least Degraded and Least to Moderately Threatened
Uganda	Banga	Least Degraded and Least to Moderately Threatened
Uganda	Kaggolube	Least Degraded and Least to Moderately Threatened
Uganda	Balabala	Least Degraded and Least to Moderately Threatened
Uganda	Buyiga	Least Degraded and Least to Moderately Threatened
Uganda	Nakkiga 1	Least Degraded and Least to Moderately Threatened
Kenya	Kaksingri	Moderately Degraded and Highly Threatened
Uganda	Waya	Moderately Degraded and Highly Threatened
Kenya	Mulundu	Moderately Degraded and Least to Moderately Threatened
Kenya	Nyawalongo	Moderately Degraded and Least to Moderately Threatened
Kenya	Nyamonye 1	Moderately Degraded and Least to Moderately Threatened
Kenya	Nyamonye 3	Moderately Degraded and Least to Moderately Threatened
Kenya	Nyamonye 4	Moderately Degraded and Least to Moderately Threatened
Kenya	Wagusu	Moderately Degraded and Least to Moderately Threatened
Kenya	Kogoye	Moderately Degraded and Least to Moderately Threatened
Kenya	Usigu	Moderately Degraded and Least to Moderately Threatened
Kenya	Openji	Moderately Degraded and Least to Moderately Threatened
Kenya	Ngegu	Moderately Degraded and Least to Moderately Threatened
Kenya	Mirunda 1	Moderately Degraded and Least to Moderately Threatened
Kenya	Karungu	Moderately Degraded and Least to Moderately Threatened
Kenya	Sori	Moderately Degraded and Least to Moderately Threatened
Kenya	Ngwena 2	Moderately Degraded and Least to Moderately Threatened
Kenya	Mwinane 1	Moderately Degraded and Least to Moderately Threatened
Kenya	Nyamarwaka	Moderately Degraded and Least to Moderately Threatened
Kenya	Nyando	Moderately Degraded and Least to Moderately Threatened
Kenya	Osodo	Moderately Degraded and Least to Moderately Threatened
Kenya	Matara	Moderately Degraded and Least to Moderately Threatened
Kenya	Muhuru 1	Moderately Degraded and Least to Moderately Threatened
Kenya	Muhuru 2	Moderately Degraded and Least to Moderately Threatened
Kenya	Muhuru 3	Moderately Degraded and Least to Moderately Threatened
Tanzania	Bumbire Bay 1	Moderately Degraded and Least to Moderately Threatened

Country	Sub bay name	Sensitivity classes
Tanzania	Bumbire Bay 2	Moderately Degraded and Least to Moderately Threatened
Tanzania	Bumbire Bay 3	Moderately Degraded and Least to Moderately Threatened
Tanzania	Budili Bay	Moderately Degraded and Least to Moderately Threatened
Tanzania	Muranga Bay	Moderately Degraded and Least to Moderately Threatened
Tanzania	Katoma Bay	Moderately Degraded and Least to Moderately Threatened
Tanzania	Luchili West Bay	Moderately Degraded and Least to Moderately Threatened
Tanzania	Luanso Bay2	Moderately Degraded and Least to Moderately Threatened
Tanzania	Simiyu Entrance	Moderately Degraded and Least to Moderately Threatened
Tanzania	Ikungu South Bay	Moderately Degraded and Least to Moderately Threatened
Tanzania	Kinesi Bay	Moderately Degraded and Least to Moderately Threatened
Tanzania	Bwari Bay	Moderately Degraded and Least to Moderately Threatened
Tanzania	Inner Rubondo Bay	Moderately Degraded and Least to Moderately Threatened
Tanzania	Inner Ishozi Bay	Moderately Degraded and Least to Moderately Threatened
Tanzania	Rubafu Bay3	Moderately Degraded and Least to Moderately Threatened
Tanzania	Rubafu Bay4	Moderately Degraded and Least to Moderately Threatened
Tanzania	Inner Masonga Bay1	Moderately Degraded and Least to Moderately Threatened
Tanzania	Inner Masonga Bay2	Moderately Degraded and Least to Moderately Threatened
Tanzania	Luanso Bay1	Moderately Degraded and Least to Moderately Threatened
Tanzania	Mitego Bay	Moderately Degraded and Least to Moderately Threatened
Tanzania	Kissenda North West Bay1	Moderately Degraded and Least to Moderately Threatened
Tanzania	Kissenda North West Bay2	Moderately Degraded and Least to Moderately Threatened
Tanzania	Kavivi West Bay	Moderately Degraded and Least to Moderately Threatened
Tanzania	Bukingo South Bay	Moderately Degraded and Least to Moderately Threatened
Tanzania	Yerarumbo North East Bay	Moderately Degraded and Least to Moderately Threatened
Uganda	Lugala	Moderately Degraded and Least to Moderately Threatened
Uganda	Bugoto 2	Moderately Degraded and Least to Moderately Threatened
Uganda	Kisumu Kubwa	Moderately Degraded and Least to Moderately Threatened
Uganda	Bufumbe	Moderately Degraded and Least to Moderately Threatened
Uganda	Mengo	Moderately Degraded and Least to Moderately Threatened
Uganda	Katebo	Moderately Degraded and Least to Moderately Threatened
Uganda	Bumero	Moderately Degraded and Least to Moderately Threatened
Uganda	Nakija	Moderately Degraded and Least to Moderately Threatened
Uganda	Lwanjaba 2	Moderately Degraded and Least to Moderately Threatened
Uganda	Lwanjaba 1	Moderately Degraded and Least to Moderately Threatened
Tanzania	Mkuyuni Bay	Moderately Degraded and Least to Moderately Threatened

Appendix X I. List of major transport routes in Lake Victoria

No.	Water transport routes
1	Bukoba to Nungwe
2	Buchenzi to Bukoba
3	Jinja to Mwanza via Roseberry Channel
4	Kisumu to Bukoba
5	Musoma to Bukoba
6	Musoma to Kisumu
7	Musoma to Mwanza
8	Mwanza to Nungwe
9	Mwanza to Nyamirembe
10	Mwanza to Buchenzi
11	Mwanza to Bukoba
12	Mwanza to Jinja via Galinzira Channel
13	Mwanza to Kisumu
14	Mwanza to Solima Point
15	Solima Point to Kunene
16	Kisumu to Jinja
17	Kisumu to Portbell
18	Mwanza to Portbell
19	Entebbe to Kalangala
20	Bukakata to Bugoma
21	Kisumu to Kindubay
22	Kendubay to Homabay
23	Homabay to Mbita
24	Mbita to Luanda Kotieno
25	Mbita to Sena
26	Sena to Karungu
27	Karungu to Muhuru
28	Kiyindi to Buvuma
29	Sena to Port Victoria
30	Port Victoria to Jinja
31	Kigongo to Busisi
32	Mwanza North to Kamanga
33	Homabay to Asembo
34	Asembo to Kisumu
35	Mwanza to Nansio
36	Kisorya to Ukerewe
37	Mwanza to Kome
38	Chato to Maisome

Appendix XII List of Water abstraction and disposal points

Water abstraction points in Lake Victoria

Country	District	Name of Water abstraction point	Latitude	Longitude
Tanzania	Bukoba Urban	Pump House	1.346310	31.815910
Tanzania	Bunda	Kasahunga	2.147922	33.513093
Tanzania	Magu	Ilungu Magu	2.507190	33.380391
Tanzania	Musoma	Nyarusurya Musoma	1.511280	33.823421
Tanzania	Nyamagana	Capri Point	2.506774	32.887144
Tanzania	Sengerema	Luchili	2.531206	32.518024
Tanzania	Ukerewe	Nansio	2.103797	33.093864
Uganda	Kampala	Uganda Breweries Ltd Luzira	0.290350	32.652470
Uganda	Kampala	Nakivubo Channel Mouth	0.287740	32.638840
Uganda	Jinja	Kirinya sewage outlet	0.418160	33.222200

Wastewater disposal points in Lake Victoria

Country	District	Name of Wastewater Point	Latitude	Longitude
Kenya	Homabay	Homabay Discharge	0.519730	34.46159
Kenya	Kisumu West	Molasses	0.093230	34.70089
Kenya	Kisumu West	Kisat Discharge	0.085430	34.74917
Kenya	Kisumu West	Hippo Point	0.123930	34.74354
Tanzania	Bukoba Urban	Kanoni	1.332836	31.823240
Tanzania	Ilemela	Butuja	2.450020	32.906086

