

**Worldwide
Data Collection Survey on Mainstreaming of
Integrated Lake Basin Management (ILBM) in
Eastern Africa**

Work Completion Report

February 2026

Japan International Cooperation Agency (JICA)

JIN Corporation

GE
JR
26-058

Photos (in Kenya)



Meeting with KFS



Meeting with the Ministry of Environment, Climate Change and Forestry



Meeting with Lake Victoria South Water Resources Authority



Meeting with Bomet County Government



Meeting with KFS Narok



Meeting with KWS Narok



Fences surrounding Mau Forest



Residents carrying back grass cut in Mau Forest

Photos (in Tanzania)



Meeting with EAC



Meeting with LVBWB



Meeting with Butiama District Council



Meeting with the Ministry of Water



Meeting with UNESCO Dar es Salaam Office



Meeting with the Water Institute

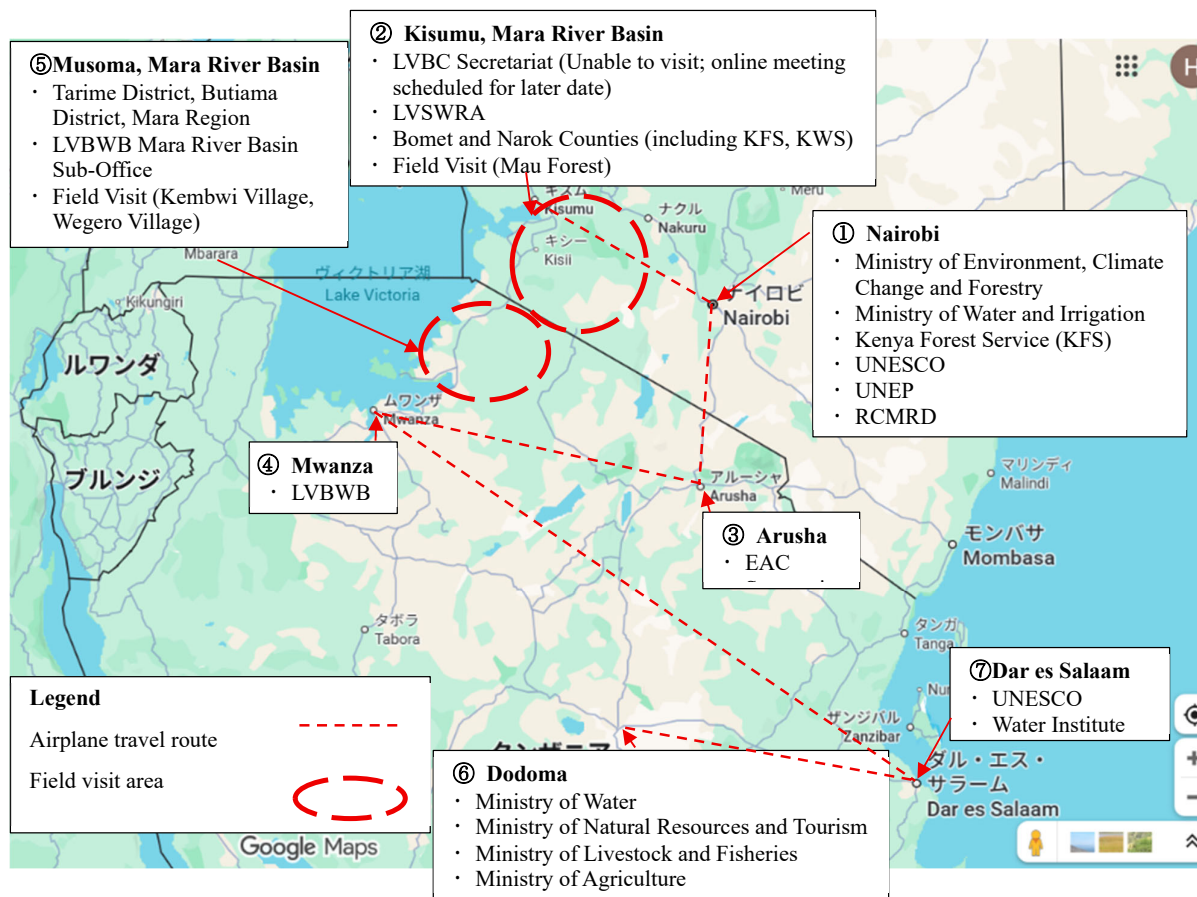


Water hyacinth (*Eichhornia crassipes*) thriving along the wetland (Kembwi Village)

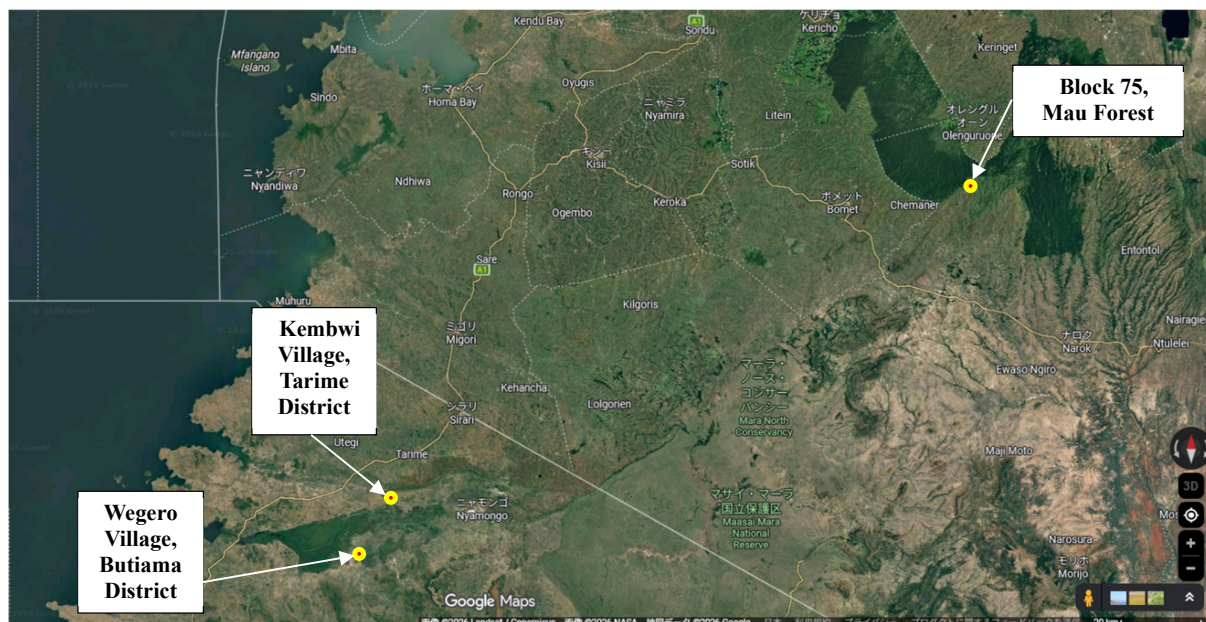


Interview with villagers in Wegero Village

Target Site Map



Survey and Field Visit Locations



Field Visit Locations

List of Abbreviations

Abbreviation	Definition
ACC-LVB	Adapting to Climate Change in the Lake Victoria Basin
ALBATROSS	Advancing Knowledge for Long-Term Benefits and Climate Adaptation Through Holistic Climate Services and Nature-Based Solutions
ASDP	Agricultural Sector Development Programme
AWARE	Action on Water Adaptation and Resilience Initiative
BES-Net	Biodiversity and Ecosystem Services Networks
BMU	Beach Management Unit
BR	Biosphere Reserve
BWB	Basin Water Board
CBD	Convention on Biological Diversity
CFA	Community Forest Association
CMU	Community Management Unit
COP	Country of Parties
CRIDA	Climate Risks Informed Decision Analysis
CSA	Climate Smart Agriculture
DADP	District Agricultural Development Plan
DALFO	District Agriculture, Livestock, and Fisheries Officer
DC	District Council
DED	District Executive Director
DFO	District Fisheries Office
EAC	East African Community
EMU	Environmental Management Unit
EU	European Union
EU-AITF	EU-Africa Infrastructure Trust Fund
FFS	Farmer Field School
GCF	Green Climate Fund
GEF	Global Environmental Facility
GIS	Geographic Information System
GPS	Global Positioning System
ICT	Information and Communication Technology
IGOs	Inter-Governmental Organizations
IHP	Intergovernmental Hydrological Program
ILBM	Integrated Lake Basin Management
ILEC	International Lake Environment Committee Foundation
ILLBM	Integrated Lentic-Lotic Basin Management
IPCC	Intergovernmental Panel on Climate Change
IWRM	Integrated Water Resources Management
JICA	Japan International Cooperation Agency
JIC	Joint Implementing Committee
JSC	Joint Steering Committee
JTC	Joint Technical Committee
KFS	Kenya Forest Service
KfW	Kreditanstalt für Wiederaufbau
KNATCOM	Kenya National Commission for UNESCO
KWS	Kenya Wildlife Service
LGA	Local Government Authority
LVBC	Lake Victoria Basin Commission
LVBWB	Lake Victoria Basin Water Board
LVEMP	Lake Victoria Environmental Management Project
LVSWRA	Lake Victoria South Water Resources Authority
MAB	Man and the Biosphere

Abbreviation	Definition
MFC-ICLIP	Mau Forest Complex Integrated Conservation and Livelihood Improvement Programme
MOU	Memorandum of Understanding
NBI	Nile Basin Initiative
NBSAP	National Biodiversity Strategies and Action Plan
NDC	Nationally Determined Contribution
NELSAP	Nile Equatorial Lakes Subsidiary Action Program
NEMC	National Environmental Management Council
NGO	Non-Governmental Organization
NORAD	Norwegian Agency for Development Cooperation
PAFO	Principal Agricultural Field Officer
PDM	Project Design Matrix
PELIS	Plantation Establishment and Livelihood Improvement Scheme
RAS	Regional Administrative Secretary
RCMRD	Regional Centre for Mapping of Resources for Development
SDGs	Sustainable Development Goals
SIDA	Swedish International Development Cooperation Agency
TBR	Transboundary Biosphere Reserve
TECREAP	Transboundary Ecosystem-based Climate Resilience and Disaster Risk Reduction in Eastern Africa Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
VLUP	Village Land Use Planning
WDPCA	World Database on Protected and Conserved Areas
WI	Water Institute
WLC	World Lake Conference
WRUA	Water Resource Users Association
WUA	Water Users Association

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1. Overview

1.1. Background

1.1.1. Current Status and Challenges in Environmental, Social, and Economic Aspects of Lake Basin Management in Lake Victoria

Lake Victoria spans three countries: Kenya, Tanzania, and Uganda, and its basin extends to Rwanda and Burundi. The lake's water resources and fisheries resources are indispensable for securing the livelihoods, food, and income of local residents, and its basin is also a valuable area used to secure food, water, and energy and for transportation. On the other hand, adverse impacts of human activities have been confirmed, such as soil runoff caused by deforestation in upstream areas, runoff of agricultural chemicals used in farming, and the dumping of wastewater and waste generated from daily life and agro-industry, resulting in eutrophication of the lake, abnormal outbreaks of algae, and abnormal proliferation of an aquatic plant called water hyacinth (*Eichhornia crassipes*).

In addition, for example, in the Kagera River Basin spanning four countries—Tanzania, Uganda, Rwanda, and Burundi—human activities such as not only soil runoff due to forest loss but also land degradation and declining agricultural productivity due to traditional farming methods and population increase, and water shortages due to overuse of wetlands, led to environmental degradation, resulting in declining productivity, water scarcity, and ultimately pushing residents into poverty as a result. Furthermore, in the lake, environmental problems have also occurred, such as the crisis of extinction and mass mortality of native species due to the introduction of an alien species called Nile perch and overfishing, and pollution by lead, mercury, and others.

In addition, various diseases considered to originate from environmental deterioration have become serious, and access to clean water has been significantly restricted, affecting the social aspects of residents' lives; moreover, although most people engaged in fisheries on the lake are small-scale fishers, fisheries resources have greatly decreased to drive many fishers into poverty, showing impacts also on the economic aspects. In this manner, the lake, including its basin, has provided various benefits to residents; however, due to human activities such as excessive use of natural resources including forests and wetlands in the basin and inappropriate wastewater and waste treatment, the environment of the lake and its basin has deteriorated, and this has adversely affected the social and economic aspects of local residents.

1.1.2. Past Initiatives Related to Lake Basin Management

The International Lake Environment Committee Foundation (ILEC), established in 1986, has contributed to the promotion of lake environmental management in various forms, including conducting lake surveys around the world, organizing research seminars and training programs on lake environmental management, and providing support and cooperation for the World Lake Conference.

The training programs implemented by ILEC include the philosophy (see Box 1) and practice of Integrated Lake Basin Management (ILBM), administrative initiatives using Lake Biwa as a case study, environmental management technologies such as water quality improvement and monitoring, environmental education, and waste management.

As characteristics of ILBM, four principles are identified¹:

- (1) It targets a combination of lentic (standing water) and lotic (flowing water) systems;
- (2) Because it is standing water, once it deteriorates, recovery is slow and it is difficult to return to its original state;
- (3) Among ecosystem services, not only provisioning services but also regulating services are extremely important; and
- (4) The continuous improvement of the ILBM governance framework described by the six pillars of "Institutions," "Policies," "Participation," "Technology," "Information," and "Finance."

¹ <https://ilec.or.jp/ILBMTrainingMaterials/wp-content/uploads/Nakamura1.pdf>

When considering this ILBM in the context of the conservation and management of international lakes such as Lake Victoria, it is necessary to address the above four principles while strengthening collaboration among the related countries that share the lake basin.

With regard to this lake, in the course of such collaboration, the East African Community (EAC), a regional inter-governmental organization (IGOs) composed of eight countries, is expected to play an important role.

Box 1. Integrated Lake Basin Management (ILBM)

As an advanced form of Integrated Water Resources Management (IWRM), Integrated Lake Basin Management (ILBM) is an approach that does not focus solely on water as a water resource, but **also looks toward environmental improvement**, including water supply and utilization, thereby leading to sustainable integrated lake basin management and water resource management.

As the principles of ILBM, the following four points are identified²:

- (1) To target a combination of lentic (standing water) and lotic (flowing water):** A lake basin is composed of a combination of standing water and flowing water, and the basin itself consists of Micro, Meso, and Macro scales; however, at the global level, 90% of surface water exists in a standing-water state. For this reason, it is necessary to consider not only rivers (flowing water) but also lakes and ponds (standing water), including small ones.
- (2) Because it is standing water, once it deteriorates, recovery is slow and it does not return to its original state:** Standing water is affected by various surrounding environmental factors, and because it is standing water, the retention time is long and it takes time for problems to manifest; therefore, problems gradually progress without being noticed, and because various environmental influences react in a complex and intertwined manner, prediction and control are difficult.
- (3) Among ecosystem services, not only provisioning services but also regulating services are extremely important:** There are four types of ecosystem services: “provisioning services” (functions that supply resources that can be directly obtained, such as food, water, timber, etc.), “regulating services” (functions that stabilize the environment, such as climate regulation, prevention of natural disasters, and water purification), “cultural services” (functions that provide culture and spiritual well-being, such as recreation, landscape, and spiritual fulfillment), and “supporting services” (functions that support other services, such as photosynthesis, nutrient and water cycles, and soil formation; also referred to as “habitat services”). Among these, provisioning services tend to be easily recognized by people and therefore highly valued; however, excessive extraction of resources leads to the degradation of other services, and the other services that people had previously enjoyed as a matter of course can no longer be received.
- (4) Continuous improvement of the ILBM governance framework described by the six pillars of “Institutions,” “Policy,” “Participation,” “Technology,” “Information,” and “Finance”:** Because various sectors are involved, and not only water but also environmental elements such as land and air are affected, and various policies and programs are intertwined, it is necessary to undertake initiatives based on the above six pillars and to conduct adaptive management by adjusting the content of the initiatives while monitoring the results of those initiatives.

² <https://ilec.or.jp/ILBMTrainingMaterials/wp-content/uploads/Nakamura1.pdf>

EAC recognizes that, for the conservation of ecosystems and species that extend across national borders, it is necessary to establish mechanisms that enable cooperation and collaboration among neighboring countries and to address such issues at the regional level. To this end, it is undertaking capacity strengthening efforts. This approach is also consistent with the “regional approach,” which has emerged under the Convention on Biological Diversity (CBD) as a global trend aimed at strengthening initiatives at the level of each region of the world. As a specialized institution of the EAC established in 2003 to address, in an integrated manner, environmental, social, and economic challenges in five countries including Lake Victoria and its basin, the Lake Victoria Basin Commission (LVBC) was created.

Furthermore, ILBM requires zoning measures such as land use planning. In order to undertake zoning, spatial information analysis using Geographic Information Systems (GIS) and related tools is useful. For capacity strengthening in this regard, the Regional Centre for Mapping of Resources for Development (RCMRD), which has been designated by the CBD as a regional capacity development hub, can be utilized. RCMRD is an IGO established in 1975, and currently 20 countries in Eastern and Southern Africa are members. Kenya, Tanzania, and Uganda have been member states since its establishment. RCMRD provides services including the management and dissemination of geospatial data, capacity development and training related to geospatial technologies and ICT, and land-related survey services. In addition, the Ramsar Convention, which promotes the conservation and wise use of wetlands, is also expected to contribute to ILBM by leveraging its knowledge, experience, and networks.

Moreover, JICA has jointly implemented training programs related to ILBM with ILEC since 1989. As of November 2024, more than half of ILEC’s 577 trainees from 74 countries are JICA trainees. The initiatives of other donors are as follows.

Table 1 Initiatives by Other Donors for Integrated Lake Basin Management in the Lake Victoria Basin

Donor	Project Name	Details
World Bank	Lake Victoria Environmental Management Project (LVEMP) I: 1996-2005 II: 2009-2017	Provided information to improve lake ecosystem management, established a tripartite cooperative management mechanism, identified and tested practical and sustainable solutions, and implemented capacity building. While exploring solutions to specific environmental issues in 14 pilot areas, efforts were also made to strengthen cooperation among the three countries.
World Bank, SIDA, NORAD	Kagera River Basin Management Project (2005-2012: Preparation, 2013-2017: Implementation)	Under the objective of establishing a sustainable cooperative framework for the joint management of water resources in the Kagera River Basin among four countries and improving the living environment of residents while conserving the environment, the project developed an information database, a basin development plan, and a water allocation model; constructed multipurpose water infrastructure in various locations; and implemented capacity strengthening.
EU	EU-Africa Infrastructure Trust Fund (EU-AITF) (2007-2019)	Established in 2007, the EU-AITF focuses on infrastructure development in four sectors—water, energy, transport, and ICT—in Sub-Saharan Africa. In the Lake Victoria basin, it implemented projects with AFD and others to improve water supply, wastewater treatment, sanitation, and capacity building in Mwanza, Kisumu, Kampala, and other locations.
EU, KfW	Lake Victoria Basin Integrated Water Resources Management Programme (2020-2026)	Aims to improve water quality and accessibility while reducing pollution in the basin through Integrated Water Resources Management (IWRM) at the regional level. Activities include establishing an IWRM unit within the LVBC, developing a water information system and its use in policy-making, constructing wastewater treatment facilities in member countries, strengthening the capacity of relevant institutions, and conducting sanitation awareness campaigns for residents.

Global Environmental Facility (GEF), World Bank	Transboundary Diagnostic Analysis & Strategic Action Program Development for the Lake Victoria Basin (2004-2008)	Targeting five Lake Victoria basin countries, this program diagnosed and analyzed transboundary environmental issues such as fisheries, water hyacinth, biodiversity, hazardous substances, algae, and land use. It synthesized existing scientific information obtained from the World Bank's LVEMP (mentioned above) and developed a joint strategic action program to address environmental problems and poverty reduction by promoting sustainable economic growth. This harmonized policies among basin countries and established an integrated management framework for the entire transboundary basin.
UNEP	Adapting to Climate Change in Lake Victoria Basin (ACC-LVB) (2018-2023)	Implemented various initiatives at the regional or community level to strengthen climate change resilience in the Lake Victoria basin. The following were achieved: 1) Strengthening institutional and technical capacity to integrate climate change resilience into transboundary water basin management; 2) Improving the ability to provide accurate and timely climate information to regional or national policymakers, technical experts, and local communities; 3) Transferring climate change adaptation technologies to reduce local community vulnerability; 4) Enhancing regional resilience through innovative community-participatory projects; 5) Improvement of the knowledge management framework for collecting and maintaining knowledge on transboundary water basin management and climate change adaptation initiatives.

In this manner, various donors, including JICA, have undertaken initiatives in lake basins to sustainably utilize shared natural resources among multiple countries by managing the impacts of human activities on those lake basins while making use of such shared resources. Shared resources are utilized by various sectors, including fisheries, agriculture, and daily life; however, the management of such utilization and its impacts cannot be completed within a single country alone, and therefore coordination among multiple countries sharing the resources is required.

Nevertheless, there are many situations in which coordination solely among the concerned parties is difficult. Accordingly, it is essential to undertake comprehensive initiatives and their associated support and coordination, such as establishing coordination frameworks with the involvement of various international organizations and IGOs, and introducing diverse technologies and knowledge to address issues within individual sectors or across sectors (see figure below).

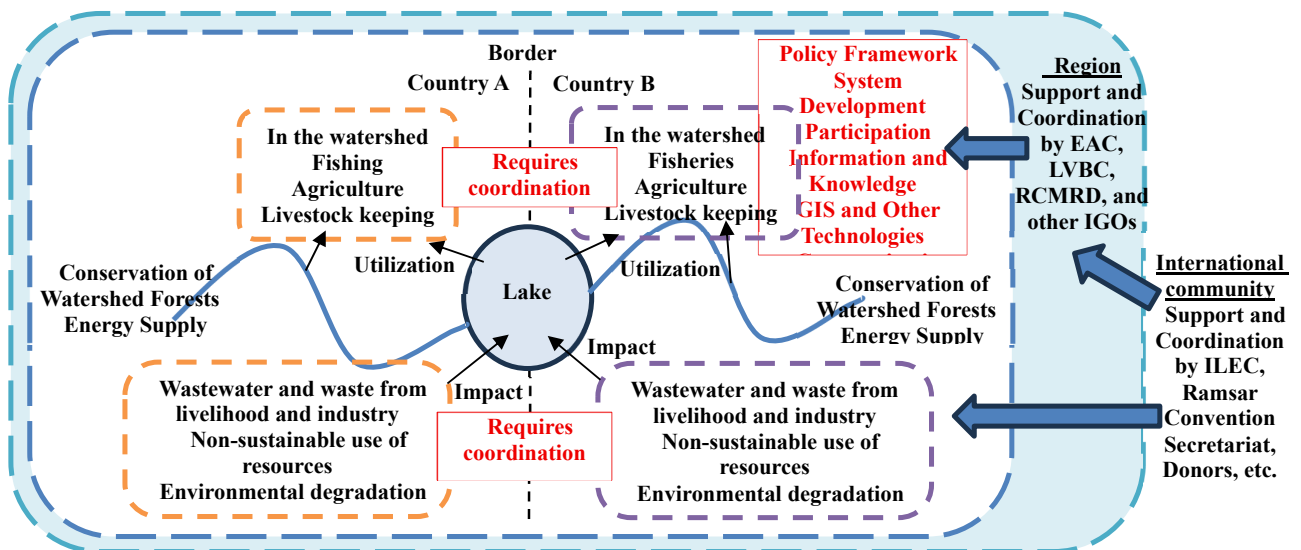


Figure 1 Integrated Approaches and Coordination for Transboundary ILBM

1.2. Objectives, Policy, and Scope of the Work

Under the circumstances described above, the objectives of this survey were to conduct information collection and confirmation in order to:

- (1) collect information on the challenges, needs, initiatives, progress, and related matters in the Lake Victoria Basin; and
- (2) examine the feasibility of future project candidates and implementation modalities, including the effective utilization of existing resources such as accumulated knowledge and established networks.

Furthermore, the policy and scope of the field survey are as follows:

- (1) To confirm the current status of Integrated Lake Basin Management in Lake Victoria and the Mara River Basin through consultations with relevant institutions and field observations, and to discuss future directions.
- (2) To collect and organize relevant information that will contribute to the implementation of full-scale cooperation.
- (3) To conduct consultations with relevant institutions with due consideration to implementation modalities and key points of attention for full-scale cooperation, to confirm the feasibility and anticipated challenges of such cooperation, and to compile the findings into a report.

1.3. Composition of the Survey Team

The composition of the survey team was as shown in Table 2 below.

Table 2 Composition of the Survey Team

Responsibilities	Name	Affiliation/Position	Field Survey Period
Team Leader / Ecosystem Conservation and Basin Management	Hiroshi Imae	Consultant, Consulting Department, JIN Corporation	Arrival in Kenya: January 11 (Sun)
Participatory Natural Resource Management / Livelihood Improvement	Hideki Sonoyama	Deputy Director, Consulting Department, JIN Corporation	Travel to Tanzania: January 19 (Mon)
Advisor	Motohiro Hasegawa	Senior Advisor, Human Resources Department, JICA	Leave from Tanzania: January 30 (Fri)
Advisor	Masahisa Nakamura	Science Advisor, ILEC	
Research Assistant	Richard Obanda	Locally hired (Kenya)	January 15 (Thu) - January 18 (Sun)
Research Assistant	Kamata Mgendi Nyarubama	Locally hired (Tanzania)	January 20 (Tue) - January 23 (Fri)

1.4. Survey Schedule

The field survey was conducted from January 10 to January 31, 2026. The details are shown in Table 3.

Table 3 Field Survey Schedule

Date	Day	Time	Activity	Location
Jan 10	Sat		Departure from Japan	
Jan 11	Sun	13:10	Arrival in Nairobi	
Jan 12	Mon	15:00	Meeting with KFS	KFS
		15:15	Meeting with JICA Kenya Office	JICA Kenya Office
		18:45	Meeting with Mr. M'May	Panafric Hotel
Jan 13	Tue	10:00	Meeting with UNESCO Regional Office for Eastern Africa	UNESCO
		13:00	Meeting with UNEP	UNEP / Online
		15:10	Meeting with RCMRD	RCMRD
Jan 14	Wed	10:25	Meeting with State Dept. of Forestry, Ministry of Environment, Climate Change and Forestry	Ministry of Environment, Climate Change and Forestry
		11:35	Meeting with Ministry of Water and Irrigation	Ministry of Water and Irrigation
Jan 15	Thu	08:10	Meeting with State Dept. of Environment and Climate Change, Ministry of Environment, Climate Change and Forestry	Ministry of Environment, Climate Change and Forestry
		11:10	Travel to Kisumu	
		13:50	Meeting with LVSWRA	LVSWRA
		15:10	Travel to Bomet	
Jan 16	Fri	09:00	Meeting with Bomet County Government	Bomet County Government
		11:00	Meeting with KFS Bomet	KFS Bomet
		12:10	Travel to Narok	
		14:20	Meeting with KFS Narok	KFS Narok
Jan 17	Sat	12:00	Site Visit to Mau Forest	Mau Forest
		16:15	Meeting with KWS Narok	KWS Narok
Jan 18	Sun	08:30	Travel to Nairobi	
Jan 19	Mon	08:15	Travel from Nairobi to Kilimanjaro	
		11:15	Meeting with EAC Secretariat	EAC Secretariat / Online
Jan 20	Tue	10:00	Travel from Arusha to Mwanza	
		13:15	Meeting with LVBWB	LVBWB
		15:00	Travel from Mwanza to Musoma	
Jan 21	Wed	08:00	Courtesy call to Mara Regional Government	Mara Regional Government
		09:00	Meeting with LVBWB Mara River Basin Branch Office	LVBWB Mara River Basin Branch
		12:00	Meeting with Tarime District Council	Tarime District Council
		14:30	Field visit of Kembwi Village	Kembwi Village
Jan 22	Thu	08:50	Meeting with Butiama District Council	Butiama District Council
		12:25	Field visit to Wegero Village	Wegero Village
Jan 23	Fri	08:05	Travel to Mwanza	
Jan 24	Sat	09:00	Travel from Mwanza to Dodoma via Dar es Salaam	
Jan 25	Sun		Documentation	
Jan 26	Mon	15:45	Meeting with Ministry of Water	Ministry of Water
Jan 27	Tue	10:10	Meeting with Ministry of Livestock and Fisheries	Ministry of Livestock and Fisheries
		13:30	Meeting with Ministry of Agriculture	Ministry of Agriculture
		15:20	Meeting with Ministry of Natural Resources and Tourism	Ministry of Natural Resources and Tourism
Jan 28	Wed	07:50	Travel from Dodoma to Dar es Salaam	
		11:00	Online meeting with LVBC	JICA Tanzania Office
		15:10	Meeting with UNESCO Dar es Salaam Office	UNESCO
Jan 29	Thu	10:10	Meeting with Water Institute	Water Research Institute
		15:00	Report to JICA Tanzania Office	JICA Tanzania Office
Jan 30	Fri	18:45	Departure from Dar es Salaam	

Date	Day	Time	Activity	Location
Jan 31	Sat		Arrival in Japan	

KFS: Kenya Forest Service, UNESCO: United Nations Educational, Scientific and Cultural Organization, UNEP: United Nations Environment Programme, RCMRD: Regional Centre for Resource Mapping for Development, LVSWRA: Lake Victoria South Water Resources Authority, KWS: Kenya Wildlife Service, EAC: East African Community, LVBWB: Lake Victoria Basin Water Board, LVBC: Lake Victoria Basin Commission

1.5. Key Interviewees

This survey conducted face-to-face interviews whenever possible. The table below lists only names that could be confirmed.

Table 4 Key Interviewees

Organization	Name	Position
KFS	Ng'oriareng Clement	Acting Senior Deputy Chief Conservator of Forests
	Omondi Bernard	Manager, Quality Assurance
	Evans Kegodi	Manager, Forest Survey and Information Management
	Andrew Muleidi	Watershed Management
	Beatrice Atemo	Senior Forest Conservator
	James Mwang'ombe Mwamodeney	Biodiversity Conservation
JICA Kenya Office	Tae Ose	Project Formulation Advisor: Climate Change, Eritrea
	Abednego Osindi	Program Officer: Climate Change & Refugee Affairs
Former LVBC Staff	Patrick M'May	Individual Consultant
UNESCO Regional Office for Eastern Africa	Louse Haxthausen	Director, UNESCO Regional Office
	Mary Nyasimi	National Programme Specialist, Natural Science Sector (Biodiversity and Mara River Basin)
	Christian Beretta	Head, Natural Science Sector (Water, World Heritage, MAB)
	Jingyi Tan	Natural Science Sector
	George Eshiamwata	Acting Director, Research and Consultancy Department, Deputy Director, Natural Sciences Programme, Kenya National Commission for UNESCO
	Jemimah Kimitu	Natural Science Sector, Ecological Section
	Laurene Pineau	-
UNEP	Heidi Savelli-Soderberg	-
	Marie Bourbon	Freshwater Ecosystem
	Toma Iida	Pollution Unit, Waste Water
	Rajiv Garg	Acting Head, Senior Program Manager
	Anu Rai	Global Wetland Watch
	Joakim Harlin	-
	Stuart Crane	Global Monitoring
	Kilian Christ	Environmental Quality
	Essey Daniel	Climate Change, Transboundary Ecosystem in East Africa
RCMRD	Josphat N. Gacoki	Ecosystems Ecology Specialist
	Erick Juma Wabwile	GIS Biodiversity Ecosystems Expert
	Christopher Amudavi Ameyo	GIS Seascapes Ecosystems Expert
Ministry of Environment, Climate Change and Forestry, State Dept. of Forestry	George Tarus	Secretary
	Kanundu Ngumba	Deputy Director, Ecosystems and Environment
	Jesse Owino	Director, Agroforestry and Commercial Forestry Development
	Susan Boit	Coordinator, 15 Billion Tree Program
	Mohamed Osuman	Deputy Director
Ministry of Water and Irrigation	Gladys Wekesa	Director
	Nancy Koech	Deputy Director
	Joe Omwenga	Hydrologist
	Stephen Nlokaya	Geologist
	Sharet Idawo	Geologist
	Gesfrey Ichai	Chemist
Ministry of Environment, Climate Change and Forestry, State Dept. of Environment and Climate Change	Festus K. Ng'eno	Principal Secretary
	John Mwegi	Environment Officer
	Chrispine Omondi	National Environment Trust Fund
	Simon Odawa	Principal Environmental Planning Officer
	Edward Ngetich	Compliance Officer, CLIP

LVSWRA	Joash Oruta Nyakara	Basin Area Coordinator, Lake Victoria South Basin Area
	Bernard K. Ngoruse	Hydrologist
	Baxton Jananga	Hydrologist
Bomet County Government	Nelson Kipng'etich Tore	Chief Officer Tourism & Investment
	Kibet Sitienei	Chief Officer Agriculture, Livestock and Fisheries
	Bernard Cheruiyot	County Executive Committee Members Agriculture Livestock and Cooperative
	Felix Lagat	Director, Fisheries Development
	Dennis Mutai	County Crop Development Officer
	Victoria Mulama	Fisheries Officer
	Cheruiyot Rangat	Director, Livestock Production
	Fedrick Ruto	Water Engineer
	Beatna Ruto	Director, Water Services
	Tore Nelson	Chief Officer, Tourism and Investment
KFS Bomet	Francis	Assistant Conservator of Forest
KFS Narok	Patrick Wasike	Chief Forest Conservator
Mau Forest Local Residents	Nehemiah Cheruiyot	
	Caren Chepkoech	
KWS Narok	David Oyugi	Assistant Director, Narok Station
EAC Secretariat	Simon Kiarie	Principal Tourism Officer
	Amani Shipella	Natural Resources Specialist, EAC/IUCN
	Maria Kapina	GIS Specialist/Expert, EAC/IUCN
	Toyoda Masatomo	Advisor on Regional Infrastructure Development for EAC Secretariat
	Takashi Matsumoto	Advisor for Customs and Trade Facilitation
LVBWB	Renatus Shinhu	Director
	Batuli Seif	Community Development Officer
Mara Regional Government	Dominicus C. Lusasi	Acting Regional Administrative Secretary (RAS)
	Mwrtta Okayo	Assistant RAS, Economic and Productive Sector Section
	Ghati Kisyei	Regional Fisheries and Aquaculture Officer
LVBWB Mara River Basin Sub-Office	Jastine Mtimbo Jacobo	Water Resources Engineer
	Kassim Seif Mtesigwa	Hydrologist
	Norbeth Zeno Honde	Hydrologist
Tarime District Council	Perugia Joel Barozi	District Executive Director (DED)
	Fulment Lawent	Agricultural Officer
	Simon N. Langoi	District Agriculture, Livestock, and Fisheries Officer (DALFO)
Kembwi Village	David Iranga Muria	Extension Officer, Manga Ward, Tarime District
	Thomas Muita Matico	Assistant Village Chairman
Butiama District Council	Winfrida Charles	AG-Tech II
	Mwantembe	
	Anatary Pantaleo Mfunzi	Principal Agricultural Field Officer (PAFO) I
	Nyahuru Robinson	Head of Agriculture Section, PAFO I
	Muhoni	
	Paulina Emmanuel	Cooperative Officer
	Maingo	
	Joseph Bahati Lukomaola	Irrigation Technician Officer
	Kamba Sanlo	Livestock Officer
	Ramadharu Shehoza	Agricultural Technician
Wegero Village	Pascheal L. Kache	Fisheries Officer
	Mantembe	Irrigation Officer
	Abdul	Extension Officer
	Seleman S. Seleman	Village Executive Officer, Wegero Village
	Emmanuel Chogoro	Wildlife Officer
Ministry of Water	Robert Sunday	Acting Director, Department of Transboundary Water Resource Management
Ministry of Livestock and Fisheries	Gabriel S. Bura	Assistant Director for Grazing Land Development
	Boniphace D. Shija	Range Management Officer, Department of Grazing Land, Animal and Feed Resources Development
	Joyce Kasebele	Environmental Officer, Environment Management Unit
	Shabani R. Tozro	Principal Veterinary Officer, Department of Veterinary Services
	Fredrick Mussa	Aquaculture Division
	Pudensiana Panga	Principal Fisheries Officer, Aquaculture Department
Ministry of Agriculture	Henry Kilapilo	Assistant Director, Agricultural Mechanization and Irrigation Division
	Haris Nzumia	Principal Engineer

	K. A. Fuko	Principal Engineer
	Helena Mkoba	Principal Engineer
	Mariam Shija	Agricultural Officer
Ministry of Natural Resources and Tourism	Alex Lobora	Director, Wildlife Division
	Fortunata Msoffe	Assistant Director, Wildlife Division
	Antonia Raphael	Principal Officer, Wildlife Division, Coordinator for Human-Wildlife Conflicts
	Africo Simon Mattogoro	Principal Officer, Wildlife Division, Environment, Climate Change, and Disaster
LVBC	Hilda Pius Luoga	Project Development Officer
	Amos Christopher Ndoto	Principal Maritime Officer
	Benjamin Sselamuli	
	Simon Otoung	Water Resource Manager
	Paul Kaiuki	Acting Director, Environment and Natural Resource Management Office
	David Mlote	Legal Officer
	Muli Cosmus Nzomo	GIZ Advisor
	Patrick Sabuni	IT Specialist
UNESCO Dar es Salaam Office	Michel Toto	Head of Office and Representative
	Keven R overt	National Professional Officer for Natural Sciences
Water Institute	William Senkondo	Deputy Rector
	Tulinave B Mwamila	Deputy Rector for Academics
	Rafik Hirji	Special Advisor
	Felix E Staki	Human Resource Manager
	Josephine Gobry	Manager, Research and Consultancy Unit
JICA Tanzania Office	Yoshito Urawa	Deputy Director
	Yukiyasu Sumi	Project Formulation Advisor
	Evona Mathew	Program Officer

2. Survey Results

2.1. Current Status, Challenges, Needs, Initiatives, and Progress in the Management of the Lake Victoria Basin (Particularly the Mara River Basin)

2.1.1. The Lake Victoria Basin

The surface area of Lake Victoria (68,870 km²) is shared by three countries, with Tanzania accounting for 51%, Uganda for 43%, and Kenya for 6%. In contrast, with respect to the basin area (180,950 km²), Tanzania accounts for 44%, Uganda for 16%, Kenya for 22%, Rwanda for 11%, and Burundi for 7%, respectively. Kenya thus possesses a relatively larger share of the basin area compared to its share of the lake surface area. Furthermore, the Kagera River, which flows in from Rwanda and Burundi, contributes significantly, accounting for 33% of the water flowing into the lake; therefore, both Rwanda and Burundi are also important stakeholders.

The major rivers flowing into Lake Victoria are shown in the Figure 2³.

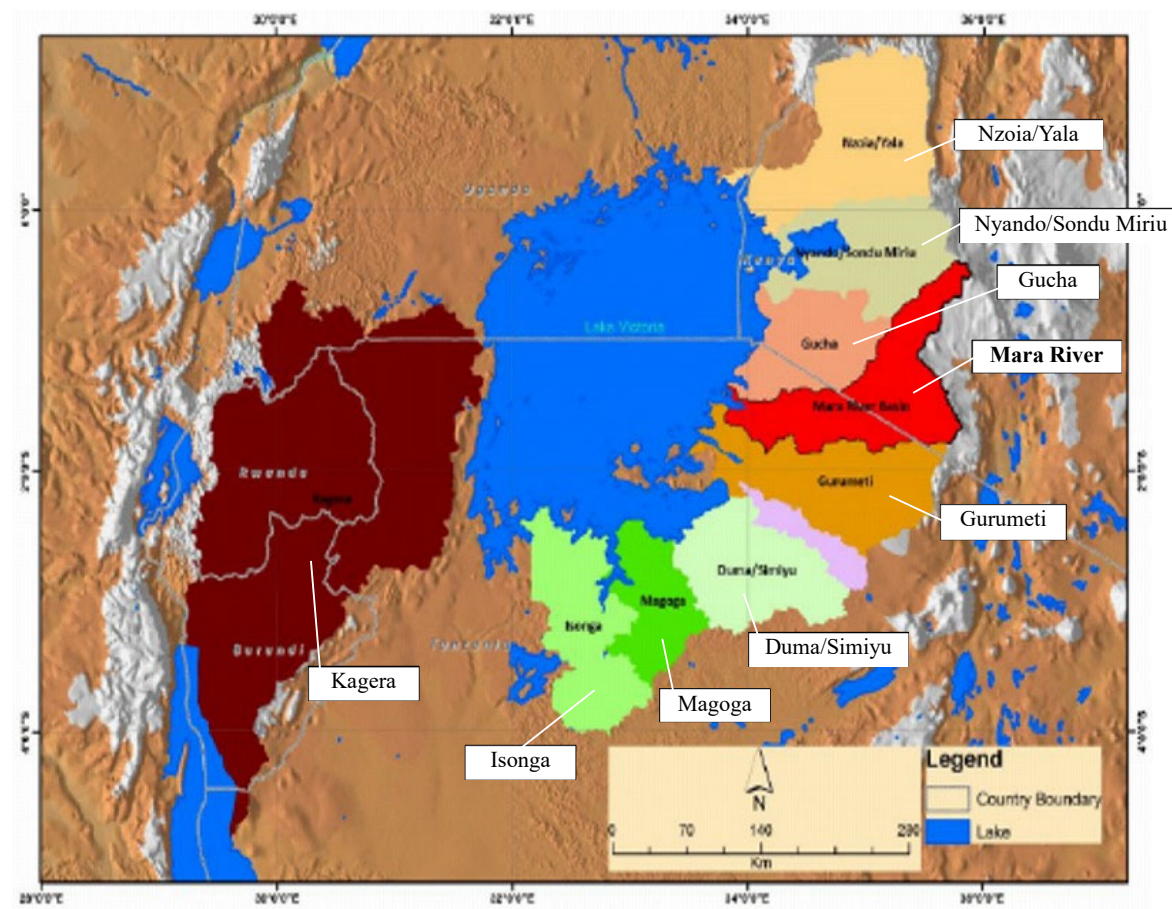


Figure 2 Major River Basins Constituting the Lake Victoria Basin

Lake Victoria is one of the most important shared resources for the EAC member states; therefore, it is positioned as an economic growth zone and is utilized for domestic, industrial, agricultural, and hydropower generation purposes. It also possesses valuable biodiversity in both terrestrial and aquatic areas, and 16% of the terrestrial area has been designated as protected areas. The lake is also rich in fisheries resources; in 2020, fish production reached 1.5 million tons, with total revenue amounting to

³ Source: LVBC, WWF, USAID, GoT&GoK. "The Trans-Boundary Mara River Basin Strategic Environmental Assessment (MRB SEA)"

USD 1,139.3 million⁴. It provides employment to 210,000 people directly engaged in fisheries, and when including indirect employment, the number reaches 4.5 million.

Moreover, as described above, because it has a broad lake basin, many activities carried out within the basin affect the lake. Eighty percent of the basin population are agriculturalists who also keep livestock, and most of them engage in rain-fed agriculture dependent on rainfall, covering an area of 10.4 million hectares. In contrast, irrigated agriculture is practiced on 100,000 hectares.² In recent years, extreme weather events such as droughts and floods, which are considered to be impacts of climate change, have occurred frequently, and rainfall patterns have become increasingly difficult to predict. Current agricultural, pastoral, and fishing activities are considered vulnerable to climate change due to high temperatures, droughts, floods, and other related factors.

Water quality sampling of Lake Victoria, including the Mara River, has been conducted by the three countries, and based on the analysis results, the EAC is currently preparing a “State of the Basin Report.” The report is currently in its finalization stage and is expected to provide highly useful information regarding the overall condition of the Lake Victoria Basin.

2.1.2. Institutions Related to the Integrated Management of the Lake Victoria Basin (particularly the Mara River Basin)

The institutions considered to be involved in the integrated management of the Lake Victoria Basin, particularly the Mara River Basin, broadly include inter-governmental organizations (IGOs) and the government institutions of Kenya and Tanzania. In addition, from the perspective of integrated management, it is considered that United Nations agencies such as UNESCO and UNEP may also be involved.

The outline and modes of involvement of these institutions are organized as follows, and presented in order of relevance to the future project development.

Table 5 Institutions Related to the Integrated Management of the Lake Victoria Basin (particularly the Mara River Basin)

Category	Organization
East African Region	(1) East African Community (EAC) (2) Lake Victoria Basin Commission (LVBC) (3) Regional Centre for Mapping of Resources for Development (RCMRD)
Kenya	(4) Ministry of Water and Irrigation (5) Ministry of Environment, Climate Change and Forestry (6) Kenya Forest Service (KFS)
Tanzania	(7) Ministry of Water (8) Ministry of Livestock and Fisheries (9) Ministry of Agriculture (10) Ministry of Natural Resources and Tourism (11) Water Institute (WI)
United Nations Agencies	(12) UNESCO (13) UNEP

2.1.2.1. East African Region

(1) East African Community (EAC)

The EAC Secretariat broadly consists of the following three divisions.⁵

⁴ LVBC Secretariat. “Synopsis of Lake Victoria Basin Sectoral Status, Prevailing challenges and Broad Investment / Intervention Priorities.” (Powerpoint slides)

⁵ <https://www.eac.int/the-secretariat>

Table 6 Organizational Structure of the EAC Secretariat

Executive Office of the Secretary-General	Office of the Deputy Secretary General in charge of Customs, Trade and Monetary Affairs	Office of the Deputy Secretary General in charge of Infrastructure, Productive, Social and Political sectors
• Office of the Secretary General • Counsel to the Community • Corporate Communications and Public Affairs • Regional Co-operation in Defense • Internal Audit • Resource Mobilization Office • Finance, Human Resources and Administration	• Customs Directorate • Trade Directorate • Monetary Affairs Directorate	• Infrastructure Directorate • Planning Directorate • Investment Department • Productive Sectors Directorate • Social Sectors Directorate • Political Affairs Directorate

Among the divisions shown in the above table, the Resource Mobilization Office and the Productive Sectors Directorate (highlighted in red in the table) are considered to be the principal departments related to integrated lake basin management.

Within the Productive Sectors Directorate, there are three departments: “Tourism and Wildlife,” “Environment and Natural Resources,” and “Agriculture and Food Security.” With support from the EU, personnel from IUCN have been seconded to both the “Tourism and Wildlife” and the “Environment and Natural Resources” departments, where they support the field of natural resource management—particularly transboundary management—through mapping of target areas and identification of and strengthened collaboration among stakeholders (see the “NaturAfrica Project” described below).

Within the EAC framework, there are several specialized institutions such as the LVBC that perform mutually complementary roles. The EAC Secretariat itself primarily operates at the policy level, whereas institutions such as the LVBC are closer to the field and possess more operational and practical information.

EAC focuses mainly on coordinating initiatives among member states, harmonizing policies, and formulating strategies. Examples include the following:

- 1) **EAC Blue Economy Strategy and Action Plan:** A document formulated with the support of UNECA (United Nations Economic Commission for Africa). Under this strategy, the Mara River Basin is positioned as one of the important areas in terms of its contribution to the regional blue economy.
- 2) **EAC Water Policy and Integrated Water Resources Management (IWRM):** Closely related to the Lake Victoria Basin. A draft was prepared during 2020–2021, and additional consultations are currently underway. It is expected that the views of newly admitted EAC members, such as the Democratic Republic of the Congo (DRC), which has the Congo River, and Somalia, will also be incorporated.
- 3) **Regional Biodiversity Strategy and Action Plan:** Formulated with the intention of aligning with the Global Biodiversity Framework, and already adopted by the Sector Council on Environment and Natural Resources Management.
- 4) **EAC Climate Change Policy:** Final confirmation has been completed and it is currently awaiting approval.

In this manner, to date EAC has engaged extensively in identifying common challenges among member states and in formulating regional common policy frameworks to address them. However, it is anticipated that the focus will shift toward implementation at the field level going forward.

EAC advances implementation through five-year development strategies. The current Sixth Development Strategy will conclude in June 2026, and the Seventh Development Strategy, scheduled to commence in July, includes the preparation of concept notes on transboundary themes such as transboundary resource management.

The NaturAfrica Project is an initiative supported by IUCN with EU funding and is scheduled to be implemented over four years through 2029 in cooperation with the EAC Secretariat. IUCN dispatches experts to strengthen transboundary conservation areas within the region, with the objectives of biodiversity conservation, reduction of biodiversity loss, and improvement of the livelihoods of communities adjacent to transboundary conservation areas. Eleven priority transboundary conservation areas have been identified, including the Mara-Serengeti region. In these priority transboundary conservation areas, mapping has been conducted to identify important ecosystems and their respective socio-economic attributes, as well as policy and management challenges and legal frameworks in each area.

Based on this analysis, approaches for collaboration with stakeholders in each region are being examined. A portal to share geo-mapping information on transboundary conservation areas among all member states is also under preparation. Furthermore, as part of the project activities, the EAC Wildlife Conservation and Management Strategy and Action Plan has been formulated and validated by all member states, and is currently progressing toward final approval within the EAC. Because there is a project team within the EAC implementing such activities, continuous collaboration with JICA is feasible.

A JICA expert in the trade sector has been dispatched to the EAC, and a certain cooperation framework exists between the EAC and JICA. The EAC previously discussed a cooperation framework with JICA in the climate change sector. In the event of requesting and implementing a project, it will therefore be necessary to confirm and examine the existing cooperation framework.

(2) Lake Victoria Basin Commission (LVBC)

The Lake Victoria Basin Commission (LVBC) is a specialized institution of the EAC established to coordinate the management of Lake Victoria and its basin and to ensure sustainability. The legal basis for the establishment of LVBC was set forth in the 1999 EAC Treaty, and its operational framework was defined in the Protocol for Sustainable Development of the Lake Victoria Basin (hereinafter referred to as “the Protocol”), adopted in 2003. The Protocol was ratified in December 2004, and LVBC commenced operations in January 2005 at the EAC Secretariat in Arusha, Tanzania. It was subsequently relocated to Kisumu, Kenya, in January 2007.

Initially, LVBC was formed by the three riparian countries—Kenya, Tanzania, and Uganda. However, in 2007 it was expanded to include Burundi and Rwanda, which, although not riparian states, are located in the upstream areas of the basin ecosystem and bear significant responsibility for basin conservation. In 2022, the LVBC Act was enacted, and LVBC currently operates in accordance with the LVBC Strategic Plan 2021–2026, aligned with the EAC Development Strategy.

The mission of LVBC⁶ is “to promote, facilitate and coordinate activities of different actors towards sustainable development and poverty eradication of the Lake Victoria Basin.” Its vision is “a prosperous population living in a healthy and sustainably managed environment providing equitable opportunities and benefits”

Under the Protocol, fourteen areas of joint activities to be coordinated by LVBC are stipulated as follows (bold indicates areas considered relevant to the scope of this survey):

- 1) **Water resources management**
- 2) **Fisheries resource management**

⁶ <https://www.lvbcom.org/about-us/#vision-mission-core-values>

- 3) **Sustainable agriculture and land use (including irrigation)**
- 4) **Sustainable forest resource management**
- 5) **Wetland development and management**
- 6) Trade, commerce, and industrial development
- 7) Infrastructure and energy development
- 8) Navigation safety and maritime security
- 9) Improvement of public health
- 10) **Research, capacity development, and coordination of information sharing within the basin**
- 11) **Environmental protection and management**
- 12) Public participation in planning and decision-making (governance)
- 13) Gender mainstreaming
- 14) **Wildlife conservation and sustainable tourism development**

With regard to the LVBC Strategic Plan, it is formulated on a five-year basis and revised every five years. In order to facilitate resource mobilization, the approach typically focuses on five to six priority areas over a five-year period, followed by evaluation and progression to the next phase. Under the currently implemented LVBC Strategic Plan 2021–2026, the following six development objectives have been set forth (bold indicates areas considered relevant to the scope of this survey):

- (i) **Promotion of environmental and natural resources management**
- (ii) **Promotion of Integrated Water Resources Management**
- (iii) Enhancement of safety and security in lake transport
- (iv) Strengthening of social development services
- (v) Promotion of investment in the economy and enhancement of the potential of the blue economy
- (vi) **Strengthening of the institutional and coordination capacity of the LVBC Secretariat and Partner States**

With regard to the organizational and operational structure of LVBC, as shown in the figure on the right⁷, the LVBC Secretariat is positioned at the center and collaborates with all stakeholders.

Since multiple countries are involved, each country designates a responsible ministry for EAC-related affairs (National Focal Point Ministry), which serves as the contact point between LVBC and the respective country. LVBC also collaborates with development partners interested in providing support, civil society, and the private sector.

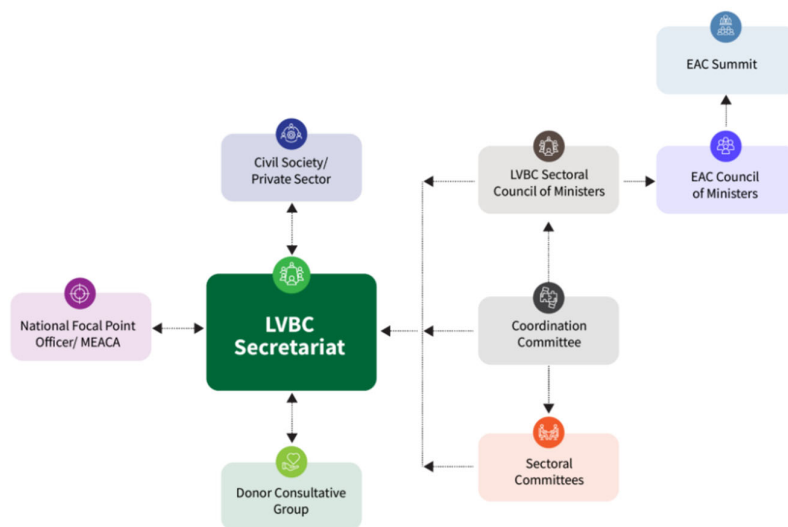


Figure 3 Organizational and operational structure of LVBC

For projects and programs, Sectoral Committees are established to address technical matters, and meetings are convened with relevant government officials. In addition, there is a Coordination Committee, which convenes twice a year or as necessary, with the participation of Permanent Secretaries responsible for the sectors targeted by the projects. This committee deliberates on technical issues and

⁷ Source: <https://www.lvbcom.org/governance-structure/>

policy matters that require action by each country.

When policy-level responses by each country are required, the LVBC Sectoral Council of Ministers is convened, bringing together ministers to deliberate on policy matters necessary for effective implementation by the Partner States. These matters are subsequently reported to the higher-level EAC Council of Ministers and, if necessary, may be elevated to the level of Heads of State.

The internal departments of LVBC include the following⁸. Although an official organizational chart is not publicly available, they are presented below for convenience, divided into sectoral departments and administrative departments.

Table 7 Departments within the LVBC

Sector Departments	Administrative Departments
• Communications and Development Awareness • Maritime Safety • Monitoring & Evaluation • Resource Mobilization • Integrated Water Resources Management and Development • Project Development • Environment and Natural Resources Management	• Human Resources • ICT • Legal • Finance • Administration • Procurement • Planning and Budget

Among the sectoral departments, those considered to be involved in the conservation and management of the Mara River Basin are the Resource Mobilization Department, the Integrated Water Resources Management and Development Department, the Project Development Department, and the Environment and Natural Resources Management Department.

Examples of projects for which LVBC has coordinated implementation among the Partner States to date are as follows. LVBC typically prepares project proposals to mobilize resources; however, the projects are integrated into national initiatives in each country so that the benefits derived from the mobilized resources are shared among the Partner States.

Table 8 Major Projects Coordinated by LVBC

Project Name	Supporting Institution (s)	Implementation Period	Description
Lake Victoria Environmental Management Project (LVEMP)	World Bank, SIDA, GEF	Phase 1: 1996–2005 Phase 2: 2009–2017	Environmental sustainability (addressing point & non-point pollution), livelihood improvement, and policy harmonization (See p9-10)
	USAID		Conducted a Vulnerability Impact Assessment, which led to the development of the Strategy for Adaptation and Action Plan, connecting to the ACC-LVB project.
Adapting to Climate Change in Lake Victoria Basin (ACC-LVB)	Adaptation Fund, UNEP	2018-2023	Targeted five countries. Applied various resilience technologies in each country to enhance people's resilience.
Multinational Lake Victoria Maritime Communication and Transport Project	AfDB	-	Improvement of safety and security in lake transport, including construction of search and rescue centers and enhancement of lake communication systems.
Integrated Water Resources Management Programme	EU, KfW	2020-2026	Initiatives to enhance Lake Victoria's potential. Dispatch of a coordinator to LVBC (see p9-10). Development of a water resources information management system.
Nile Cooperation for Climate Resilience	World Bank		Worked closely with the Nile Basin Initiative (NBI) on policies, strategies, and

⁸ <https://www.lvbcom.org/strategic-program-areas/>

(NCRR)			action plans for water management in the basin, and formulated the Water Quality Guidelines Policy and the Water Quality Strategic Action Plan.
Sustainable Water Partnership	USAID		Assessed river flows and related hydrological conditions in Kenya and Tanzania, and developed water allocation plans to coordinate water allocation between the two countries. The water allocation plan on the Tanzanian side was adopted; however, the Kenyan side has not been finalized.

In addition, EAC has been engaged in the formulation of harmonized policies, laws, and regulations among Partner States, and the following policies and related frameworks have been developed to date. However, many of these harmonized policies are not publicly available on official websites and other platforms, and their detailed contents cannot be confirmed at present.

- Harmonized Policy for Water Resources Management (2012)
- Inland Fisheries and Aquaculture Policy for EAC
- Information and Data Sharing Guidelines among and within Countries and Agencies in the Lake
- Integrated Water Resources Management Plan for the Lake Victoria Basin
- Basin-wide Sustainable Land Management Strategy
- LVB Climate Change Adaptation Strategy and Action Plan (CCASAP 2018)

At present, discussions are underway with the World Bank regarding a multi-faceted, multi-approach project. As LVBC is not able to address all challenges comprehensively, discussions are being conducted on how to respond in a more integrated manner. Efforts are being made to promote inclusive sanitation initiatives and to apply sustainable urban models.

With regard to the implementation of these harmonized policies, LVBC supports implementation by maintaining communication and coordination through the responsible institutions of each Partner State, and by convening the annual meetings of the Lake Victoria Basin (LVB) Sectoral Council, meetings of policymakers, and Joint Regional Policy Steering Committees for various projects. Furthermore, within LVBC there is a Technical Advisory Committee (TAC), composed of experts representing each Partner State. In this committee, representatives from relevant ministries, including Ministries of Water, participate on behalf of their countries, and representatives are also selected at lower levels to take part in the work. These experts provide technical advice, and the committee makes decisions based on their recommendations.

LVBC monitors and addresses key challenges facing Lake Victoria and its basin, including the expansion of water hyacinth distribution and sediment inflow into the lake. Progress has also been made in fisheries management, water quality management, and poverty reduction. However, significant challenges remain, including water pollution, actual land use practices, unmanaged or excessive water abstraction, and flooding.

Currently, incidents such as mass fish mortality and discoloration of lake water are occurring, and water quality monitoring has become a matter of high importance. Previously, there was a system in place whereby the lake was monitored on a monthly basis through boat patrols; however, this is no longer being conducted. The establishment of water quality monitoring and information systems for Lake Victoria is considered to be an initiative that should be carried out under the coordination of LVBC.

(3) Regional Centre for Mapping of Resources for Development (RCMRD)

Established in 1975, the Regional Centre for Mapping of Resources for Development (RCMRD) initially functioned primarily as a surveying institution, conducting land and resource surveys. Subsequently, it

expanded its scope to include research, capacity development across various fields, training programs for multiple countries, and ecosystem conservation initiatives. With a history of 50 years, RCMRD is currently a regional inter-governmental organization (IGO) operating as a training institution funded through contributions from 20 member states in Eastern and Southern Africa, as well as through project-based funding.

RCMRD currently employs 136 staff members, including social scientists, and handles socio-economic data in addition to geospatial information. Its training programs include short-term courses, long-term courses, and tailor-made programs designed in response to requests from specific institutions. Short-term courses, lasting up to three months, primarily target professionals already in employment—such as corporate personnel and practitioners—who seek to enhance their skills. Long-term courses can lead to the issuance of diplomas or certificates of completion. Subjects include surveying, photogrammetry, remote sensing, drone-based mapping and data analysis, and GIS. At present, approximately 1,000 students are enrolled.

RCMRD engages in capacity strengthening across 24 countries and has also been designated as a Sub-regional Technical and Scientific Cooperation Support Centre (TSC) under the Convention on Biological Diversity (CBD), serving 11 countries (Comoros, Eswatini, Ethiopia, Kenya, Madagascar, Rwanda, Somalia, South Sudan, Tanzania, Uganda, and Zambia). While based in Kenya, it provides training courses in other countries as well. The four principal activities under the CBD mandate are as follows:

- 1) **Online training:** In 2025, global training was conducted on Target 3 of the Kunming-Montreal Global Biodiversity Framework (KMGBF), which calls for conserving 30% of land, inland waters, and oceans. In September of the same year, training was conducted on Target 1 (planning and management across all areas to reduce biodiversity loss). At the end of January 2026, with support from FAO, training on Target 2 (restoring 30% of degraded ecosystems) is planned, and in March 2026, training on Target 6 (reducing the introduction and impacts of invasive species) is scheduled. Exercises are included to enable participants to use GIS data to identify the distribution of invasive species. Three additional trainings are planned in 2026 and three more in the following year, with the intention of conducting training once per quarter.
- 2) **Development of data and information for effective protected area management:** RCMRD supports 24 countries in contributing data to the World Database on Protected and Conserved Areas (WDPCA). Although countries possess data, it must be validated prior to submission to WDPCA. RCMRD assists in this process, thereby enabling international visibility of progress in protected areas. With advancements in GIS technology, demand for training in this field is increasing.
- 3) **Training on new tools and technologies related to conservation.**
- 4) **Support for updating National Biodiversity Strategies and Action Plans (NBSAPs):** Programs and action plans are being developed, and workshops are planned within the region.

The types of capacity requiring strengthening vary by country, and needs assessments are typically conducted through questionnaires during workshops. However, several common challenges have been repeatedly identified across countries:

- 1) **Data management portals:** Effective management of data on protected areas and UNESCO Biosphere Reserves (BRs) is essential. In many countries, data are managed separately by different sectors and institutions, and there is a need for a centralized portal. In particular, Tanzania has consistently raised questions regarding what kind of data management model should be established.
- 2) **Ecosystem mapping:** A need expressed particularly by Somalia, especially regarding natural resources and technology transfer. This represents one of RCMRD's important response areas.
- 3) **GIS skills:** A common need across all member states.

- 4) **Infrastructure development:** Also a common need. Even if GIS training is provided, there are limitations to actual implementation. In many cases, only a single computer is available for data collection, processing, and storage, with insufficient capacity to handle large datasets. Although the Government of Japan supported the establishment of a forest data laboratory for KFS, in many other countries data remain stored on individual computers, risking data loss. There is a need to establish GIS laboratories capable of consolidating and integrating data held across countries and institutions.
- 5) **Capacity to establish protected areas:** A common need across member states. There is demand for guidance on how to determine zoning categories and what procedures should be followed to formally designate protected areas. Currently, there is also growing interest in procedures and requirements for communities to establish OECMs (Other Effective area-based Conservation Measures)⁹.
- 6) **Capacity strengthening in conservation reporting:** A common need across member states, as reporting on conservation efforts is mandatory. NBSAPs and CBD targets are not sufficiently understood at the field level, and many countries are unable to explain how livelihood activities such as fisheries correspond to international targets. Reports from governments and implementing agencies often remain limited to statements such as “training was conducted” or “animals were counted,” and do not adequately demonstrate progress toward national obligations in accordance with required reporting standards and formats.
- 7) **Capacity strengthening for resource mobilization:** A common need across member states. For example, asking communities to implement conservation activities without generating income from such efforts is difficult to accept. The challenge lies in identifying mechanisms to generate revenue while maintaining ecosystems through conservation, and in determining how to support communities in mobilizing their own financial resources. In another example, databases developed under projects were handed over to governments, but due to insufficient understanding of the need for investment in maintenance and updates, budgets were not secured. As a result, after donor support ended, systems were not updated and became inoperative. Many countries express concern that after international support ends, it is unclear what capacity remains locally and how conservation can continue independently. Establishing systems capable of sustaining mechanisms such as UNESCO Biosphere Reserves after designation remains a challenge.

In responding to these capacity development needs, RCMRD faces the following challenges:

- **Financial constraints:** Limited budgets prevent full coverage of all target areas. Even when workshops are organized, although many qualified professionals exist in each country, only 30–40 participants can realistically be invited.
- **Facilities:** For example, the number of mapping software licenses (e.g., ArcGIS) is limited, preventing all trainees from accessing the software simultaneously. Regarding data hosting, as the number of participants and ecosystem datasets increases, server capacity becomes constrained.
- **Security challenges:** In countries such as Somalia, Sudan, and the Democratic Republic of the Congo, security risks are high. Even when training is planned locally, it is often postponed or cancelled for security reasons. As a result, only selected areas are targeted for in-country training. Where direct access is not possible, responsibilities may be delegated to other institutions, with prior training provided to enable implementation.
- **Lack of political goodwill:** Due to intergovernmental tensions or domestic political circumstances, access to target areas may be restricted, or governments may not permit the use

⁹ Areas that are not formally designated as protected areas such as national parks, but which effectively and sustainably contribute to the conservation of biodiversity over the long term. In some cases, green spaces located within private company premises may be designated. This mechanism also aims to promote and stimulate private-sector engagement in conservation efforts.

of facilities or local activities.

- **Language barriers:** Training is primarily conducted in English; however, not all target countries are English-speaking. While this may not significantly affect countries around Lake Victoria, for example, when participants from Portuguese-speaking countries such as Mozambique attend training, interpretation and translation are provided to ensure equivalent services.

In this manner, although RCMRD bears broad responsibilities as a TSC, its capacity is limited. It therefore places importance on leveraging the expertise and capacity of other institutions and has concluded MOUs with organizations such as WWF. For example, training on OECMs is conducted by IUCN, which has particular expertise in this area.

Regarding cooperation with JICA, RCMRD has identified potential areas including:

- **Development of training programs for the establishment of UNESCO Biosphere Reserves:** RCMRD possesses GIS expertise, while JICA has technical knowledge related to zoning. By improving tools collaboratively, knowledge would remain within RCMRD even after assistance ends, enabling support for the establishment of Biosphere Reserves in other countries.
- **Field-based data collection related to ecosystems:** For example, in areas such as forests and soils, where diverse technical expertise is required.

In addition, RCMRD sees potential for joint concept development and joint project implementation with JICA.

2.1.2.2. Kenya

(4) Ministry of Water and Irrigation

Organizational Structure and Institutional Framework

In Kenya, the entire country is divided into the following six Catchment Areas, which serve as the units for water resources management¹⁰:

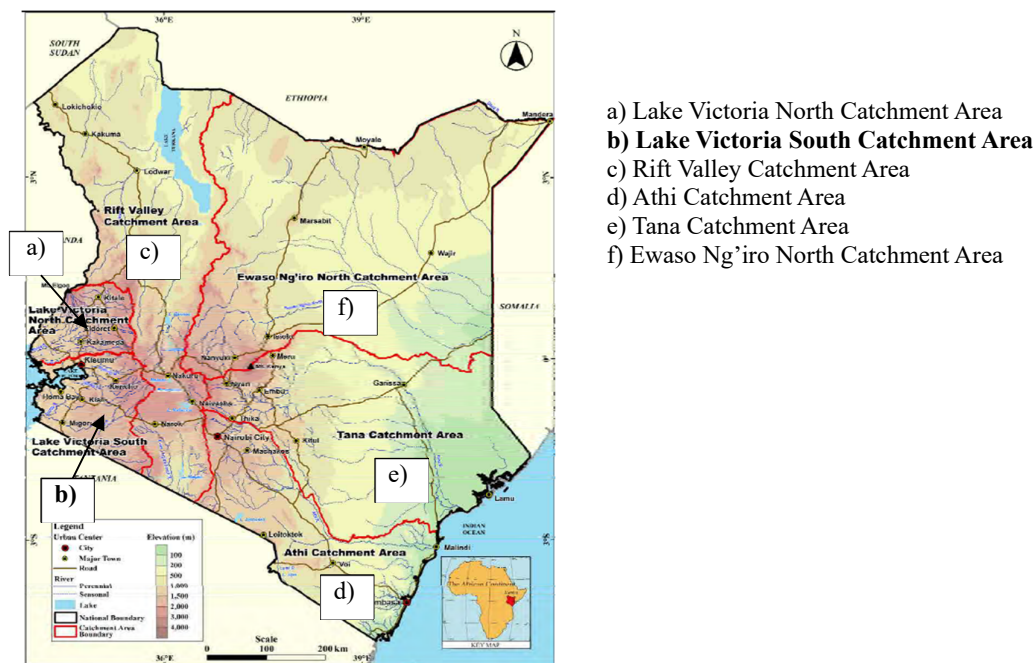


Figure 4 Catchment Areas of Kenya

¹⁰ Source: Japan International Cooperation Agency (JICA) / Nippon Koei Co., Ltd. (2013) Final Report of the Kenya National Water Resources Master Plan 2030 Formulation Project

The Mara River flows through b) the Lake Victoria South Catchment Area; while the Mau Forest also serves as a water source for neighboring catchment areas.

The Ministry of Water and Irrigation in Kenya consists of the State Department for Water and Sanitation and the State Department for Irrigation. Among these, the State Department for Water and Sanitation provides the following services:

- Water Supply Services
- Sewer and Non-Sewer Sanitation Services
- Water Harvesting and Storage
- Water Resource Management and Use
- Water Sector Investment Planning
- Transboundary Water Resource Management and Use

In order to implement its policies, the Ministry of Water and Irrigation oversees external agencies including¹¹:

- Water Resources Authority (WRA)
- Water Services Regulatory Board (WASREB)

As of 2013, the institutional framework of the water sector under the Ministry of Water and Irrigation was as shown below¹².

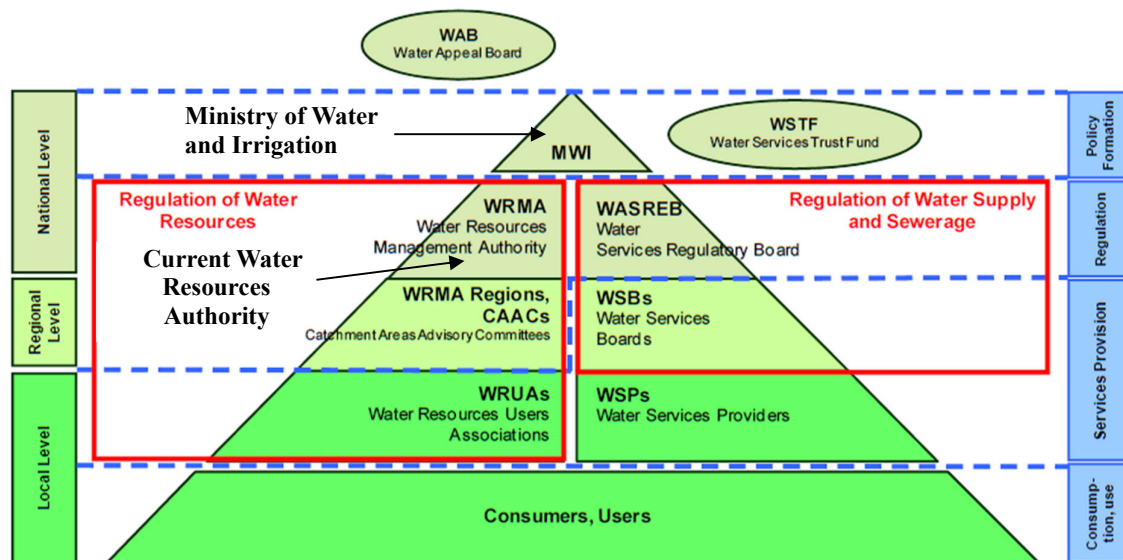


Figure 5 Institutional Framework of the Water Sector under the Ministry of Water and Irrigation

Thus, while the Ministry formulates policy at the national level, the Water Resources Authority (WRA) is responsible for water resources management based on those policies, and WRA manages water resources according to each catchment area. In other words, although the Ministry of Water and Irrigation holds authority for basin conservation, actual implementation is carried out by WRA. At the local level, communities form Water Resources Users Associations (WRUAs), which manage water resources at smaller sub-catchment levels, ultimately ensuring that water reaches end users. However, it has not been confirmed whether this institutional framework remains unchanged at present.

¹¹ <https://www.water.go.ke/mandate-functions>

¹² Source: Japan International Cooperation Agency (JICA) and Nippon Koei Co., Ltd. (2013), The Project for Formulation of the National Water Resources Master Plan 2030 in the Republic of Kenya – Final Report.

Major Development Strategies and Plans

Currently, there is a national water resources management strategy; however, it is not specifically for lake management, nor is it tailored to a particular basin. Nevertheless, WRA has Catchment Management Plans for each catchment area, bearing specific names such as “Lake Victoria North” and “Lake Victoria South.” With decentralization, responsibilities such as budget management and national park management have shifted to county governments. However, water resources themselves remain under national jurisdiction, and monitoring, abstraction, allocation, conservation, and management of lake water resources continue to be conducted by WRA. Although WRA is also responsible for conservation of water resources in individual lakes within the country, it cannot be said that it possesses sufficient management capacity. The law does not contain lake-specific provisions; rather, water bodies are treated collectively under the general Water Act, and specific lakes are not individually named.

Initiatives for Water Resources Conservation in the Mara River Basin

Regarding the Lake Victoria South WRA, it oversees multiple catchments, including the Mara River, and covers seven counties, including Bomet and parts of Narok. WRUAs under WRA are formed along tributaries of the Mara River. On the Kenyan side of the Mara River Basin alone, there are approximately 20 WRUAs; however, their levels of activity vary. Some are actively engaged in river management, while others are less so. Each WRUA has a Sub-catchment Management Plan, although in some cases the plan period has expired and requires revision.

Under Kenya’s Water Act, a Basin Area Committee is to be established in each basin; however, such a committee has not yet been established in the Lake Victoria South Catchment Area. This committee is expected to formulate a catchment management strategy, but this has not yet been achieved. While there exists a Lake Victoria Basin Action Plan, it has not been translated into a comprehensive strategy due to the absence of the committee.

In communities within the Mara River Basin, citizen science activities are conducted whereby the health of the Mara River ecosystem is monitored physically, chemically, and biologically, and assigned scores. However, there are challenges in continuity. WRA conducts routine monitoring of groundwater and surface water, checking both quantity and quality. There are water quality and water quantity observation stations, as well as meteorological stations.

Conservation and restoration activities for water resources in the upper Mara River Basin cannot be undertaken by WRA alone. WRA collaborates with WRUAs, county governments, and Kenya Water Towers Agency¹³ to jointly manage riparian lands. WRA’s direct involvement with WRUAs primarily concerns riparian conservation, including the establishment of buffer zones between agricultural land and rivers to prevent farmland encroachment into riverbanks. Not all water originates from upstream forests; there are numerous tributaries, and without preventing agricultural development along these tributaries, riverbank erosion may frequently occur.

WRUAs are primarily engaged in the removal of eucalyptus trees from river basins. Because eucalyptus is a species that absorbs large amounts of water and contributes to wetland drying, it must be removed to secure downstream water availability. Recently, Kenya enacted environmental legislation regarding the removal of eucalyptus in river basins, stipulating that eucalyptus must be removed within 30 meters from the maximum flood reach. County governments are required to remove eucalyptus within two years, and WRUAs serve as implementers. However, rather than merely prohibiting planting, efforts are being made in collaboration with relevant agencies in other sectors to propose alternative tree species and livelihood options.

Since eucalyptus has high commercial value as timber and is easily monetized, requesting residents to replace it is not straightforward. Nevertheless, after felling eucalyptus, replanting is being carried out with various species, including both indigenous and exotic species and bamboo. Only problematic species such as eucalyptus are subject to removal. Residents are gradually accepting replanting with alternative species and are also experimenting with alternative livelihood activities. For example, in

¹³ It was dissolved in 2025 and absorbed into the Ministry of Environment, Climate Change and Forestry.

collaboration with the livestock department, beekeeping has been introduced, and in coordination with agricultural agencies, gabion structures (using stones and wire mesh) for riverbank protection and terracing have been promoted.

In view of the water retention function of forests, WRA and KFS maintain a cooperative relationship. While KFS is responsible for forest conservation itself, WRA focuses on the function of forests as water sources. For example, when water abstraction is proposed within forests, permission from KFS is required. Subsequently, WRA analyzes the water balance and evaluates the downstream impact of abstraction; if the impact is deemed minimal, approval is granted, reflecting a division of roles.

Additionally, since the Mara River occasionally experiences flooding, WRA considers that the introduction of an early warning system is necessary.

(5) Ministry of Environment, Climate Change and Forestry

Organizational Structure

The Ministry of Environment, Climate Change and Forestry consists of the State Department for Environment and Climate Change and the State Department for Forestry.

The role of the Ministry primarily lies at the high-level policy and coordination level. Practical field operations are undertaken by agencies and organizations under the Ministry, such as the Kenya Forest Service (KFS), while research functions are carried out by institutions such as the Kenya Forestry Research Institute (KEFRI). Accordingly, for example, when attending international conferences, the delegation is led by the State Department for Forestry; however, in order to support discussions on technical and implementation aspects, related agencies such as KFS and KEFRI also participate in the delegation. When research outcomes from KEFRI are to be translated into implementation, KFS assumes responsibility. KFS and KEFRI are also member institutions of the Technical Advisory Committee. Furthermore, initiatives have commenced to establish research stations within the Mau Forest to continuously monitor ecosystem changes.

To date, the Ministry has engaged in policy formulation, regulatory development, awareness-raising, implementation of the Mau Forest Complex Integrated Conservation and Livelihood Improvement Programme (MFC-ICLIP)—a program launched in 2025 to promote forest restoration and livelihood improvement in the Mau Forest—and investment in monitoring systems. In addition, a national forest restoration initiative known as the “15 Billion Trees” program is being advanced across Kenya. MFC-ICLIP is led by the State Department for Environment and Climate Change, with the State Department for Forestry collaborating. The 15 Billion Trees program is promoted by the State Department for Forestry.

Mau Forest Complex Integrated Conservation and Livelihood Improvement Programme (MFC-ICLIP)

The Mau Forest is a forest reserve covering 43,000 hectares, spanning four counties—Kericho, Narok, Bomet, and Nakuru—and consisting of 22 forest blocks. Of these, 21 are managed by KFS and one by the community. The Mau Forest is a key component of the Lake Victoria Basin, supplying water to the Nile River and supporting the Mara–Serengeti ecosystem. It is globally significant for biodiversity conservation and serves as a major carbon sink. It is also the source of 12 major rivers and constitutes the foundation of local livelihoods. At the same time, it faces numerous threats, including illegal charcoal production, illegal logging for fuelwood and timber, overgrazing, illegal encroachment by residents into forest areas, land-use change, forest fires, inappropriate agricultural practices, weak legal frameworks, and inadequate institutional arrangements. As a result, changes in forest cover, encroachment into riparian areas, and water pollution have occurred.

In response to these challenges, MFC-ICLIP was formulated and commenced in 2025. This is a ten-year program with an estimated total budget of 21.5 billion Kenyan shillings. The target areas include Eastern Mau, Molo, Western Mau, Southwestern Mau, and adjacent agricultural lands, covering approximately 403,000 hectares. The principal objective is to restore and sustainably manage the Mau Forest through an integrated conservation and livelihood improvement approach, thereby enhancing ecosystem

functions and strengthening climate resilience across the landscape.

The specific objectives include:

- (1) forest restoration and protection;
- (2) promotion of nature-positive enterprises;
- (3) advancement of a circular economy;
- (4) promotion of environmental education and research; and
- (5) strengthening of policy and governance.

The five main components and their primary targets are as follows:

- 1) **Sustainable Landscape Management (SLM):** Restoration of 33,000 hectares of forest; installation of 300 km of forest boundary fencing; establishment of 200 km of socio-economic buffer zones; protection and ecosystem restoration of wetlands, rivers, and riparian areas; and improvement of 403,000 hectares through SLM practices involving 5,000 farmers. Activities include provision of alternative energy (solar, biogas, improved cookstoves, etc.) to households and schools; installation of biogas systems; rehabilitation of dams for water storage and distribution and distribution of water tanks; protection of 40 springs; and development of small-scale irrigation tools.
- 2) **Community livelihood improvement:** Expansion of nature-positive enterprises (with priority value chains including honey, pyrethrum, sunflower, milk, potatoes, and avocado); training of 100,000 farmers; preparation of 100,000 land-use plans; implementation of SLM practices (such as terracing, gabions, grass strips, and agroforestry) across 403,000 hectares; and job creation.
- 3) **Circular economy:** Implementation of awareness campaigns; establishment of waste collection and treatment centers and material recycling centers; and distribution of metal waste bins.
- 4) **Environmental education, education, and governance:** Designation of 500 schools as “Mazingira Clubs” (environmental clubs); annual conferences involving 50 model schools; organization of conservation marathons; and promotion of youth-led innovation.
- 5) **Project management, coordination, and resource mobilization:** (No specific targets indicated.)

To restore 33,000 hectares of forest, approximately four million seedlings are required annually. Accordingly, the target area is divided into blocks, and partner organizations—including government agencies, corporations, and foundations—are assigned to take responsibility for planting in each block. Under this “Adopt a Block” initiative, the estimated cost for afforestation in one block (approximately 10 hectares), including land preparation, pit digging, planting, seedling procurement, transportation, technical support, fencing and protection, and monitoring and evaluation, is approximately 2 million Kenyan shillings. Each partner contributes a designated amount to “adopt” a block, and afforestation is carried out using those funds. To date, blocks within the target area have been allocated to various partners.

The Kenya Forest Service (KFS) leads field-level support for forest restoration; however, the program is community-driven, and communities themselves desire restoration of degraded forests. The livelihood component is critically important, and the program is designed so that communities can derive direct benefits from engaging in forest restoration. Afforestation within blocks is carried out by communities with support from partner institutions. Conventional electric fencing costs approximately 2 million Kenyan shillings per kilometer. In areas requiring wildlife mitigation, such fencing is installed; however, in areas focused on forest restoration, low-cost local fencing is used, enabling the planting of 100,000 trees for restoration of 10 hectares at comparable cost.

15 Billion Trees Program

In addition to MFC-ICLIP, the 15 Billion Trees program aims to plant 15 billion trees nationwide by 2032. This program aligns with the National Landscape and Ecosystem Restoration Strategy 2023–2032, formulated under a presidential directive aimed at bottom-up economic transformation, and commenced

in 2023. Of the 15 billion trees, 30% are required to be fruit trees. Through this program, the objective is to increase national forest cover from the current 12.8% to 30%.

(6) Kenya Forest Service (KFS)

Organizational Structure

The Kenya Forest Service (KFS) is a state corporation mandated to implement activities aimed at the protection, conservation, and sustainable utilization of forest resources pursuant to the Forest Conservation and Management Act of 2016. Its organizational structure consists of a Board of Directors as the highest decision-making body, headed administratively by the Chief Conservator of Forests (CCF), and is composed of six Directorates and three Departments directly under the CCF¹⁴. The hierarchical structure, in descending order, is Directorate, Department, Division, Section, and Unit.

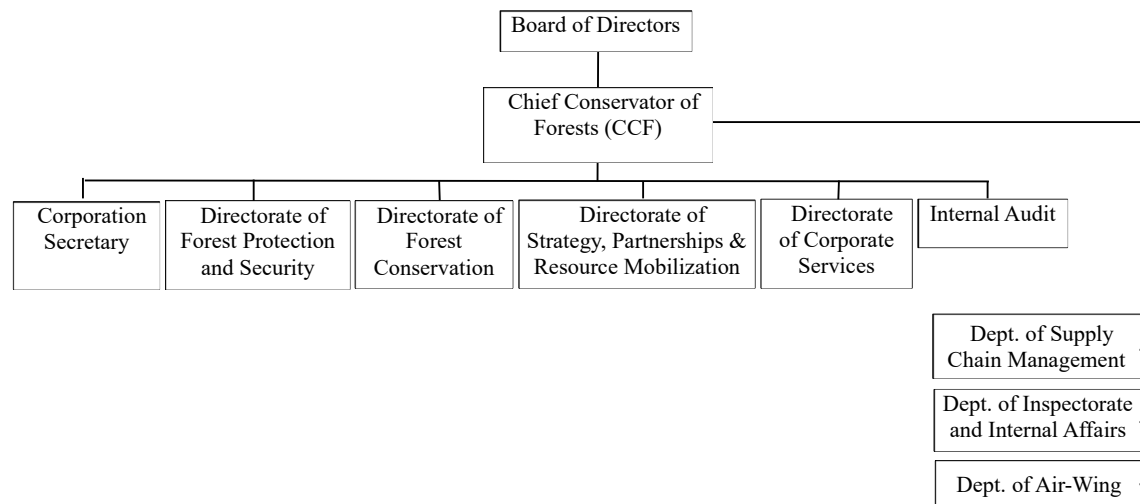


Figure 6 Organizational Structure of KFS (Main Components Only)

KFS manages the entire territory of Kenya by dividing it into ten Conservation Areas (Conservancies) according to vegetation characteristics. Each Conservancy is overseen by an officer responsible for forest conservation and management. Under each Conservancy, there are uniformed law enforcement units tasked with combating illegal activities, technical officers, and officers who provide advisory services to communities and private forestry-related enterprises. Each Conservancy comprises several counties, with designated officers assigned to each county. Beneath this level are Forest Stations.

Major Development Plans and Strategies, and Forest Conservation and Management Activities

KFS has formulated the Strategic Plan 2023–2027 in alignment with Kenya’s national development strategy, Kenya Vision 2030. KFS is responsible for conserving approximately 2.6 million hectares of forest nationwide and 440,000 hectares within the Mau Forest. If properly managed, these forest resources could contribute significantly to Kenya’s economy in various aspects, including climate change mitigation, water supply, and tourism. At the same time, KFS faces the following challenges in undertaking forest management:

- 1) Forest conservation requires patrols by officers and rangers; however, there is a shortage of transportation means, road maintenance capacity, and staff housing necessary to support such patrols.
- 2) In order to achieve forest conservation targets, it is necessary to prepare one billion seedlings annually over the next ten years; however, nursery capacity is insufficient. Technical transfer for seedling production is required.

¹⁴ <https://www.kenyaforestservice.org/organization-and-grading-strcuture>

- 3) Community support is also necessary. Participatory forest management is required to reconcile forest conservation with livelihood improvement for residents who depend on forest resource extraction. There are various approaches to this, including providing financial support for community-led tree planting and other income-generating activities.
- 4) The required level of technical expertise differs by community. For example, some communities identify forest fire management as a key challenge.
- 5) Under JICA's current technical cooperation project, development of the National Forest Monitoring System is nearing completion; however, funding will be required for its operation and continued implementation of monitoring after the conclusion of the technical cooperation project, which may become a challenge.

KFS collaborates with various institutions in forest conservation efforts. It works with government agencies, including the Water Resources Authority (WRA), through the above-mentioned nationwide 15 Billion Trees program. It also collaborates with the Kenya Wildlife Service (KWS), KEFRI, and county governments. In addition, it cooperates with security agencies to combat illegal activities within forests.

Plantation Establishment and Livelihood Improvement Scheme (PELIS)

KFS also collaborates with Community Forest Associations (CFAs) to formulate Participatory Forest Management Plans. Under the management of CFAs, the Plantation Establishment and Livelihood Improvement Scheme (PELIS)¹⁵ is implemented, whereby communities adjacent to forests take the lead in afforestation activities. Under PELIS, individual community members are allocated plots of 0.5 acres for tree planting and are provided with seedlings. In exchange for assuming responsibility for maintaining the seedlings for three years, they are permitted to engage in agricultural activities on the same land during that period. Upon completion, they relocate to another area. For the government, this represents one of the simplest and most cost-effective means of implementing conservation and restoration, while also contributing to the capacity development of local communities.

2.1.2.3. Tanzania

(7) Ministry of Water

The Ministry of Water is the central government ministry responsible for overseeing the management and development of water resources, as well as overall water supply and sanitation services. It is engaged in the formulation and implementation of water resources management and development policies, river basin development and protection of water resources, groundwater development and dam construction, and the development of sewerage and sanitation systems.

Organizational Structure

As shown in the Figure below¹⁶, the Ministry of Water is broadly composed of five Divisions, each of which contains several Sections. In addition, there are independent Units established separately from these Divisions.

¹⁵ <https://www.wfkenya.org/?236570/PELIS-The-Best-Practice-of-Forest-Landscape-Restoration-in-Kenya>

¹⁶ Source: https://www.maji.go.tz/uploads/publications/sw1680014291-muundo%20wa%20wizara_20230328143029.pdf

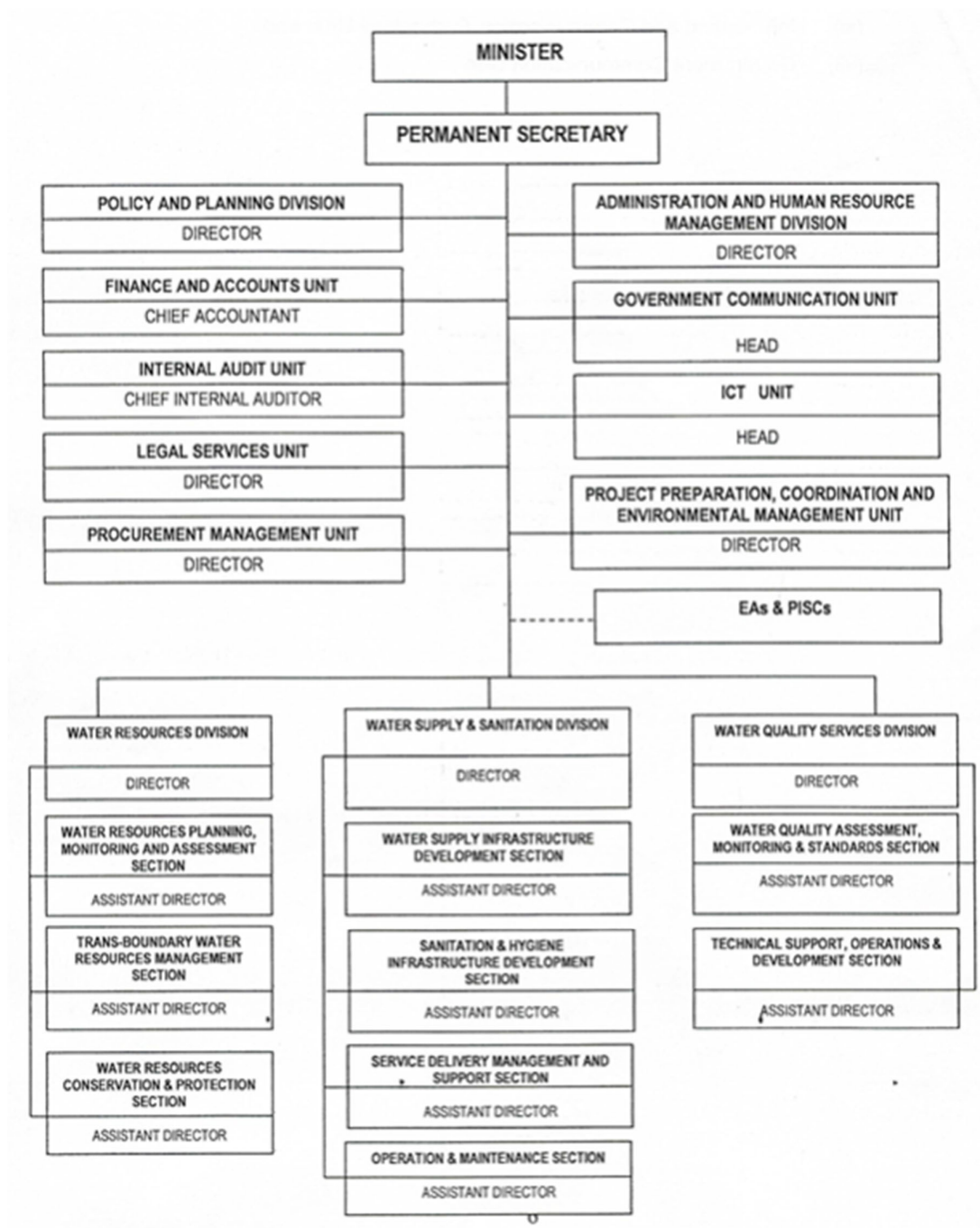


Figure 7 Organizational Structure of the Ministry of Water

In addition, the institutions under the Ministry of Water (Ministry Institutions) include the following¹⁷:

¹⁷ <https://www.maji.go.tz/>

Table 9 Institutions under the Ministry of Water

Ministry Institution
• Water Institute • Rural Water Supply and Sanitation Agency (RUWASA) • Energy and Water Utilities Authority (EWURA) • Basin Water Board (BWB) • Regional WSSAs • National Projects • National Water Fund

Water resources management in mainland Tanzania is carried out by dividing the mainland into nine basins, as shown below¹⁸, and establishing a BWB for each basin unit.



Figure 8 Water Resources Management Units (Basins) in Tanzania

The BWB is one of the institutions under the Ministry of Water and is responsible for the sustainable management, development, and protection of water resources within each basin. Each basin is further subdivided into Catchments, which are managed by Catchment Water Committees. These Committees are composed of multiple Water Users Associations (WUAs), major water users, representatives from the power sector, private sector actors, and other stakeholders.

¹⁸ Source: Ministry of Water (2019) Tanzania Water Resources Atlas

WUAs are formed at the community level for the purpose of protecting water sources and preventing pollution. The size of a WUA varies depending on the characteristics of the river or basin; however, it typically consists of seven to eight villages and, at most, approximately ten villages. Beneficiaries residing around water sources and utilizing water, including for domestic use, are required to become members of the WUA. Each WUA has its own by-laws, and violations such as water pollution or illegal tree cutting may result in coercive enforcement measures.

Accordingly, water resources management is structured into a four-tier system from the national level to the grassroots level, as follows:

1. National Water Board: National level
2. Basin Water Board (BWB): Mainland divided into nine basins
3. Catchment Water Committee: Each basin further divided into Catchments
4. Water Users Association (WUA): Comprising approximately 7–10 villages

Lake Victoria Basin Water Board (LVBWB)

The organizational structure of the Lake Victoria Basin Water Board (LVBWB), which has jurisdiction over the basins surrounding Lake Victoria, is as follows¹⁹.

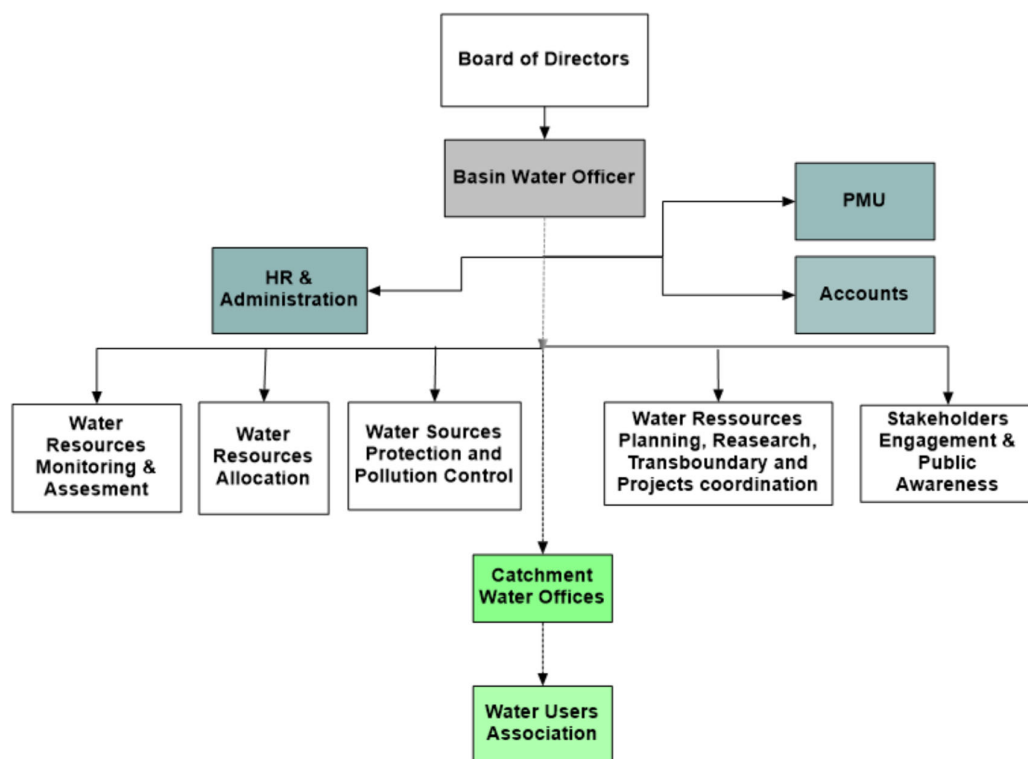


Figure 9 Organizational Structure of the LVBWB

The LVBWB is also composed of the following six Catchments.²⁰

¹⁹ Source: Ministry of Water, Lake Victoria Basin Water Board (2019) Strategic Plan for 2019/2020–2023/2024

²⁰ Source: Ministry of Water (2019) Tanzania Water Resources Atlas.



Figure 10 Catchments within the LVBWB

The total number of staff within the LVBWB is 89, of whom approximately 15 are assigned to the Maramori Catchment Sub-office. The number of staff includes three sociologists at the LVBWB headquarters and an additional three at the catchment sub-offices.

The principal functions and roles undertaken by the LVBWB for the conservation and management of the Mara River Basin are primarily the following three: 1) Assessment and monitoring of water resources; 2) Protection of water sources and pollution control; and 3) Water allocation. In addition, the functions of the Catchment Water Committee include conserving water resources and allocating them for various uses, as well as conducting awareness-raising, tree planting, training, and land management activities at the catchment level.

1) Assessment and Monitoring of Water Resources:

The LVBWB monitors both water quantity and water quality at water sources. To this end, hydrological stations have been installed within the basin to monitor river water levels, discharge, and related fluctuations. Hydrogeological stations also monitor wells to observe changes in groundwater levels. Rainfall gauging stations measure precipitation, and meteorological stations measure temperature and wind speed. Furthermore, telemetry equipment for automatic data measurement has been installed at eight locations.

Regarding participatory water quality monitoring activities involving communities, the LVBWB collaborates with communities, including WUAs, schools, and other stakeholders. Communities monitor physical parameters such as “color changes,” “turbidity,” “odor,” “nitrates,” and “phosphates” (the latter two using test strips), while the LVBWB monitors chemical and biological parameters requiring specialized expertise and laboratory facilities. Results measured by communities are shared monthly with LVBWB headquarters and can also be confirmed at the Catchment Office.

Previously, WWF provided funding to support community-based monitoring activities; however, the LVBWB currently covers daily allowances. Groundwater monitoring is conducted quarterly with the involvement of all medium-scale mining operators within the Mara River Basin (for gold mining activities in the Mara River Basin, see Section 2.2.3.). If pollution is detected through sample testing, legal measures such as fines may be imposed. Large-scale mining companies also demonstrate a cooperative attitude toward water quality monitoring by conducting quarterly monitoring together with communities in areas surrounding mines and by providing support for other monitoring activities.

2) Protection of Water Sources and Pollution Control:

The Constitution of Tanzania stipulates that all citizens have the obligation to protect water resources. Accordingly, under the Water Resources Act, when the LVBWB designates a 60-meter buffer zone

from the main river channel as public land, residents are prohibited from conducting livelihood activities such as agriculture within that zone.

Prior to establishing a buffer zone, the LVBWB must assess the impacts of climate change and human activities. Because this assessment requires time, fewer than 20 water sources have been formally designated to date. In other words, the remaining water sources have not yet been protected. Once an assessment is completed, the designated area is demarcated, awareness-raising activities are conducted within the community, and indigenous tree species are planted within the buffer zone. Finally, the Ministry of Water issues an official notice, and signboards and posters are installed for awareness purposes.

Despite these efforts, there are areas where water source protection has not been adequately achieved, including agricultural activities within buffer zones, pollution caused by livestock excreta at water sources, and tree cutting along riverbanks for fuelwood. One reason is that the LVBWB does not have sufficient resources for water source protection, resulting in areas where demarcation and tree planting have not been implemented. In addition, it is yet to be well-known that permission from the LVBWB is required for water use.

3) Water Allocation:

Water resources are allocated based on an understanding of their quantity and condition in accordance with the National Water Policy and the National Water Resources Act. Water allocation is determined based on the following three priorities: 1) Domestic use; 2) Environmental water; and 3) Socio-economic activities. Based on this prioritization, the LVBWB issues water use permits to water users.

In the Mara River Basin, water users include large-scale gold mining companies, medium-scale miners, and small-scale users, encompassing private companies, individuals, and communities. Permits are issued to those who abstract water using machinery or pumps, construct dams, drill wells deeper than 50 meters and abstract water mechanically, or conduct water harvesting exceeding 20,000 liters, and payment is required according to the volume of water used. The Water Allocation Plan of the Mara River Basin has been formulated, and water allocation is conducted in accordance with this plan.

In basin conservation management, the LVBWB and WUAs collaborate to conduct educational activities in villages and schools and to report and respond to violations related to water use. With support from WWF, activities such as education and training for WUAs and stakeholder consultations have been implemented.

Other stakeholders beyond WUAs include local government authorities such as District Council Offices, the National Irrigation Commission, NGOs, and civil society organizations. In some cases, there is also an expectation to address livelihood improvement for residents; however, the mandate of the Ministry of Water is to supply water. While it can support communities requiring wells, assistance in other livelihood-related areas requires support from other institutions.

Regarding water pollution, the LVBWB has the authority to halt illegal water pollution activities and may impose penalties in accordance with the law when necessary. When farmers or pastoralists engage in activities that cause water pollution, the LVBWB collaborates with District officials, WUAs, and other stakeholders to intervene and halt illegal cultivation or logging. It works with village leaders to conduct awareness-raising and organize community groups in order to discourage prohibited activities. However, controlling migratory pastoralists remains challenging.

The National Environmental Management Council (NEMC) is also one of the key stakeholders collaborating with the LVBWB. In the past, when a malfunction at a dam operated by a gold mining company resulted in acid leakage downstream, causing river pollution, skin rashes, and damage to fisheries, NEMC intervened and imposed a fine of 1 billion Tanzanian shillings on the mining company.

In the Mara River and its tributaries, pollution caused by mercury and cyanide discharge associated with

gold mining activities, as well as nitrate increases resulting from livestock excreta, has become a significant concern.

(8) Ministry of Livestock and Fisheries

The Ministry of Livestock and Fisheries of Tanzania is the central government ministry responsible for overseeing the livestock and fisheries sectors. Its mandate covers rangeland management, animal health and disease control, livestock improvement, development of feed resources, fisheries resource management, promotion of aquaculture, and development of related infrastructure.

(Livestock sector)

Livestock keeping constitutes one of the most important livelihood bases in rural Tanzania, with livestock functioning as assets and sources of income for many households. At the same time, grazing activities are closely linked to water resources, river basin management, and ecosystem conservation. Overgrazing and direct access of livestock to water sources may contribute to land degradation and water quality deterioration. For this reason, the Ministry of Livestock and Fisheries considers balancing livestock development with natural resource management to be a fundamental policy issue.

Organizational Structure

Within the livestock sector, the Ministry comprises multiple specialized departments, including:

- The Department of Rangeland Development and Animal Feed Resources, which is responsible for demarcation of grazing areas, development of pasture resources, promotion of feed production, and support for the formulation of grazing land management plans; and
- The Department of Veterinary and Livestock Health Services, which oversees animal disease control measures, strengthening of veterinary systems, vaccination campaigns, quarantine, and livestock movement control.

While these departments oversee policy formulation, strategy development, and establishment of technical standards at the central level, actual implementation of rangeland management, livestock health services, and extension activities is carried out through Local Government Authorities (LGAs).

Major Development Strategies and Plans

The principal development plan for the livestock sector is the five-year Livestock Sector Transformation Plan (2022/23–2026/27). In light of challenges such as low-productivity livestock breeds, livestock diseases, shortages of water and pasture, inadequate value addition and market infrastructure, and weaknesses in extension services, the Plan identifies the following priority reform areas:

1. Introduction of high-productivity livestock breeds (e.g., large-scale artificial insemination);
2. Water, pasture, and feed resources;
3. Livestock health;
4. Extension services;
5. Research and training;
6. Value addition of livestock products; and
7. Strengthening of the National Ranching Company.

Formulation and Management of Land Use Plans for Grazing Areas

For pastoralists dependent on grazing, securing feed (pasture) and water is critical. Accordingly, similar to the Ministry of Agriculture (described below), the Ministry of Livestock and Fisheries places importance on securing grazing areas and promoting their sustainable management through the formulation of Village Land Use Plans. However, in Mara Region at present, only approximately 5% of villages have formulated land use plans. There is also a significant gap between the area allocated to grazing land under land use plans and the number of livestock kept, with grazing areas often insufficient relative to livestock numbers.

With respect to grazing land management and feed resource development, the following initiatives are

being implemented:

- Promotion of Grazing Land Management Plans: Based on the Grazing Land and Animal Feed Resources Act, management plans are formulated for demarcated grazing areas under the supervision of district livestock officers and village leaders.
- Support for Farmer Field Schools (FFS) for pasture production: Implemented nationwide by extension officers, with technical support and guidelines provided by the Ministry and monitoring conducted twice annually. In the first year, 100 FFS were implemented in 44 districts; in the second year, 150 FFS were implemented in 72 districts. These typically target areas with large livestock populations and high vulnerability to drought.
- Provision of pasture seeds: Pastoralists are provided with pasture seeds to enable establishment of their own grazing lands, ensuring sufficient feed production so that livestock do not need to migrate into river basins or forests. Introduction of high-yield varieties and cultivation guidance are also required.
- Development of water infrastructure for livestock: To prevent direct livestock intrusion into natural water sources while ensuring stable access to drinking water, livestock dams such as charco dams (a traditional method in East Africa, particularly in arid and semi-arid areas of Tanzania, for harvesting water) and earth dams (a traditional embankment-type dam formed by uniformly compacted earth, commonly used for small reservoirs) are constructed. Charco dams are designed to serve up to 20,000 head of livestock and are constructed by the Ministry of Livestock and Fisheries.
- Provision of extension services: Motorcycles are provided to livestock and fisheries extension officers to enable them to visit farmers. Artificial insemination campaigns are conducted across all districts in Mara Region, with approximately 5,760 head inseminated in 2024.

Veterinary Services and Animal Health

The Ministry is strengthening systems for prevention and control of livestock diseases. Nationwide vaccination against Contagious Bovine Pleuropneumonia (CBPP) is currently being conducted. Vaccination against Peste des Petits Ruminants (PPR) for goats and sheep, as well as routine rabies vaccination for dogs and cats, is also implemented. Vaccination against Foot-and-Mouth Disease is planned for areas bordering Serengeti National Park.

Looking ahead, the Ministry intends to strengthen veterinary infrastructure such as livestock dipping facilities, tick control, parasite control, management of transboundary animal diseases (e.g., PPR, Foot-and-Mouth Disease, Rift Valley Fever), continuation of large-scale vaccination campaigns, and capacity development of veterinary personnel.

Furthermore, a nationwide campaign for vaccination and livestock identification has been launched in 2025. The objective is to manage disease and livestock movement. Individual identification clarifies “which village the livestock belongs to,” and formal procedures are required when livestock move outside their village.

(Fisheries sector)

Organizational Structure

Within the fisheries sector, multiple units under the Department of Fisheries Development are responsible for fisheries resource protection and promotion of aquaculture. At the district level, District Fisheries Offices (DFOs) are established. At the community level, Beach Management Units (BMUs) and Community Management Units (CMUs) are organized under institutional frameworks to engage in co-management and conservation along lakeshores and coastal areas.

Major Development Strategies and Plans

Under the National Fisheries Policy (2015), the Fisheries Sector Master Plan (2021/22–2036/37) has been formulated as a strategic framework to strengthen resource management while promoting industrial development for fisheries and aquaculture in mainland Tanzania (excluding Zanzibar).

In addition, with support from FAO, the National Plan of Action for Small-Scale Fisheries Guidelines (2021) was developed through consultations with a broad range of fisheries stakeholders. It outlines necessary actions for combating illegal fishing, promoting co-management, improving value chains, and ensuring gender considerations and social inclusion (including support for women fishers and promotion of participation in decision-making).

For aquaculture, the National Aquaculture Development Strategy (2018–2025) has been formulated. In 2024, the Fisheries (Aquaculture) Regulations 2024 were enacted as a framework for the management and development of all aquaculture activities in mainland Tanzania.

Enforcement Against Illegal Fishing and Resource Protection

The Fisheries Regulations 2009 for mainland Tanzania provide an institutional framework for community-level organizations to participate in ensuring compliance with fisheries regulations and deterring illegal fishing (through monitoring and enforcement).

In Mara Region, with funding from the UK Darwin Initiative, WWF-UK, in collaboration with WWF-Tanzania, the Tanzania Fisheries Research Institute, and district governments, implemented the Community-led Fisheries Management in the Mara Wetlands Project (2022–2025). This included formulation and dissemination of the Mara Wetlands Fisheries Co-management Plan, development of by-laws for BMUs and CMUs, and training on illegal fishing gear, sustainable fishing methods, and monitoring.

Promotion of Aquaculture

The Fisheries Sector Master Plan recognizes that aquaculture development may generate conflicts between aquaculture operators and other stakeholders over the use of natural resources such as water, land, and wetlands. As a strategic intervention, the Ministry is promoting the introduction of zoning and spatial planning in aquaculture by advancing site demarcation and mapping of aquaculture areas.

In Lake Victoria, cage aquaculture has expanded in recent years and is regarded as a key pillar for productivity improvement. However, in many rural areas of mainland Tanzania, pond aquaculture remains predominant, and technical dissemination for productivity improvement is required. Most existing aquaculture ponds are earth ponds, and measures to address seepage due to soil permeability and water shortages during the dry season are necessary. Accordingly, the introduction of technologies such as waterproof liners is considered important.

(9) Ministry of Agriculture

The Ministry of Agriculture of Tanzania is the central government ministry responsible for the agricultural sector, overseeing crop production, the use of agricultural inputs (such as seeds, fertilizers, and pesticides), dissemination and research of cultivation technologies, agricultural land use planning, soil and water management, agricultural mechanization, and related matters. It is responsible for policy formulation, institutional development, establishment of technical systems, and overall coordination of sectoral investments.

Agricultural activities are one of the principal factors directly affecting water quality, water quantity, and ecosystems within lake and river basins. Accordingly, the Ministry of Agriculture plays a critical role in reconciling environmental conservation in river basins with livelihood improvement for rural communities.

Organizational Structure

The Ministry's organizational structure comprises specialized departments, including the Department of Crop Development; the Department of Agricultural Training, Extension and Research; the Department of Land Use Planning and Management; the Department of Agricultural Mechanization and Irrigation; and the Department of Policy and Planning. In addition, it includes cross-cutting units such as the Environmental Management Unit (EMU), which oversees environmental and climate change responses.

However, these departments and units are primarily responsible at the national level for policy and strategy formulation, establishment of technical standards, and capacity development. Actual implementation of programs at the field level is carried out through a decentralized system via Local Government Authorities (LGAs), specifically District Councils (DCs).

Major Development Strategies and Plans

The core development framework for the agricultural sector is the Agricultural Sector Development Programme II (ASDP II) (2017/18–2027/28). Under ASDP II, 23 priority investment areas have been identified across four components: 1) Sustainable Water and Land Use Management; 2) Enhanced Agricultural Productivity and Profitability; 3) Commercialization and Value Addition; 4) Sector Enablers, Coordination, and Monitoring and Evaluation.

Among these, “Component 1: Sustainable Water and Land Use Management” is particularly important in relation to basin management and environmental conservation, with land use planning and watershed/soil management positioned as key investment areas.

The ASDP II Implementation Manual identifies “Land Use Planning and Sustainable Watershed and Soil Management” as a sub-component, promoting zoning and management of land as a prerequisite for reducing land-related conflicts and achieving sustainable production. Elements directly related to climate change adaptation and environmental conservation, such as mainstreaming climate resilience, including Climate Smart Agriculture (CSA), and environmental and social safeguards related to irrigation, are addressed in an integrated manner across the components.

In addition, ASDP II stipulates the formulation of District Agricultural Development Plans (DADPs) as the basic planning framework for agricultural development at the district level. DADPs are designed to implement the priority activities identified under ASDP II at the local level, taking into account needs and proposals from villages and wards.

Promotion of Conservation Agriculture and Climate-Smart Agriculture

In addition to ASDP II, the Ministry promotes conservation agriculture and climate-smart agriculture through official documents such as the Climate-Smart Agriculture Guideline. These emphasize the dissemination and adoption of technologies contributing to soil and water conservation. Major examples include:

- Conservation agriculture: Practices such as replacing deep soil inversion using disk ploughs with subsoilers (which break up hardpan layers beneath the soil without overturning it), covering farmland with cover crops or post-harvest residues, and combining these with crop rotation to improve soil conditions. These practices reduce the impact of rainfall, prevent topsoil erosion, and increase infiltration of rainwater into the soil.
- Slope and erosion control measures: In sloped cultivation areas, contour farming combined with physical structures such as terracing to prevent soil erosion. Afforestation and agroforestry are also promoted where appropriate.
- Water harvesting: Installation of dams and water harvesting facilities to manage surface runoff during rainfall and to utilize stored water effectively for crop production.

Within the Ministry, the Department of Land Use Planning and Management and the Environmental Management Unit (EMU) are responsible for mainstreaming and promoting conservation agriculture and climate-smart agriculture.

Land Use Planning

To prevent friction and conflict between pastoralists and farmers over land use in rural and riparian areas, the Ministry of Agriculture places importance on promoting the formulation of Village Land Use Planning (VLUP), including zoning of grazing areas, agricultural land, livestock corridors, and water

points, in collaboration with other sector ministries.

Within the Ministry, VLUP is overseen by the Department of Land Use Planning and Management. However, the VLUP framework is based on the Land Use Planning Act (2007) and is implemented in accordance with strategies and participatory VLUP guidelines developed by the National Land Use Planning Commission. The overall VLUP system is under the jurisdiction of the Ministry of Lands. The Ministry of Agriculture participates as a related ministry in promoting its implementation.

(10) Ministry of Natural Resources and Tourism

The Ministry of Natural Resources and Tourism of Tanzania is the central government ministry responsible for the conservation and management of the country's natural resources, wildlife, and cultural heritage, as well as for the promotion and development of the tourism sector. Through the management of protected areas such as national parks, forests, and cultural assets, as well as through the promotion of sustainable tourism development and wildlife conservation, the Ministry seeks to balance national economic growth with environmental conservation.

Organizational Structure

The organizational structure of the Ministry is as follows²¹:

²¹ Source: <https://www.maliasili.go.tz/administration/structure>

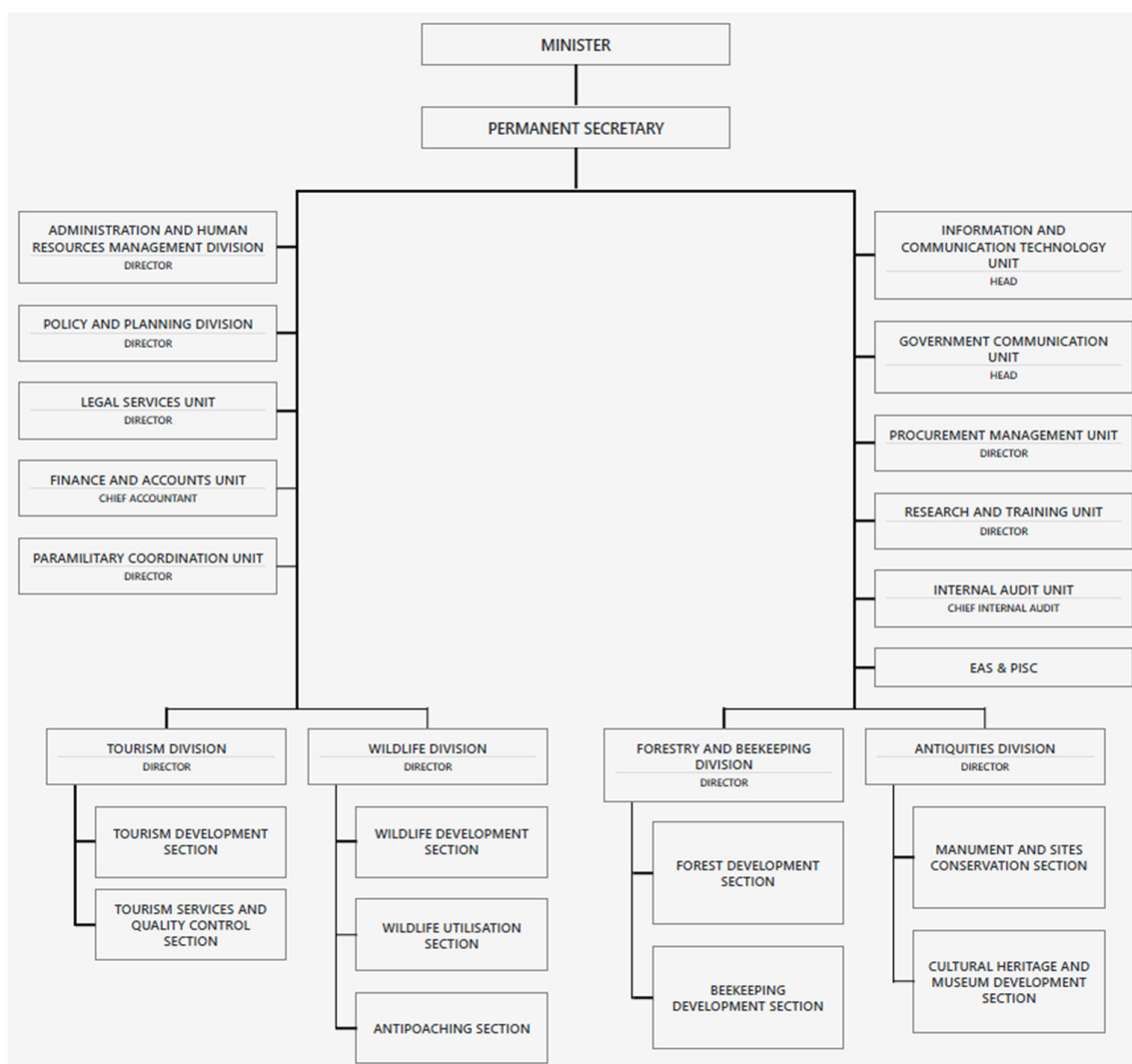


Figure 11 Organizational Structure of the Ministry of Natural Resources and Tourism

Within the mandate of the Ministry, the three sectors considered most relevant to conservation and management of the Mara River Basin are wildlife, tourism, and forestry and beekeeping. In these three sectors, the Ministry oversees the following related institutions:

Table 10 Related Institutions in the Wildlife, Tourism, and Forestry & Beekeeping Sectors²²

Sectors	Institutions
Wildlife	• Tanzania National Parks (TANAPA) • Tanzania Wildlife Management Authority (TAWA) • Ngorongoro Conservation Area Authority (NCCA) • Tanzania Wildlife Research Institute (TAWIRI) • Tanzania Wildlife Protection Fund (TWPF)
Tourism	• Tanzania Tourist Board (TTB) • Tourism Development Levy (TDL)
Forestry and Beekeeping	• Tanzania Forest Services Agency (TFS) • Tanzania Forestry Research Institute (TAFORI) • Tanzania Forest Fund (TaFF)

²² <https://www.maliasili.go.tz/administration/institutions>

Human–Wildlife Conflict in the Mara River Basin

Based on interviews conducted during this survey with the Wildlife Division, the Division’s explanation and views regarding the current challenges related to conservation in the Mara River Basin are summarized below.

- From the perspective of the Wildlife Division, the most significant challenge related to conservation and management of the Mara River Basin is the mitigation of human–wildlife conflict. The Ministry of Natural Resources and Tourism provides compensation for human injuries, fatalities, and crop damage caused by wildlife; however, this approach cannot be considered sustainable in the long term. The Division is responsible for returning wildlife that have strayed from national parks into residential areas back to protected areas, as well as for providing compensation and consolation payments for crop damage and human casualties.
- Under the compensation rules, damage occurring within 500 meters of a protected area boundary is not eligible for compensation. However, in some cases farmlands immediately outside protected area boundaries suffer damages by wildlife. The Wildlife Division’s jurisdiction extends to any location where wildlife appears; therefore, even if a person is attacked 100 km away from a protected area, the incident falls under the Division’s responsibility. Along the shores of Lake Victoria, damage caused by crocodiles is particularly frequent.
- Currently, the Wildlife Division is reviewing its ten-year management strategy for human–wildlife conflict. The revised strategy is expected to be the first to incorporate other sectors such as agriculture, livestock, and land use planning. The overarching objectives of the new strategy are limited to two: (1) preventing wildlife from leaving protected areas; and (2) preventing community members from entering protected areas. Under these two objectives, specific targets and activities are defined. However, the primary challenge lies in implementation.
- With respect to the Memorandum of Understanding (MOU) concerning conservation and management of the Mara River Basin, activities within the basin affect both Kenya and Tanzania. In the past, discussions reportedly arose on the Kenyan side regarding large-scale dam development plan, which were also brought to the East African Community (EAC) for deliberation. The Great Serengeti ecosystem, including the wildebeest migration, depends on the Mara River. If natural resources are not conserved, the Mara River may dry up; if the wildebeest migration were to stop, both Kenya and Tanzania would suffer severe impacts. It is therefore necessary to organize and clarify how to address the challenges related to conservation and management of the Mara River Basin, as well as the broader challenges across the entire Lake Victoria Basin.

(11) Water Institute

The Water Institute is one of the institutions under the Ministry of Water and is a technical and vocational education and training institution with a history of more than 50 years, having been established in 1974. Its primary mandate is the development of specialized human resources to strengthen capacity in the water sector, and it also conducts research and consultancy services related to water and sanitation. The Institute is headed by a Rector and employs a total of 223 staff members, of whom 134 are academic and research personnel and 89 are administrative staff.

Organizational Structure

The organizational structure of the Water Institute is as follows:

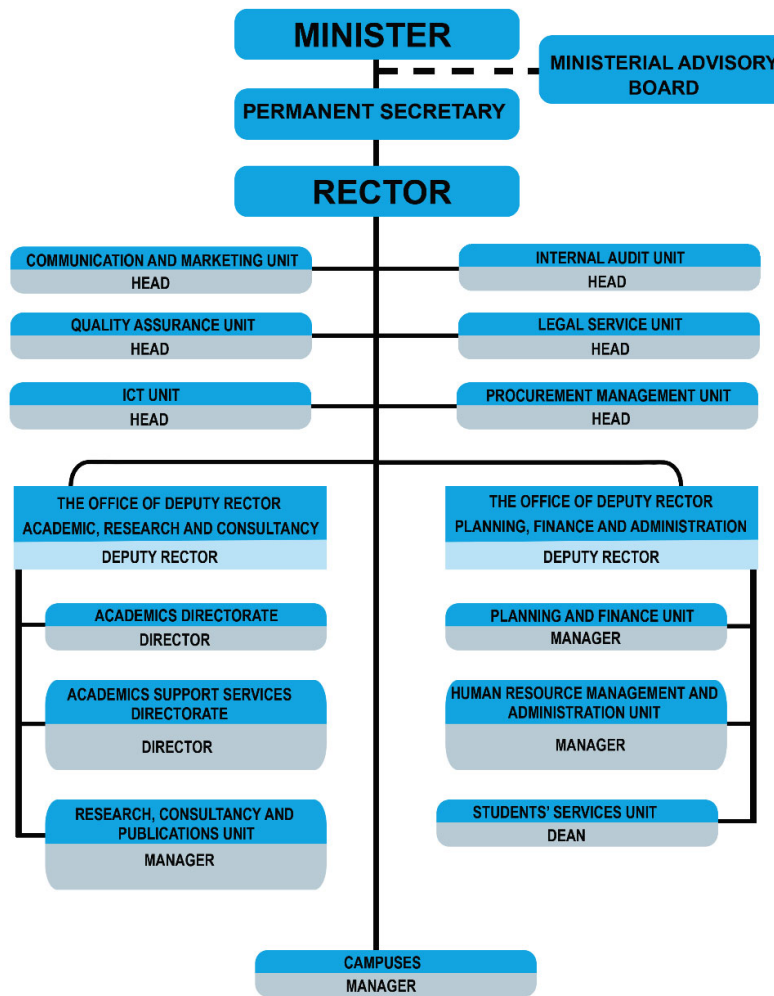


Figure 12 Organizational Structure of the Water Institute²³

Human Resource Development and Training Programs

The Water Institute offers a wide range of short-term and long-term training programs and has the flexibility to design customized programs according to specific requests. It trains highly skilled technicians as well as diploma-, bachelor's-, and master's-level graduates. In addition to engineering disciplines, it also develops development specialists in the social sciences. Staff engaged in basin management are often required to possess master's-level competencies.

Within the framework of “water and sanitation,” the Institute covers all areas, including groundwater, surface water, and potable water supply. Its fields of specialization include geology, geophysical exploration, hydrology, hydrogeology, water harvesting, water supply, water resources management, water quality management, community development, surveying and geospatial information, and operation and maintenance of facilities, among others. Currently, more than 5,000 students are enrolled, and more than 650 students graduate each year. The long-term programs at diploma, bachelor's, and master's levels include the following courses in the figure below:

²³ Source: <https://www.waterinstitute.ac.tz/pages/organization-structure>

MASTERS DEGREE PROGRAMMES	ORDINARY DIPLOMA PROGRAMMES
1. Master of Engineering in Water Resources and Utility Management	1. Ordinary Diploma in Sanitation Engineering
2. Master of Engineering in Water Supply and Sanitation Engineering	2. Ordinary Diploma in Water Supply Engineering.
3. Master Degree in Water Quality and Laboratory Management (New)	3. Ordinary Diploma in Hydrology and Meteorology.
4. Master Degree in Sanitation Management (New)	4. Ordinary Diploma in Hydrogeology and Water Well Drilling
	5. Ordinary Diploma in Water Quality and Laboratory Technology.
	6. Ordinary Diploma in Irrigation Engineering.
	7. Ordinary Diploma in operation and maintenance of water systems Engineering. (New)
	8. Ordinary Diploma in Community Development for Water and Sanitation. (New)
	9. Ordinary Diploma in Quantity Surveying for Water and Sanitation. (New)
	10. Ordinary Diploma in Geomatics for Water and Civil Work Management (New)
	11. Ordinary Diploma in Plumbing Engineering (New)
	12. Ordinary Diploma in Pump Mechanics Engineering (New)
BACHELOR DEGREE PROGRAMMES	
1. Bachelor's Degree in Water Resources and Irrigation Engineering.	
2. Bachelor Degree in Community Development for Water Supply and Sanitation	
3. Bachelor Degree in Hydrogeology and Drilling	
4. Bachelor Degree in Engineering Hydrology	
5. Bachelor Degree in Sanitation Engineering	
6. Bachelor Degree in Water supply Engineering	
7. Bachelor Degree in Quantity Surveying for Water and Sanitation (New)	
8. Bachelor Degree in Water Quality and Laboratory Technology. (New)	
9. Bachelor Degree in Plumbing and Service Engineering (New)	

Figure 13 Long-term Programs (Diploma, Bachelor's, and Master's Levels)²⁴

The Water Institute works closely with institutions under the Ministry of Water, such as water utilities and basin water offices, in delivering training programs. Furthermore, given that fluoride contamination has become a major concern in the Rift Valley, the Institute also conducts research on addressing fluoride contamination in both groundwater and surface water.

2.1.2.4. United Nations Agencies

(12) UNESCO

Organizational Structure

Within UNESCO, the Division of Water Sciences under the Natural Sciences Sector is responsible for programs related to integrated hydrology. UNESCO maintains a global network known as the “UNESCO Water Family,” which connects Headquarters, the Secretariat of the Intergovernmental Hydrological Programme (IHP), water specialists in regional offices, and National Commissions for UNESCO in 70 countries. Through these National Commissions, governmental bodies established within each country, UNESCO maintains direct institutional linkages with national governments.

UNESCO collaborates with research institutes and universities to develop various open-access and open-source tools for environmental assessment and implementation of interventions. These tools can be deployed in countries and governments requiring them, accompanied by capacity development and knowledge transfer. Examples include early warning systems for predicting floods and droughts, and tools such as the Water Quality Portal, which monitors lakes using satellite data. Through these tools, UNESCO supports governments in making decisions based on scientific evidence and assessments. UNESCO also conducts activities targeting transboundary river basins and transboundary aquifers. Furthermore, UNESCO operates IHP-WINS, an information network system on water that is freely

²⁴ Water Institute (2026) Water Institute History and Story since 1974.

accessible to anyone worldwide and allows for data accumulation and sharing.

Programs Implemented by the Intergovernmental Hydrological Program (IHP)

The Intergovernmental Hydrological Program (IHP) currently implements the following four initiatives:

- 1) **Lake Turkana Program:** A 10-year project funded by the Government of the Netherlands, initiated several years ago in collaboration with the World Food Programme (WFP). Lake Turkana is a transboundary lake located between Ethiopia and Kenya. WFP is responsible for components related to nutrition, livelihood improvement, and fisheries value chains, while UNESCO is responsible for knowledge management and related components. Various tools are being utilized for assessing and managing Lake Turkana's resources, including groundwater assessments, water quality monitoring, and fisheries productivity models.
- 2) **Action on Water Adaptation and Resilience Initiative (AWARe):** An initiative aimed at promoting sustainable water resources management and climate change adaptation.
- 3) **Groundwater for Resilience Project:** Implemented in collaboration with the World Bank and UNDP. Under this large-scale World Bank initiative, UNESCO supports data sharing by developing information systems for groundwater data collection and management in cooperation with multiple countries. Through IHP-WINS, UNESCO also supports the establishment of transboundary groundwater information systems and the development of protocols for cross-border data sharing.
- 4) **Kilimanjaro Project (Planned):** A project is scheduled to commence in the Kilimanjaro region to assess both the quantity and quality of groundwater using various methodologies. In addition, UNESCO is implementing groundwater-related initiatives in Mauritius and Madagascar.

Programs Implemented by the Man and the Biosphere (MAB) Programme

Furthermore, the following six projects under the Man and the Biosphere (MAB) program may be relevant to the conservation of the Mara River basin:

- 1) **Biodiversity and Ecosystem Services Network (BES-Net):** Closely related to landscape conservation in the Mara River Basin, this initiative seeks to collect Indigenous and Local Knowledge (ILK) from the Ogiek community in the Mau Forest—an Indigenous community traditionally dependent on hunting and gathering—through participatory approaches. The aim is to integrate this knowledge into ecosystem monitoring systems and databases. In particular, oral histories and traditional knowledge from elders are documented and incorporated into national ecosystem and biodiversity monitoring portals.
- 2) **Mau Forest Complex Integrated Conservation and Livelihood Improvement Programme (MFC-ICLIP):** This initiative (See also Section 2.1.2.2, “(5) Ministry of Environment, Climate Change and Forestry.”) receives support from multiple international and local organizations, including UN agencies, NGOs, universities, and community organizations. The Mau Forest has been significantly degraded due to commercial logging and the harvesting of medicinal plants. While the harvesting of medicinal plants does not inherently cause degradation, improper harvesting practices—such as incorrect bark removal—can kill plants. Although Indigenous communities traditionally practiced sustainable harvesting methods, this knowledge has not been adequately transmitted to younger generations, leading to a decline in important native medicinal plant species.

In addition to afforestation, the program supports sustainable agriculture and clean energy solutions. For example, it addresses issues such as women's exposure to smoke from cooking with firewood. The program also utilizes the Climate Risks Informed Decision Analysis (CRIDA) tool. Communities—including primary school students—participate in monitoring activities such as tracking seedling survival rates, forest restoration progress, and biodiversity indicators. Given existing human-wildlife conflicts both inside and outside forest areas, involving students in monitoring also serves as an educational process.

- 3) **Mount Elgon Transboundary Biosphere Reserve:** Mount Elgon, located on the border

between Kenya and Uganda, is the source of several rivers that, like the Mara River, flow into Lake Victoria. In 2023, UNESCO designated this area as a Transboundary Biosphere Reserve (TBR). Five Indigenous communities reside in the surrounding areas. UNESCO focuses primarily on promoting coexistence between people and nature. Planned activities include promoting agro-ecosystems for biodiversity conservation and food security, conducting comprehensive biodiversity assessments, identifying climate-related hazards such as droughts, floods, and landslides, and assessing socio-economic risks. These efforts aim to evaluate communities' adaptive capacity to climate change and biodiversity shifts.

- 4) **Advancing Knowledge for Long-Term Benefits and Climate Adaptation Through Holistic Climate Services and Nature-Based Solutions (ALBATROSS):** Advancing Knowledge for Long-Term Benefits and Climate Adaptation Through Holistic Climate Services and Nature-Based Solutions (ALBATROSS) is an EU-funded climate initiative implemented in Kenya, Ghana, South Africa, Madagascar, and Tanzania. The project conducts extensive studies to understand the complex interactions between climate, ecosystems, and communities. Findings are compiled into policy briefs at national and county levels and shared with policymakers across multiple governance levels. The results are also disseminated to communities. Although the Mara River is not a direct project site, the outcomes can be applied in other parts of Kenya, including the Mara River Basin.
- 5) **Transboundary Ecosystem-based Climate Resilience and Disaster Risk Reduction in Eastern Africa Programme (TECREAP) (Under formulation):** This LVBC-led initiative aims to secure funding from the Adaptation Fund and implement activities across the Lake Victoria Basin countries (Kenya, Uganda, Tanzania, Rwanda, and Burundi). The program will map disaster hotspots to enhance ecosystem-based climate resilience and disaster risk reduction. According to the Intergovernmental Panel on Climate Change (IPCC), East Africa is projected to experience increased rainfall by 2050; therefore, strategies to manage flood volumes are being examined. The program aims to strengthen early warning systems involving 43 million households, including communities, fishers, and women, to monitor lake and river water levels. Capacity building will also be provided to ensure that activities are integrated into government policies and sustainably implemented.
- 6) **Registration of Lake Victoria as a Transboundary Biosphere Reserve (TBR):** The Kenya National Commission for UNESCO (KNATCOM) is the governmental body responsible for biosphere reserve designations in Kenya. LVBC is working with the five Lake Victoria Basin countries toward the registration of Lake Victoria as a TBR. To qualify, each country must first designate a national Biosphere Reserve (BR). Therefore, National Commissions for UNESCO in each country play a significant role. LVBC collaborates by preparing preliminary reports; however, funding constraints remain a major challenge.

Towards the Establishment of a Transboundary Biosphere Reserve (TBR) in the Mara River Basin

Regarding the idea of designating the Mara River Basin, which spans Kenya and Tanzania, as a TBR, the following advice was provided:

- The Serengeti–Ngorongoro area in Tanzania is already designated as a BR; however, the Mara Wetlands are outside its current boundary. As a long-term strategy, it would be technically feasible to first designate a Biosphere Reserve on the Kenyan side, with the Mara–Maasai Mara area as the core zone; then expand the Serengeti–Ngorongoro BR in Tanzania to include the Mara Wetlands as a buffer zone; and subsequently integrate both national BRs into a Transboundary Biosphere Reserve.
- When nominating areas including the Mau Forest as a BR in Kenya, consultations with highly organized Indigenous communities in the target area—including NGOs representing them—will be essential. Respecting and incorporating Indigenous knowledge systems and governance structures of forest-dwelling communities is critical.
- Maasai Mara National Reserve could serve as a core area. Parts of the Mau Forest could function as buffer zones and other parts potentially as core areas. The delineation of transition zones

should appropriately follow administrative ward boundaries. Maasai Mara National Reserve is also pursuing World Heritage inscription and is already on the tentative list. Establishing a BR buffer zone around the World Heritage site could complement this process. A precedent exists in Mount Kenya and the Lewa area, which were first inscribed as World Heritage sites and subsequently designated as BRs. Any expansion of World Heritage areas must be justified during periodic review processes. While time-consuming, the process is feasible.

- Engagement of the EAC is important in pursuing a TBR for the Mara River Basin. UNESCO is currently finalizing a comprehensive MOU with the EAC covering five sectors, including the environment sector; the process has taken considerable time but is nearing completion.
- LVBC also plays a critical role. During the Mount Elgon TBR registration process, LVBC supported initial stages and provided financial assistance to KNATCOM for stakeholder workshops. LVBC is particularly effective in securing government endorsement for projects, which constitutes part of its coordination function. When JICA proposes a new transboundary project, obtaining government support and official letters from each country falls within LVBC's coordinating role. Therefore, consultation with LVBC is strongly recommended.

(13) UNEP

Data Assessment and Analytical Tools for Freshwater Ecosystems

UNEP has developed the following tools that can be utilized in the field of freshwater ecosystems:

- 1) **Freshwater Ecosystem Explorer:** UNEP has developed a completely free and open-access portal that compiles all information collected by UNEP in relation to SDG Indicator 6.6.1 (change in the extent of water-related ecosystems over time), namely assessment data on changes in freshwater ecosystems. Statistical information at the national level or river basin level can be accessed anywhere in the world. River discharge data dating back to 2000 are available, and detailed annual data series can be obtained to observe changes over time. The portal also includes information on surface water, permanent water bodies, reservoirs, and changes in seasonal water bodies. If there is interest in a specific lake, detailed information can be confirmed by clicking the relevant link. Some data on protected areas are also included, and information at the basin level can be extracted.
- 2) **Global Wetlands Watch (scheduled for completion in 2026):** This is an initiative currently being implemented in collaboration between UNEP and UNEP-DHI, aimed at mapping freshwater ecosystems as a whole at high resolution. Using satellite data and machine learning processes, these ecosystems are classified based on globally standardized ecosystem typologies. Ultimately, approximately 24 indicators will be developed and integrated into the Freshwater Ecosystem Explorer. Diverse wetland types that have never before been mapped at the global scale will be identifiable at very high resolution. With support, it will also be possible to provide statistics tailored to specific projects.

In addition, UNEP, in collaboration with UNESCO and GIZ, is currently implementing a pilot project to establish a data-sharing mechanism among four countries: Tanzania, Kenya, Rwanda, and Uganda. At present, protocols and procedures are being organized, and it is expected to serve as a foundational platform enabling newly developed models and tools to function effectively. In this way, UNEP is working to develop infrastructure that allows freshwater ecosystem data to be accessible to everyone.

Initiatives Concerning Lake Victoria and Transboundary Basins

UNEP-DHI is also undertaking initiatives in transboundary basins related to Lake Victoria, as follows:

- 1) **CREATES Project:** This is a large-scale project implemented jointly with IUCN. It is positioned within the framework of the Team Europe Initiative. The project period is five years, with a total amount of approximately EUR 40 million, and implementation has just commenced with funding provided by Denmark. It targets two transboundary river basins. The first is the Sio-Malaba-Malakisi River Basin, located north of the Mau Forest, with Mount Elgon as its

water source; part of this basin flows into Lake Victoria, and part flows further downstream. The second is the Mara River Basin. This project is highly comprehensive, with major pillars including strengthening institutional and organizational capacity, improving tools and systems for decision-making, and strengthening transboundary cooperation. In addition, implementation of Nature-based Solutions on the ground constitutes an important component.

- 2) **Online training on ILBM:** This training was developed in response to the 2022 UN resolution, and ILEC provided some feedback to UNEP. However, there are currently no concrete plans for the next fiscal year. If the training is to be continued, it is considered necessary to update the content, and further discussion will be required on that point.

UNEP is also engaged in climate change adaptation, and among these efforts, the following are considered to be related to Lake Victoria or transboundary management:

- 1) Over the past five years, mainly in collaboration with LVBC, UNEP has worked on ecosystem-based adaptation projects in transboundary ecosystems. Through a USD 5 million project funded by the Adaptation Fund, transboundary resource management and early warning systems at the regional level were strengthened, but the project has very recently been completed. At present, UNEP is again working with LVBC on a new proposal to be submitted to the Green Climate Fund (GCF). This initiative addresses climate change challenges in the Lake Albert Basin (located on the border between Uganda and the Democratic Republic of the Congo and forming part of the upper Nile), the Mount Elgon system, the Kagera River region, and the Mara River Basin, and aims to strengthen integrated transboundary management to address climate risks and disasters by supporting regional institutions such as EAC and LVBC. It originally began with support from USAID, subsequently obtained funding from the Adaptation Fund, and is now seeking expansion.
- 2) A concept currently under consideration targets six EAC member states excluding Somalia and the Democratic Republic of Congo, with a total amount of approximately USD 120 million. It integrates climate-smart agriculture and innovative adaptation options in both upstream and downstream areas. It also focuses on the issue of nutrient inflows into Lake Victoria and on flood risks resulting from insufficient flow regulation from the Mara River Basin toward South Sudan and the White Nile.
- 3) Meetings have been held with UNESCO to consider how to involve the private sector. For example, Yamaha of Japan has expressed interest in the issue of nutrient inflows into the Lake Victoria Basin, and possibilities are being explored for engagement through carbon credits and other mechanisms. In such cases, co-financing through its own funds would be a prerequisite. It is expected to provide significant assistance in securing co-financing in GCF and other fund-based projects.
- 4) Small-scale grant programs are also being advanced, including transboundary projects between Tanzania and Malawi and between Uganda and South Sudan. In addition, collaboration with universities to explore innovative adaptation options is progressing.

2.1.3. Field Visit Results in the Mara River Basin

2.1.3.1. Field Visit in Kenya

(1) Mau Forest

The South Western Mau Forest Reserve, which forms part of the Mau Forest, belongs to Bomet County, while the Masai Mau Forest Reserve belongs to Narok County. The Mau Forest constitutes the headwaters of 12 rivers. Of these, rivers that serve as the sources of the Mara River and the Sondu River flow through Bomet County. The Mara River originates from the Nabuiyabui Swamp (elevation 2,932 m) in the Mau Forest and flows from the Nyangores Forest (Masessa area) in Narok County as the Nyangores River, which is the principal river of Bomet. Other major rivers in Bomet—namely the

Kiptiget River, Itare River, and Kipsonoi River—converge to form the Sondu River, which ultimately flows into Lake Victoria.

The following summarizes the information obtained in each county and in the Mau Forest.

1) Bomet County

In Bomet County, the Nyangores River flows through the center of the town, while the Amala River flows along the boundary with Narok County. These two rivers merge within Bomet County to form the Mara River, which then flows into Tanzania. The headwaters of these two rivers are also common, both originating from the same Abuya wetland.

Agriculture and Livestock keeping

In the upper reaches of the rivers, tea plantations are cultivated, and soil erosion is kept to a minimum. In the areas downstream up to the confluence with the Mara River, mixed farming combining agriculture and livestock is practiced. Agriculture includes cultivation of maize and beans (which constitute a very important value chain locally and are supported by three irrigation schemes), as well as horticulture.

While some irrigation exists, the majority of farming is rain-fed. Farmland has been developed by residents up to the riverbanks; however, as riparian conservation must also be promoted, discussions are being held with residents, and countermeasures are encouraged, such as providing avocado as an alternative livelihood instead of grain cultivation, and planting Napier grass. In agriculture, the invasive species dodder (*Cuscuta* spp.) has encroached, and armyworms are affecting grain production. Tea production is also being reduced by a pest known as the tea mosquito bug (*Helopeltis theivora*).

Although livestock keeping activity in the downstream area is limited, livestock drink water from the rivers, especially during the dry season. When livestock descend to the river, slopes are degraded, leading to riverbank erosion. In rural areas, piped water systems are not developed. A small number of pastoralists have installed cattle dips along the river, but chemical runoff from these facilities sometimes flows into the river, causing pollution.

Thus, both agriculture and livestock activities pose risks of riverbank erosion. In some areas, erosion has progressed, increasing water turbidity and resulting in pollution. In hilly areas in particular, soil loosens during the dry season and is eroded during the rainy season, causing significant water quality deterioration. Water between the forest and tea plantations remains clear, but quality deteriorates in inhabited areas where mixed farming is practiced. In particular, sewage in urban areas also has an impact.

Beekeeping is also practiced along the riverbanks, and many beehives installed by beekeepers can be observed. The primary water sources for beekeeping are the two rivers mentioned above, and when riparian vegetation decreases during the dry season, honey production also declines.

Regarding human–wildlife conflict, damage caused by elephants has been reported. When elephant forage becomes scarce during the dry season, elephants migrate northward from the Masai Mara into the downstream areas of Bomet, consuming crops and occasionally causing human fatalities. However, elephant damage is not recognized within the forest itself. Additionally, transmission of diseases from wildlife to livestock (anthrax, foot-and-mouth disease, rabies, etc.) is a major problem. Infection appears to occur when livestock are taken into conservancies to drink water.

Fisheries

The main fish species in the rivers include Labeo, Barbus, and catfish. Cultured species include Nile tilapia and catfish. Aquaculture is practiced in tributaries, dams, and wetlands.

Recently, drought conditions have persisted, and water levels in major rivers such as the Nyangores and Amala, as well as their tributaries, have declined, leading to a decrease in fish populations. Reduced riparian vegetation has increased evaporation and raised water temperatures, affecting fish spawning grounds. Lower water levels may also have made fish more susceptible to predation and capture by

fishers, contributing to declines in fishery resources. To address these issues, in addition to ponds and dams that create microclimates around the Mara River, new dams and ponds are being constructed.

In addition to water quantity issues, water quality issues have also been identified, including environmental degradation and pollution caused by fertilizers and pesticides flowing from farms, land tenure conflicts, and insufficient funding for water resource utilization and development.

Future plans for the fisheries sector include construction of a modern fish hatchery to improve fry production and ensure sustainable supply of high-quality fishery resources, with the Fisheries Department involved in project planning, site selection, implementation guidance, and monitoring and evaluation.

Related institutions in the fisheries sector include NEMA (National Environment Management Authority), which enforces strict environmental regulations; NGOs such as WRUAs, which conduct awareness-raising and livelihood improvement projects; and local communities, which implement catchment conservation activities such as tree planting and soil conservation.

Water Supply

The Nyangores River is the principal river in Bomet County, and numerous water projects have been implemented. A gravity-fed water scheme is planned. Currently, water is pumped, which is costly. Non-revenue water exceeds 80 percent.

There are three irrigation schemes along the river, supported by the Red Cross and the African Development Bank. Two are operational, and one is under construction. Small dams have also been constructed to supplement domestic and livestock water supply.

A major challenge in the region is encroachment by residents within the catchment. When the dry season is prolonged, springs may dry up. Wells have been dug, but productivity is low and fluoride and iron concentrations are high, making the water unsuitable for domestic use. The county corporation Bomet Water and Sanitation manages water supply and sewerage. Water is abstracted from the Amala River at Mulot, near the boundary with Narok county, while sewage collection and treatment are conducted in Bomet county. Major towns such as Bomet and Longisa, as well as four tea processing factories, exist in the Mara River Basin, but they operate independent water supply systems separate from county services. Development of water supply and sewerage management remains a challenge.

Mara River Basin Conservation Efforts

Institutions involved in Mara River Basin conservation include the ministries of both countries, as well as WWF, KFS, KWS, and Community Forest Associations (CFAs). KFS engages in forest conservation and restoration through provision of seedlings, awareness activities in schools, establishment of nurseries, and provision of seeds. It also promotes agroforestry and responds to forest fires. Within Bomet County, one CFA has been established for each of the four Forest Stations, including indigenous communities living around the forests. CFAs comprise groups utilizing forests in various ways, including beekeeping groups, livestock grazing groups (goats, cattle, sheep, etc.), and medicinal plant collectors. Each group is registered as a forest user group, and the CFA provides the framework for forest management. Each Forest Station formulates a management plan, involving the CFA in its preparation. Within these plans, CFAs are permitted to cut and carry grass from the forest as fodder to prevent grazing within the forest.

Encroachment by residents is a major forest management challenge. In some areas, extensive forest land has been cleared due to settlement. Currently, solar-powered fencing is being installed to prevent intrusion by residents and livestock. Wildlife intrusion is not considered a major problem within the forest.

Several small forests forming part of the Mau Forest are located in southwestern Bomet County, including Kapchumbe Forest. In one of these forests, livestock were expelled to protect the forest, and installation of beehives within the forest has been permitted, resulting in high honey productivity.

Despite these efforts, drought reduces water levels even when irrigation is practiced, creating difficult conditions. Wastewater treatment facilities are also exceeding capacity. River water pollution caused by runoff from towns, including mercury, is serious. While there are no mines, pollution sources include both point and non-point sources, primarily soil erosion from farmland (excluding tea plantations), inflow of fertilizers (nitrogen and phosphorus), effluent from Tenwek Hospital, and heavy metals from beauty salons, car wash stations, and discarded vehicle batteries.

The Mau Forest is in the process of recovery. Bomet and Narok Counties, located south of the Mau Forest, have experienced water quality deterioration due to human factors. Policies are currently being formulated to address land fragmentation, population pressure, biodiversity loss, and habitat loss. Efforts are being made to ensure food security while clearly demarcating land boundaries to prevent encroachment and secure space for wildlife.

Water scarcity is attributed to forest degradation in the Mau Forest, and forest restoration is considered a key countermeasure. One of the major challenges is human–wildlife conflict, and in order to prevent such conflicts, policies are being formulated regarding residents’ entry into forests. Another key issue concerns the development of a benefit-sharing model between Narok and Bomet Counties to avoid conflicts over revenues derived from transboundary resources. Narok considers that it has a larger protected area within its county and seeks a greater share of revenue. Discussions have become necessary regarding revenue allocation ratios and land rights.

Future plans include the County Integrated Development Plan (CIDP), a five-year development plan covering all sectors, emphasizing mainstreaming of environmental conservation services and strengthening coordination among multi-sector stakeholders at national and county levels. A Food & Nutrition Multi-sectoral Policy also exists. In the water sector, in addition to the Riparian Lands Protection Policy, there is a county water master plan promoting access to safe water, establishment of sewerage systems, and inter-agency coordination. However, there is no inter-sectoral water allocation plan within Bomet County. The livestock master plan includes Integrated Riparian Management, which covers introduction of perennial fodder crops along riverbanks, tree planting for soil conservation and erosion reduction, and installation of embankments to create watering points away from riverbanks. In fisheries, measures include conservation of fishery resources, construction of hatcheries, and interventions in rivers, lakes, and dams.

Communities are the groups closest to nature. An example of community initiative is the Chepalungu Wildlife Sanctuary. In Chepalungu, located in southwestern Bomet, surrounding communities historically benefited from forest use, including livestock grazing, which led to degradation and conflicts over forest encroachment in 2007–2008. Subsequently, forest restoration efforts were undertaken in collaboration with the county government and other institutions. The government has requested residents to relocate from forests, installed fencing, and planted indigenous species. At the same time, it promotes the establishment of forest user associations to involve residents in conservation, strengthens their capacity, and promotes alternative livelihoods such as beekeeping and tourism to generate income and foster coexistence with wildlife.

Since 2018, communities have implemented activities in accordance with CFA management plans in collaboration with KFS. The CFA management plan forms part of MFC-ICLIP and includes community empowerment plans to reduce dependence on forests while incorporating stakeholder interests. For other communities relocated from conservation areas, KFS supports introduction of “Zero Grazing,” whereby pastoralists are permitted to enter forests to cut grass and carry it home to feed livestock, thereby preventing overgrazing within forests.

Bomet is the county with the highest tea production, and it plans to promote Tea Tourism and events such as Tea Marathons leveraging its scenic landscapes, tea plantations, and tea factories. Residents with livestock graze animals outside the forest. Additional initiatives include irrigation-based agriculture along the basin, capacity development, and adoption of alternative livelihoods. These activities are implemented through WWF.

2) Narok County

Within Narok County, there is a community forest called the Masai Mau Forest. This is the only community forest among the 22 forest blocks that make up the Mau Forest, and it is managed by the community. Within the same ecosystem, there are also four state forest reserves under the jurisdiction of KFS: Ol Posimoru Forest Reserve (FR), Nairotia FR, Olenguruone FR, and Nyangores FR. These are located outside Masai Mau, but all are comprehensively managed by KFS as important components of the Mau Forest ecosystem. In addition, two important rivers in this area are the Amala River and the Nyangores River. These two rivers flow downstream from the Mau Forest and merge outside the forest to form the Mara River.

In the southern part of Narok County bordering Tanzania, there is the world-famous Masai Mara National Reserve. National parks are under the jurisdiction of KWS, while national reserves are under the jurisdiction of county governments, and the Masai Mara National Reserve is a valuable source of foreign currency earnings for Narok County. For the Masai Mara National Reserve, the Mara River is an important water source, and the wildebeest migration crossing the Mara River is a major tourist attraction, known as one of the Seven Wonders of the World. However, it is said that the spectacle is no longer as impressive as before because the flow of the Mara River has decreased. In that sense as well, the Masai Mara National Reserve depends on the Mau Forest and many other rivers flowing into the reserve, and conservation and management of forests and river catchments are important.

Forest Management

The Mau Forest within Narok County is a pure natural forest with no invasive species and no commercial plantations, and therefore its conservation is of high importance. Although degradation has progressed in some areas, the causes are human activities such as overgrazing by livestock, illegal charcoal production, and exploitation of forest products. Because these activities caused valuable species to disappear from the forest, there has been a major shift away from granting forests to people for settlement, toward encouraging people to move away from the forest to promote regeneration. In order to have people move away from the forest, forced evictions were carried out in the past; however, since evictions had an extremely large impact on people's lives, they are no longer conducted, and the forest is now in the recovery stage. For residents who were forcibly evicted, compensation is now provided, and support is given to help them maintain their livelihoods by finding alternative land (Note: see the interview findings from residents described later).

A challenge in forest management is how to address encroachment by residents into degraded areas, and the forest needs to be protected by fencing. In Phase 1 of fence installation, as much as 30 km was completed, and in Phase 2, efforts were made to install 45 km. However, even if Phase 2 is completed, the entire forest will not be fully enclosed, and more fencing is required. Gates for residents and for wildlife are also provided in the fencing. In areas where forest fires are a major cause of degradation, awareness-raising activities on forest restoration are conducted with communities, while efforts are made for early detection of fires using fire watchtowers and CCTV monitoring cameras.

Forest restoration is undertaken with the cooperation of relevant stakeholders such as the government and NGOs. As part of MFC-ICLIP (Note: although Masai Mau is not included as a target area in MFC-ICLIP materials, KFS recognizes that it should be included as a target of forest conservation), degraded portions of the Masai Mau FR are divided into blocks of 100 ha, with a plan to restore a total of 41,000 ha, and in the future, the entire area is planned to be enclosed by fencing. In parallel, activities to support residents' livelihoods are also implemented. Certain tree species in the Mau Forest provide nectar sources preferred by people and offer an environment suitable for beekeeping, and there are many beekeepers among residents. For this reason, depending on the area, when developing a forest management plan, agreement may be reached on zones where beekeeping is permitted as one of the livelihood options for community residents.

In addition, in some forests, residents carry out tree planting using a scheme called PELIS (where KFS provides seedlings to the community, and the community plants trees and takes care of the seedlings while engaging in agriculture around them). Forest management plans are developed jointly by the

government and residents through agreement on division of roles and other matters. In some cases, once the forest is restored to a certain extent, livestock grazing may become possible, while in other cases it may not be permitted; however, even in the latter case, cutting grass in the forest and taking it home for fodder (Cut and Carry) is permitted. Even after PELIS ends and residents no longer have places to replant trees or farm, residents can still make a living through beekeeping and cutting grass for livestock.

Human–Wildlife Conflict

In the Greater Mara ecosystem, which has an area of 18,000 km² and includes the Mau Forest and the Masai Mara National Reserve, human–wildlife conflict is severe and occurs across areas with completely different vegetation types, namely forests and savannas. The main wildlife species inhabiting the forest are elephants and buffalo, and the species basically causing conflict is elephants. Many residents cultivate potatoes and beans just outside the Mau Forest, and elephants (savanna elephants adapted to forests) may come out of the forest. Meanwhile, among the elephants living in the savanna such as the Masai Mara National Reserve, some begin seasonal migration during the dry season and head north, sometimes damaging crops along the migration route. This is a conflict caused by residents developing and settling on land that originally lay along routes used by elephants for seasonal migration.

On the other hand, land subdivision has progressed, and land that was formerly shared communally has become privately owned and enclosed by fences, in some cases blocking elephant migration routes. Land use has changed significantly, including cultivation of wheat, horticultural crops, and sugarcane on subdivided lands, and agriculture has expanded in some areas.

The Maasai, the major ethnic group in Narok County, rely primarily on pastoralism, and Maasai livestock and wildlife compete for water and grass. Therefore, especially during the dry season, conflicts frequently occur when pasture and water become scarce. Because elephants consume large amounts of water, Maasai sometimes spear and kill elephants when they enter grazing lands, and when lions kill livestock, Maasai may also kill lions using spears or poison. This is also one form of human–wildlife conflict. In addition, livestock numbers have increased compared to before, and riverbank erosion has also occurred due to livestock entering rivers to drink water.

Thus, human–wildlife conflict is increasing, and the causes can be organized as follows: (i) wildlife-usable land is shrinking due to changes in land use; (ii) wildlife movement patterns have been disrupted by development of infrastructure such as roads, high-voltage power lines, lodges, and fences; and (iii) human population and livestock numbers are increasing. In addition, poaching targeting wildlife meat is also taking place. In this way, residents' livelihood activities, wildlife, and the river basin environment influence each other, and together they create a severe situation.

The managing authority of the Masai Mara National Reserve is Narok County. Within the reserve, KWS is limited mainly to involvement in research; however, outside the reserve, KWS conducts research, fitting radio collars to elephants, awareness-raising through education, compensation for victims of human–wildlife conflict, and conservation activities. Regarding information sharing with Tanzania, transboundary meetings are held once a year with Serengeti National Park to share information on security, research, and animals such as rhinos and elephants fitted with radio collars. Separately, a national-level bilateral meeting hosted by the KWS headquarters is held every year, alternating the venue between Kenya and Tanzania.

Regarding management outside the reserve, there is an umbrella organization called the Masai Mara Wildlife Conservancy Association, of which KWS is also a member, and discussions are held on conservancy issues. Each conservancy has its own management plan, and they exchange information and experiences.

3) Mau Forest



Figure 14 Location of Mau Forest Block 75 Visited

The survey team visited a place called Block 75 of the Mau Forest. This site is part of the 30 km fence constructed during Phase 1 of the fencing installation. Residents previously lived there, but due to government intervention for forest restoration, they were forcibly evicted in 2019. This area called Block 75 has not yet been “adopted” under the “Adopt a Block” programme. Nearby communities are permitted to access resources such as cutting grass and collecting firewood.

Residents who were forcibly evicted in 2019 were asked about the situation at that time, as follows:

“Regarding the forced eviction, there were no discussions with the community and no coordination. One day, we were suddenly told unilaterally over the radio to leave within 60 days. KFS and its rangers came and drove the residents out. There were no negotiations. When we were forcibly evicted, we were not given alternative land, and we lived by being incorporated into a community of the same ethnic group outside the protected area. That community welcomed us. In 2023, the government purchased that land, so we had to move again. We bought land where we are currently living and settled there. We now live less than 5 km from the gate of the protected area. Among those who

were forcibly evicted, some families received compensation of Ksh 300,000 per family, but others have not received it. Compensation is under the jurisdiction of the Ministry of Finance, and KFS is supposed to facilitate it. On the other hand, 'Adopt a Block' is a project for forest restoration and is not related to the eviction."

"Regarding changes before and after the forced eviction, positive changes include that trees were planted, water began to flow in the river, and rainfall increased (Note: this was the subjective opinion of the resident who responded, and since the interview was conducted in the presence of a KFS officer, there was an impression that textbook-like answers were being given). Negative changes include that agricultural productivity before the eviction was good and crops were large. Now crops are grown outside the forest, but they are smaller, and we are not happy. We are still waiting to receive compensation, and if we receive it, we would like to buy larger land or increase the number of cattle and change our livelihood."

Regarding access to forest resources, there is a participatory forest management plan with zoning. There are areas where medicinal plants used in traditional medicine can be collected, and collection in those areas is permitted, but not throughout the entire forest. As for firewood, residents are allowed to take home wood that has fallen to the ground and dried. Normally this requires payment; the amount that can be carried on the head costs Ksh 100 per time and is valid for 30 days. This system has been generally practiced and did not start after the forced eviction. Rangers monitor whether illegal firewood collection is taking place.

The main source of income for residents living near the forest is grain cultivation, and they use fertilizer. There is a pasture grass called Napier grass (*Pennisetum purpureum*), which prevents soil erosion, and residents felt that thanks to this, land degradation has not progressed significantly. In addition to these, beekeeping conducted inside the forest is also one source of income. Near the forest, agriculture is mostly rain-fed, but since the forced eviction in 2019, drought has not occurred, and water is stored in tanks and wells, so there is no difficulty in obtaining water for agriculture. Domestic water is drawn from the river. Some people sell river water to nearby lodges at Ksh 30 per 20 liters. Under such living conditions, they say they are not economically sufficient.

As support from NGOs and the government, one day of technical training on tree planting methods was conducted for all residents. Based on this, native species were planted inside the forest, and fruit trees and timber trees were planted outside.

One of the settlements that had been inside the forest was a place where land inside the Mau Forest was given to troops returning from deployment to Sierra Leone for peacekeeping, and that area came to be called "Sierra Leone." At the time of the forced eviction, the people of this settlement were also driven out. However, the people who had lived in Sierra Leone were not originally from this region and did not have the same community nearby to accept them, so they moved far away.

In addition, KEFRI has established a nursery in one corner of the forest, where it is growing seedlings of exotic species such as cypress and tree species used for agroforestry.

2.1.3.2. Field visit in Tanzania

(2) Kembwi Village, Tarime District

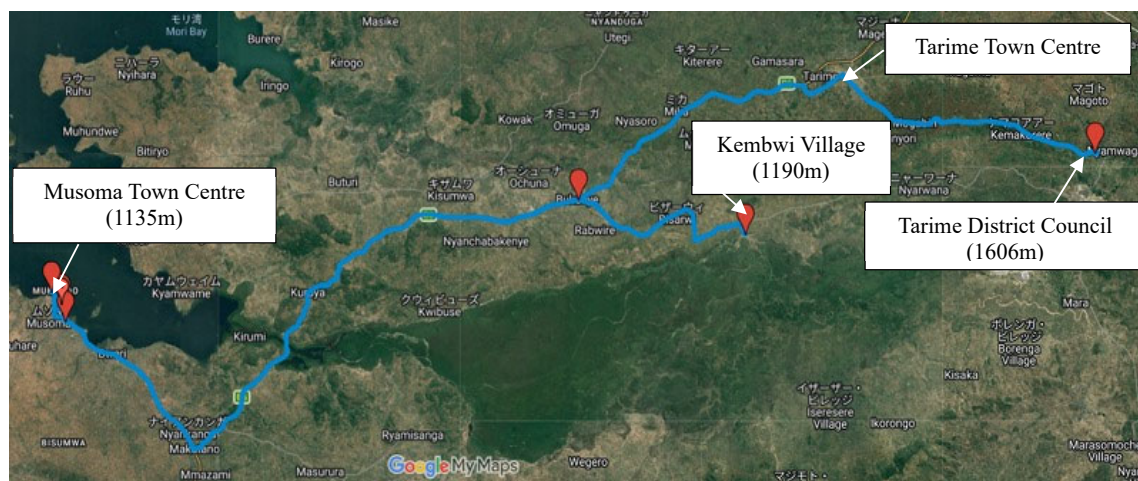


Figure 15 Location of Tarime District Council and Kembwi Village

Kembwi Village belongs to Manga Ward in Tarime District, Mara Region, and is a rural village with a population of approximately 2,700 located in the Mara River Basin. The primary livelihood of residents is agriculture, and all households cultivate crops; in addition, some households engage in livestock keeping and fishing. On the other hand, mining (gold extraction) is not conducted in the village.

Agriculture

The main food crops produced in the village are maize, sorghum, finger millet, cassava, sweet potatoes, vegetables, fruits, and rice. Sunflower and sugarcane are cultivated as cash crops. Cotton was cultivated in the past, but it is no longer grown due to large price fluctuations. Crop production mainly depends on rainfall, and irrigation is not practiced. Therefore, annual crop production is greatly affected by unstable rainfall, and food shortages occur in years with insufficient rainfall. Other major challenges related to crop production are as follows:

- **Lack of an agricultural calendar:** A systematic cropping system has not been established, and cultivation is carried out based solely on experience according to weather conditions.
- **Lack of mechanization:** Although the soil is fertile, cultivation depends on hoes and ox-ploughing, limiting the cultivated area. It is expected that the introduction of tractors and other equipment would expand the cultivated area.
- **Seed quality:** Since improved seeds are not purchased externally and farmers rely on self-saved seeds, yields are not high. If seeds become infected with disease, yields decline further.
- **Soil issues:** During the rainy season, farmland soil is eroded, and in some areas salinity problems occur, but no concrete countermeasures have been taken.
- **Fertilizer use:** Chemical fertilizers are hardly used due to the perception that they reduce land value, and compost made mainly from livestock manure is used. However, compost alone may not sufficiently supply the necessary nutrients and may be one cause of declining productivity.

Livestock

The main livestock raised in the village are cattle, sheep, goats, chickens, and donkeys. The number of animals kept varies by household, but on average households own about 20–30 cattle and 10–20 sheep/goats. Some households own more than 100 cattle. Donkeys are mainly used for transport and not for food purposes. Major challenges related to livestock are as follows:

- **Shortage of grazing land:** Zoning of residential areas and grazing areas is stipulated by village by-laws; however, grazing pressure is increasing. In addition, floods occur particularly during the rainy season, submerging pastureland and reducing available grazing land.
- **Weak livestock disease control:** Livestock need to be protected against diseases such as Foot-

and-Mouth Disease and Lumpy Skin Disease (LSD), but infrastructure such as dip tanks for tick control and facilities for prevention and treatment of skin diseases are not in place. Disinfection using sprayers is also difficult. There is only one veterinarian in the Ward, who covers a wide area, making it difficult to receive timely treatment.

Fisheries (Aquaculture)

Fishing is conducted by some households, and the main species caught are catfish, tilapia, small Nile perch, and other small fish. Catches decrease during the dry season and tend to increase during the rainy season; however, residents feel that fish numbers have declined compared to ten years ago.

There are no clear rules regarding fishing, and mosquito nets are sometimes used as fishing nets. Such methods disturb fish spawning grounds, and conservation is an issue. Catches are sold unprocessed to middlemen, who then fry or dry the fish and sell them at the village market every Wednesday. Aquaculture is not practiced within the village.

Wildlife

In certain areas of the Mara River, hippos appear. Human injuries to fishers caused by hippos and crocodiles have occurred, but no particularly effective countermeasures have been taken. When damage occurs, the village office reports to the district authority, which then contacts TANAPA (Tanzania National Parks Authority); however, no substantial action is taken after the report.

Water Resources Environment

In recent years, significant changes have been observed in the water resources environment of the Mara Wetland and its surroundings. The main channel of the Mara River has shifted, and during the rainy season water now reaches areas close to residential zones. In addition, sediment deposition has reduced water depth. Although rainfall has not increased, fluctuations in river flow have become greater, and dry-season water levels have declined compared to the past. Water hyacinth is proliferating in the wetland, and its roots fix sediment, which may be one factor contributing to channel shifts (avulsion).

During the dry season, river water is used for livestock drinking; however, in recent years cases of diarrhea and weight loss in livestock have been reported. Residents also perceive that the taste of the river water has changed compared to ten years ago. In the past, WWF conducted training for residents on natural resource conservation through water quality monitoring, but this ended three years ago due to lack of funding. Water quality monitoring targeted parameters such as pH, EC (electrical conductivity), TDS (total dissolved solids), water temperature, color, and turbidity.

Of the five sub-villages in the village, three have their own boreholes, while the remaining two share boreholes; no major changes in groundwater quality have been confirmed.

(3) Wegero Village, Butiama District

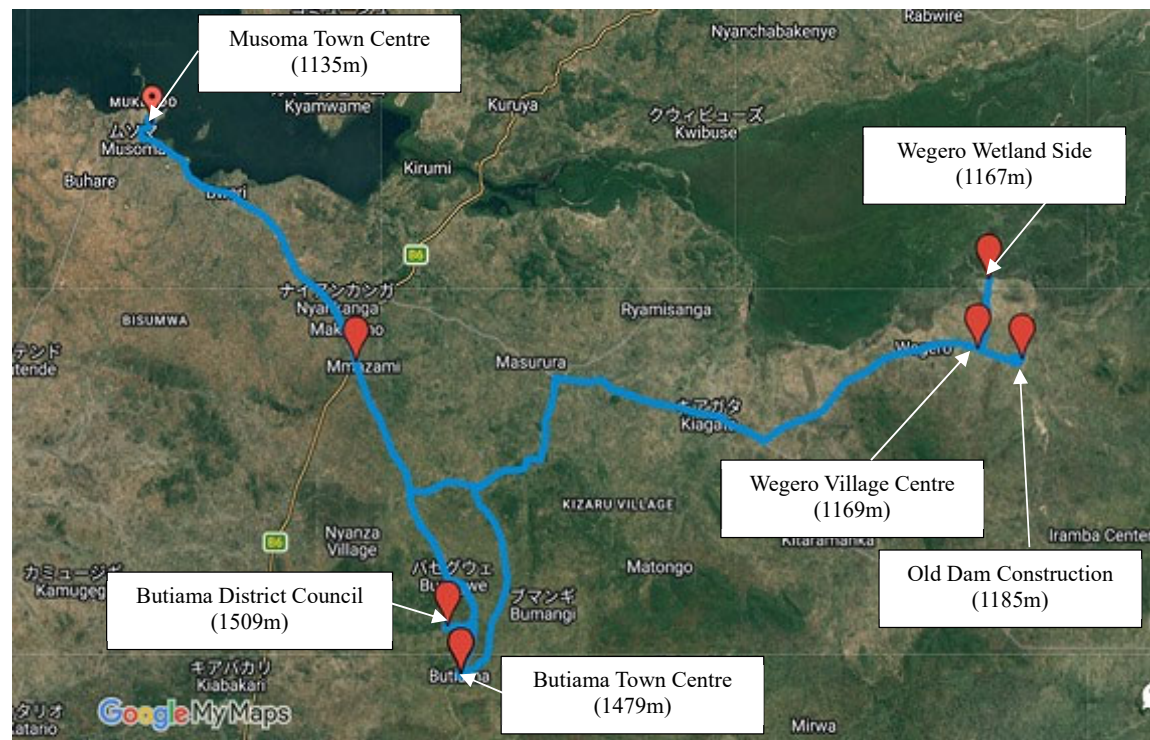


Figure 16 Location of Butiama District Council and Wegero Village

Wegero Village belongs to Butiama District in Mara Region and is a rural village with a population of approximately 5,700 located on the periphery of the Mara Wetland. It is mainly composed of residents from two ethnic groups, the Kurya and the Zanaki. The primary livelihood of residents is agriculture, and almost all households engage in farming. In addition, livestock keeping and small-scale fishing are also practiced. Land in the Mara River Basin is used for agriculture, grazing, and fishing, and grass used as roofing material for houses is also collected from the basin. Mining (gold extraction) is not conducted in the village.

Agriculture

The main food crops cultivated by residents in the village are maize, sorghum, cassava, rice, potatoes, and vegetables. As cash crops, cotton and tobacco are grown, as well as finger millet and sunflower (for oil). Residents do not have irrigation facilities and rely entirely on rainfall. The main challenges related to crop production are as follows:

- **Crop damage by birds:** During the harvest season, large numbers of birds arrive and cause damage; they are driven away by throwing stones and other methods.
- **Pests:** Armyworms occur in the early growth stage of maize, reducing yields.
- **Lack of pesticides and knowledge:** There is a shortage of pesticides to prevent pests and diseases and insufficient knowledge regarding their use.
- **Weed management:** Weed overgrowth affects crop growth, and weeding is mainly done manually.
- **Shortage of seeds and fertilizer:** There is a shortage of quality seeds and fertilizer. Chemical fertilizers are not used due to high cost and lack of knowledge about their application. Compost made from cattle manure is used, but the lack of equipment to transport the prepared compost to farmland is a constraint.

In addition, insufficient agricultural extension services, unstable market prices, and the absence of large

nearby markets even when harvests are abundant—leaving only local markets for sales—are major challenges. In order to sell agricultural products at appropriate prices, they must be transported to the Musoma market, but the distance is far and transport costs are high.

Livestock

The main livestock raised in the village are cattle, sheep, goats, chickens, and donkeys. The main challenges related to livestock are as follows:

- **Shortage of grazing land:** The village has zoned grazing land and farmland separately, and violators are fined. All livestock in the village are registered, and intrusion into grazing land by livestock from other villages is restricted. However, during the rainy season, flooding of the Mara River submerges grazing land, significantly reducing the area available for grazing.
- **Weak livestock disease control:** During the dry season, diseases such as Lumpy Skin Disease (LSD) and Foot-and-Mouth Disease are likely to occur, and it is said that the village as a whole has lost 4,000–6,000 cattle. Cases of Liver Fluke Disease and unexplained sudden livestock deaths have also been observed. Although there is no evidence, residents are concerned that during rainy-season floods, chemicals may flow in from a large upstream gold mine reservoir. There is only one veterinarian in the same Ward, and adequate services are not being provided. Although there is one dip tank in the village, it is completely insufficient given the number of livestock, and due to unstable water sources, it cannot be used during the dry season.
- **Damage by wildlife:** Crocodiles attack livestock, and nearly 100 cattle per year have reportedly been lost to such attacks.

Residents hope in the future to introduce high-yield hybrid dairy breeds and to establish processing units for dairy products, meat, and leather.

Fisheries (Aquaculture)

Fishing is conducted both for self-consumption and income generation, and the main fish caught are catfish and lungfish. Currently, illegal fishing (such as the use of poison or explosives, or capturing juvenile fish with fine-mesh nets) is not practiced. However, although flooding during the rainy season increases spawning areas, during the dry season water recedes and spawning sites are damaged. It is expected that stabilizing and controlling the river channel will help conserve spawning areas and restore fish populations. The proliferation of water hyacinth also limits areas where fishing can be conducted.

Fish are in high demand because catches have declined and supply in markets is insufficient. The catch is sold fresh in markets such as Serengeti, Musoma, Butiama, and Bunda. However, due to the absence of storage facilities, fishers sometimes rush to sell at inappropriate prices out of fear that the fish will spoil within about two days. There are also incidents of fishers being attacked by hippos and crocodiles during fishing activities.

Aquaculture is not practiced, but interest has been expressed in catfish and tilapia farming, and there are requests for technical support from the government. There is also demand for appropriate storage and processing facilities for fish preservation. Among residents, there is also a need for vocational training opportunities—such as driving, handicrafts, and mechanical work—so that younger generations may have alternative livelihood options.

Water Resources Environment

Flooding was not frequently observed before the 1990s, but it has increased in recent years. Meandering and channel shifts of the Mara River have become pronounced due to fish traps set in the river and the impact of invasive and expanding water hyacinth. During the rainy season, water reaches residential areas and has become a major problem. Sediment deposition from upstream has reduced water depth and is considered one factor contributing to increased flooding.

Residents strongly request river training works and dam construction to stabilize the river channel. Construction of an irrigation dam upstream of the village began in 2006 but was suspended due to lack

of funds before completion. Another dam completed downstream in the same year was washed away by flooding.

In the past, with support from WWF, a Community Management Unit (CMU) consisting of approximately 40 members (with two representatives from each village in the target area) was established. Activities included water quality monitoring, prevention of illegal fishing, and awareness-raising and training to prevent cultivation along riverbanks. Membership in the Water Users Association (WUA) is low, and some residents say, “Water is a resource given by God and should be available for free.”

Other

There is a shortage of firewood resources in the village, and dried cattle manure is used as fuel. From 2006 to 2008, the government implemented a tree-planting campaign along wetland riverbanks, and cutting trees for vegetation conservation is not permitted.

2.2. Challenges, Needs, Initiatives, and Progress in Mara River Basin Management

2.2.1. Memorandum of Understanding (MOU) between Kenya and Tanzania

For the conservation of shared resources in the Mara River Basin, the Memorandum of Understanding (MOU) signed in 2015 by both Kenya and Tanzania presents a vision and an organizational framework at various levels. It is already a highly important tool with legally binding force. The contents of the MOU are as follows.

Table 11 A Summary of MOU on Transboundary Basin Management of the Mara River Basin (Signed on 15 September 2015)

Official Title	MOU between Tanzania and Kenya for Joint Water Resources Management of the Transboundary Mara River Basin
Purpose	a) To establish an organizational structure for the joint management of projects, programs, and initiatives related to water resources management and development in the Mara River Basin b) To develop a collaborative mechanism/framework for the sustainable development and management of water resources in the Mara River Basin
Joint Management Structure	Establish a Joint Management Committee (JMC) at three levels, incorporating the following sectors: Water, Environment, Natural Resources, Finance, Planning, Fisheries, Land, Agriculture, Livestock, Regional Development, Local Government, Tourism, Foreign Affairs, EAC, etc. • Joint Steering Committee (JSC): Permanent Secretary level (twice yearly) • Joint Technical Committee (JTC): Director/Senior Official Level (3 times per year) • Joint Implementing Committee (JIC): Working-level (4 times per year) The chairmanship shall rotate annually between the two countries.
Responsibilities of the LVBC	a) Promoting the development and implementation of programs related to the MOU b) Reporting progress to the LVB Sectoral Council c) Operating cross-border meetings in accordance with the MOU d) Promoting the sharing of experiences and lessons learned e) Providing technical support and advice for joint transboundary water resource management in the basin f) Supporting both countries in resource mobilization for MOU implementation g) Execution of other instructions from the LVBC Sectoral Council regarding the MOU
Other	This MOU is not intended to impose any legal obligations on either country. This

	MOU may be amended by written request from either country and by mutual written agreement.
Signatories	Kenya: Cabinet Secretary, Ministry of Water and Irrigation Tanzania: Minister, Ministry of Water

Following the signing of this MOU, both countries agreed that the LVBC would host and continue resource mobilization and implementation coordination. Activities implemented under the MOU have centered mainly on the annual celebration of “Mara Day” held every September, while meetings of the above-mentioned Joint Management Committees have been held only intermittently. The reasons include difficulties in mobilizing the resources required for convening such meetings and challenges in bringing together stakeholders from a wide range of sectors. When USAID support was available, meetings were held regularly. In another ecosystem, committees have been established and meetings convened with funding support from WWF and GIZ. Thus, securing resources for convening meetings is the primary constraint.

Although the possibility of holding thematic meetings focused on specific issues within the broad-based Joint Management Committees has been considered, no meeting limited to members relevant to a specific theme has been convened to date.

Mara Day was decided by the LVB Sectoral Council of Ministers to be held annually in recognition of the importance of the Mara River as a transboundary resource, and it has been conducted 14 times as part of conservation promotion and awareness-raising in the Mara River Basin. It is usually organized jointly by the host country, the partner country, and the LVBC, and on the Kenyan side it is coordinated by the National Department responsible for EAC affairs. One of the overall objectives of Mara Day is stakeholder awareness-raising, particularly to reach grassroots communities by connecting them with politicians, other stakeholders, and partners, discussing on-the-ground challenges, and contributing to interventions and policy decisions as a result. Another overarching objective is to promote public-private partnerships and synergies to improve stakeholder engagement in the Mara River Basin.

Scientific conferences and stakeholder forums are organized in conjunction with Mara Day to discuss basin challenges and formulate recommendations for actions to be taken by each country. These recommendations are reviewed by the LVB Sectoral Council, which provides policy guidance on how to intervene in identified issues, and they are communicated to each country through the Council of Ministers. In the context of the difficulty in convening the JIC and other Joint Management Committees, these scientific conferences and stakeholder forums have, to some extent, substituted for the role of the JIC. Other activities at different levels are not specified in the MOU; however, each country has its own strategies and other means of action implemented by national institutions.

The MOU is an institutional document, and its implementation includes resource mobilization, project identification, implementation, and coordination. Accordingly, no single department within LVBC is solely responsible for the MOU. Instead, multiple departments—including Project Development, Resource Mobilization, Integrated Water Resources Management and Development, Environment and Natural Resources Management, and Legal—coordinate extensively among themselves in handling MOU-related matters.

Specifically, examples include wildlife management initiatives and the organization of Mara Day undertaken by LVBC with support from USAID and in collaboration with EAC; water flow assessments, water allocation planning, and water resources management through the Sustainable Water Partnership. These environmental and natural resource management initiatives under the MOU were implemented with support from cooperating partners and were advanced in coordination with departments responsible for resource mobilization and project development.

Regarding the MOU, LVBC identifies the water allocation plan as an issue requiring further consideration. The two countries had agreed to prepare a common water allocation plan to ensure both water quantity and quality. The intention was to reach agreement on how much water could be used, recognizing that water use upstream in Kenya would affect downstream Tanzania. Tanzania’s water

allocation plan has already been completed, but in Kenya additional domestic consultations are required, and it has not yet been finalized. Once finalized, it will be shared with Tanzania, and a joint water allocation plan will be established by both countries, but without clear projection so far.

KFS is invited every year to Mara Day and undertakes activities such as tree planting but does not know the detailed contents of the MOU. Even institutions that are involved in Mara River Basin management and that continuously participate in the implementation of the MOU, such as through Mara Day, may be in a passive position of implementing actions based on higher-level agreements without full awareness of the outcomes at those levels.

LVBWB participates in Mara Day and is aware that there are certain agreements under the MOU and that LVBC is responsible for coordination of their implementation, but it does not have much knowledge of progress or compliance status. The Director of LVBWB is a member of the JSC but recognizes challenges in convening meetings.

2.2.2. Management from a Basin-Wide Perspective of the Mara River Basin

In the management of the Mara River Basin, transboundary cooperation between Kenya and Tanzania is key. Appropriate cooperation mechanisms already exist, and there is an MOU between the two countries. Based on this MOU, various forms of cooperation and numerous projects have been implemented through the LVBC. However, with population growth, pressure on water resources and the basin has increased, and degradation of the Mara River Basin is progressing. Although many documents have been prepared and meetings have been held to date, it is now necessary to produce tangible results, such as improvements in river flow and forest restoration. It is also important to strengthen existing tree-planting initiatives and to work in collaboration with communities, particularly WRUAs, while enhancing their financial and technical capacities through training.

Based on the resolutions of both countries discussed during Mara Day, there is an initiative to develop a joint water allocation plan. In this regard, it was agreed that the JIC stipulated under the MOU should function effectively, that both countries would prepare their respective water allocation plans, and that these would then be integrated. While a water allocation plan has been developed and adopted on the Tanzanian side, it has not yet been finalized on the Kenyan side.

Beyond the question of whether water is sufficient to meet current and future demand, there are additional issues that need to be considered, including climate change, human–wildlife conflict, and conflicts between pastoralists and farmers.

In Tanzania’s Mara Region, water quality sampling of Lake Victoria has recently been completed. As an outcome of the NCCR project, a Water Quality Guidelines Policy and a Water Quality Strategic Action Plan have been formulated, incorporating numerous actions. These documents also reflect the needs of the Mara River and other related activities and may serve as useful references.

2.2.3. Mining and Its Impacts in the Mara River Basin

In the lower reaches of the Mara River Basin in Tanzania’s Mara Region, particularly including Tarime District, gold mining is considered to be the activity that has the most significant impact on the water resources environment of the basin. Several tributaries (including the Tigithe River, Somoche River, and Tobora River) flow into the Mara River from the Tanzanian side. Among them, the Tigithe River basin is particularly closely associated with mining activities, and Artisanal and Small-Scale Gold Mining (ASGM) is widely conducted in its downstream area (Lower Tigithe).

Large-Scale Mining (LSM) operations are also located in the same region. In Tarime District, the foreign-owned North Mara Gold Mine, which has an ore processing capacity of approximately 8,000 tons per day on average, is in operation. In the vicinity of this mine, since the late 2000s, cases have been mentioned in policy documents and media reports in which pollution of the Tigithe River was allegedly caused by the seepage and leakage of contaminants from processing facilities and related

infrastructure. It has also been reported that in 2019 the environmental authority NEMC issued a corrective order. On the other hand, it is said that approximately 4,000 artisanal and small-scale miners are present; however, they often lack modern processing facilities and environmental management systems, and are said to significantly contribute to water quality deterioration.

The principal causes of water quality degradation due to artisanal gold mining are the use of mercury and cyanide, as well as sediment runoff associated with excavation and ore washing. Many small-scale miners process gold through a method known as “amalgamation,” which uses mercury. During this process, mercury may be spilled onto the ground or into processing water and subsequently washed into rivers by rainfall. In addition, tailings—waste materials remaining after gold extraction—may be left on riverbanks, or the construction of tailings ponds used for their treatment may be inadequate, leading to leakage or overflow during the rainy season, thereby allowing contaminated water to flow into soil and rivers. Such issues and risks have been reported in the past. Furthermore, harmful mercury vapor generated during heating processes may be released into the atmosphere and subsequently return to the land surface or rivers through rainfall. Similar problems arise when cyanide is used for processing, as inadequate management and facilities may result in processing solutions overflowing or leaking during the rainy season.

In Butiama District, cooperatives of artisanal miners have been organized; however, their gold processing facilities are underdeveloped, and the recovery efficiency remains at approximately 25 percent. Although it is desirable to introduce more advanced equipment to improve recovery rates to around 75 percent, the absence of formal gold buyers as trading partners limits their creditworthiness, thereby creating challenges in applying for loans to finance equipment investment.

In the past, WWF implemented a project in the Mara River Basin to separate gold processing activities conducted by artisanal miners near rivers from the riverbanks by relocating them to “mercury retention ponds” constructed away from the river. Through the development of such ponds and awareness-raising and coordination efforts, the project sought to prevent the direct inflow of contaminated water and tailings into the Mara River and to promote the horizontal expansion of similar countermeasures. The introduction of Payment for Ecosystem Services (PES) was also considered in the past; however, the pollution issue caused by mining has a structural characteristic in which “miners are both beneficiaries and victims.” Because the relationship between mining operators and communities affected by pollution is not a simple perpetrator–victim relationship, the institutional design required for such a mechanism to function effectively has proven to be complex and challenging.

3. Consideration of Future Project Components

3.1. Basic Approach

With regard to the content of future projects, the following three basic approaches are considered.

(1) Viewing the Entire Basin from an ILBM Perspective

Under this project, the aim is not merely to regard water as a resource and focus solely on it, but rather to look toward environmental improvement based on the concept of Integrated Lake Basin Management (ILBM), including water supply and use, thereby contributing to sustainable integrated lake basin management and water resources management. Accordingly, it is necessary not only to implement separate initiatives in the upstream areas (such as improvement of flowing water environments) and in the downstream areas (such as improvement of livelihoods of residents in lentic environments), but also to ensure that these respective initiatives are interconnected so that synergistic effects are generated as a whole.

One specific example would be to focus on the river water that connects upstream and downstream areas, and to address improvements from the perspective of the entire river basin by sharing information and data on initiatives undertaken in both upstream and downstream areas and on their impacts on the quantity and quality of river water.

Furthermore, by targeting the Mara River Basin, which is a transboundary river basin, the project would also address initiatives spanning two countries and the strengthening of bilateral cooperation. Expanding the knowledge and experience gained through activities in the Mara River Basin to other river basins, and potentially serving as a model for strengthening cooperation among related countries in the management of the Lake Victoria Basin as an international lake basin, are also important points in taking a regional approach.

(2) Strengthening Basin Governance

With regard to conservation and management in the Mara River Basin, the MOU has already been concluded between Kenya and Tanzania. Although activities based on this MOU are currently very limited, the fact that a legal foundation for cooperation between the two countries already exists is significant. Utilizing this MOU as a foundation for cooperation is expected to bring numerous advantages, such as accelerating the efforts made to date by the Lake Victoria Basin Commission (LVBC), Kenya's Ministry of Water and Irrigation, and Tanzania's Ministry of Water; saving resources that would otherwise be required to build a framework for cooperation from scratch; and enabling efficient and effective collaboration.

Furthermore, by developing activities based on the MOU, it becomes possible to strengthen the governance capacities of LVBC, which plays a coordinating role between the two countries, as well as Kenya's Ministry of Water and Irrigation and Tanzania's Ministry of Water, which are expected to play central roles within their respective countries.

In addition, as mentioned above, from a regional perspective, it is necessary to share, disseminate, and reflect in policy the knowledge gained through bilateral initiatives within both countries and across the region. For this purpose, capacity development of LVBC, Kenya's Ministry of Water and Irrigation, and Tanzania's Ministry of Water is required. Through such activities, it is important to work toward strengthening basin governance.

(3) Utilizing Existing Initiatives and Resources

In the Mara River Basin, various initiatives have been undertaken to date by the World Bank, WWF, and others. By carefully examining their approaches, outcomes, and lessons learned, and by designing initiatives that avoid duplication while leveraging past efforts to create synergies, effective and efficient

interventions can be expected.

Moreover, by utilizing existing resources with proven track records—such as ILBM training conducted by ILEC, and training conducted by RCMRD and water research institutes—or by mobilizing local resources, it is expected that networks within the region will be strengthened and sustainability enhanced through the involvement of training institutions.

Based on these basic approaches, the following framework is envisioned for future projects.

- **Implementation Structure:**

Kenya’s Ministry of Water and Irrigation and Tanzania’s Ministry of Water shall serve as the principal counterpart institutions, while LVBC shall function as an institution equivalent in substantive terms and take on the overall coordinating role. Other sectoral ministries shall be positioned in accordance with these three institutions.

- **Central Theme:**

While pilot activities will be implemented separately in Kenya and Tanzania, “water environment” shall be positioned as the central theme connecting them. Through initiatives in both countries aimed at improving the water environment, information and data related to the water environment shall be shared between the two countries, and the approach to basin-wide initiatives shall be aligned in order to promote integrated river basin management.

- **Key Considerations in Project Design:**

Within the Mara River Basin, the Mau Forest is a forest reserve with established conservation mechanisms. In addition, near the Kenya–Tanzania border, protected areas have been designated, namely the Maasai Mara National Reserve and Serengeti National Park. In future projects, it is important to conduct pilot activities in non-protected areas where such conservation mechanisms are absent, thereby working toward harmonizing local livelihoods and environmental conservation.

Furthermore, as a long-term vision beyond the project period, sharing with relevant institutions the concept of establishing a Transboundary Biosphere Reserve—one mechanism to enhance the coexistence of local livelihoods and environmental conservation—constitutes one possible approach. A Biosphere Reserve is composed of a three-tier structure: a Core Area (strict conservation), a Buffer Zone (where research, education, tourism, and other conservation-compatible activities are permitted), and a Transition Area (where sustainable economic activities by local communities compatible with environmental conservation are permitted). Conducting pilot activities in currently non-protected areas and aiming for their consolidation and incorporation into the Transition Area of a Biosphere Reserve would provide a shareable goal for relevant institutions and is expected to serve as a driving force for advancing initiatives.

The following sections organize potential future activity options and proposals for utilizing existing knowledge, networks, and other available resources.

3.2. Proposed Future Activities and Utilization of Existing Resources

3.2.1. Strengthening the Coordination Capacity of LVBC

LVBC plays an extremely important role as the coordinating body between the two countries in implementing the MOU. To date, due to a lack of resources and other constraints, implementation of the MOU beyond Mara Day has been difficult, and it cannot be said that LVBC has accumulated sufficient experience, knowledge, or networks related to coordination. Strengthening LVBC’s coordination capacity is indispensable for the implementation of the MOU. For this purpose, it is necessary to assign an expert who is stationed at LVBC, supports LVBC’s daily operations, and facilitates coordination for MOU implementation. If the arrangement were based on a shuttle-type modality, whereby an expert engages with LVBC only for a limited period, it would be difficult to mainstream coordination work for

MOU implementation into LVBC's regular operations.

Activities to be supported by LVBC for the implementation of the MOU include the convening of various committees such as the JSC, JTC, and JIC; the sharing of information and data and collaboration between the two countries; capacity development of relevant institutions through training; and the strengthening of networks with various stakeholders, including the World Bank and WWF.

With regard to capacity development of relevant institutions through training, the following training programs are proposed as candidates through the utilization of existing resources:

- **ILBM Training by ILEC:** In order to disseminate the ILBM concept, training would be provided to relevant institutions in both countries as well as to LVBC/EAC. While training in Japan is one option, another option would be for lecturers from ILEC to visit both countries and conduct training while jointly visiting field sites in both countries (or alternatively in one country depending on the year).
- **Monitoring Training by RCMRD / Water Research Institute:** RCMRD, based in Nairobi, and the Water Institute, based in Dar es Salaam, are both capable of providing various types of training related to river water quality and quantity and river basin management. While the specific content and division of roles should be finalized in consultation with relevant institutions, taking into account the content of the pilot activities, monitoring of water quality, riverbank erosion, and riparian forest growth are considered potential areas of focus. Target institutions for the training should also be determined considering the needs for the training. By using common parameters in both countries, it will become easier to share and analyze data and information; therefore, due attention should be paid to the monitoring methods currently being implemented in both countries.

With regard to strengthening networks, it is important to learn from the various initiatives undertaken to date and to reinforce cooperation with diverse stakeholders in order to ensure sustainability of activities. Efforts should be made to strengthen networks facilitated by LVBC not only with development partners and NGOs, but also with UN agencies such as UNESCO, relevant sectoral ministries in both countries, and related local government authorities.

3.2.2. Pilot Activities on the Kenyan Side

With regard to afforestation activities in the Mau Forest, the Government of Kenya is already implementing nationwide initiatives. Therefore, the rationale for JICA to be directly involved in afforestation within the Mau Forest itself appears limited.

On the other hand, agriculture is practiced immediately outside the Mau Forest. It has been pointed out that riverbank erosion is occurring in areas where farmland extends right up to the river's edge or where livestock descend to the river to drink water, and that river environments are deteriorating due to pollution from fertilizers and agrochemicals flowing into the river from agricultural land. In such areas, it is expected that the promotion of soil conservation techniques on farmland would contribute to river environmental conservation through improved land management and prevention of soil erosion. Moreover, such soil conservation techniques may meet the needs of farmers who are compelled to cultivate sloping land near forests, and thus have strong potential for dissemination not only as environmental conservation measures but also as livelihood-supporting technologies.

Further downstream, in savanna areas, it has been observed that riverbanks are eroded when livestock go down to the river to drink water, and that riparian forests are cut for fuelwood. In such areas, it is expected that river environmental improvement can be achieved by promoting bank protection through the planting of riparian forests while also installing designated livestock watering points so that animals do not need to descend directly to the river. This may constitute one form of Nature-based Solutions.

In addition, it is important to monitor the condition of riparian forests and river water quality in order to verify whether these activities are indeed contributing to improvements in water quality.

3.2.3. Pilot Activities on the Tanzanian Side

On the Tanzanian side, it is also necessary to conduct monitoring activities similar to those on the Kenyan side. By doing so, it becomes possible to connect upstream and downstream initiatives and to assess, from an integrated basin-wide management approach, the extent to which water quality changes resulting from activities on the Kenyan side are reaching the Tanzanian side. Furthermore, with regard to water quality monitoring, Tanzania has specific circumstances, such as mercury pollution associated with gold mining.

Therefore, various considerations are required, including not only monitoring the main stream of the Mara River but also monitoring tributaries where gold mining takes place, and incorporating participatory monitoring approaches that enable local residents themselves to conduct monitoring.

In the vicinity of the Mara Wetlands, flooding occurs during the rainy season, significantly reducing the area available for grazing land. At the same time, some residents utilize floodwaters to engage in aquaculture activities. Thus, flooding has both positive and negative impacts on livelihoods. It is therefore considered important to examine livelihood models that incorporate flooding and to promote more sustainable livelihood practices, thereby contributing both to livelihood improvement and to basin environmental conservation. In examining livelihood models, multifaceted analysis and consideration are required, including issues such as mercury contamination and the need to respond to a wide range of climatic variations—from drought to flooding—that are believed to be influenced by climate change.

In addition, water hyacinth has proliferated in parts of the Mara Wetlands, likely having spread upstream from the lake. If left unaddressed, it may spread further upstream, making its removal an urgent issue. It has also been pointed out that the roots of water hyacinth may contribute to avulsion by stabilizing sediments and altering flow paths, potentially leading to changes in the wetland environment if left untreated. In the lake area, residents had clear incentives to remove water hyacinth, as failure to do so resulted in fish suffocation due to oxygen depletion and impeded fishermen from operating their boats. However, in the Mara Wetlands area, water hyacinth has not yet reached a level where it completely covers the surface and causes visible damage, and it is unclear whether residents have sufficient incentives to remove it. Therefore, while conducting awareness-raising activities regarding water hyacinth removal, it is necessary to consider possible beneficial uses, such as utilizing it as a component of compost, and to develop activities aimed at promoting its removal.

As a point of caution in implementation, the number of district-level officials who are expected to serve as counterparts in the field in Tanzania is limited, and their mobility, including access to motorcycles, is also constrained. Therefore, careful consideration is required regarding how to effectively involve counterparts in field activities. It may be necessary to limit pilot activities to a very narrow geographic area, concentrate resources there to generate tangible results, and then replicate them in other areas once prospects for replication are established.

3.2.4. Sharing and Dissemination of Knowledge and Lessons Learned

The knowledge and lessons that would be obtained through pilot activities in both Kenya and Tanzania are valuable. These may include technologies that reconcile livelihood improvement and environmental conservation in river basins, and techniques for monitoring river water quality. In addition, they are expected to include operational know-how, such as effective methods for collaboration with local communities.

While activities are assumed to focus on the Mara River Basin as part of ILBM, the knowledge and lessons obtained are expected to be applicable to other basins within Lake Victoria and, by extension, to lake basins elsewhere. With such expansion in mind, it is necessary to systematically organize, share, and disseminate the knowledge and lessons learned. Furthermore, beyond technical aspects, the experience of basin management through cooperation between Kenya and Tanzania also constitutes valuable knowledge and lessons, and sharing and disseminating these experiences is considered to contribute to the further development of ILBM.

3.3. Future Direction

As stated above, setting the establishment of a Transboundary Biosphere Reserve as a long-term vision is expected to serve as a clear and shareable goal among relevant institutions and to function as a driving force for advancing initiatives. Since Serengeti National Park is already registered as the “Serengeti-Ngorongoro Biosphere Reserve,” one possible approach would be to incorporate the Mara Wetlands by expanding this existing Biosphere Reserve.

Separately, it is also worth considering the registration of the Mara Wetlands as a Ramsar site. The Ramsar Convention upholds the wise use of wetland resources as its fundamental concept and promotes the maintenance of ecosystem services that support local livelihoods as well as the sustainable use of resources. Furthermore, the importance of wetland conservation is recognized as a climate change mitigation and adaptation measure. Rather than positioning Ramsar registration of the Mara Wetlands as a direct project objective, supporting the registration process as a long-term goal is expected to solidify initiatives that reconcile local livelihoods and environmental conservation, institutionalize the collection, sharing, and analysis of data through monitoring, and accelerate the strengthening of governance by local authorities such as regional, district, and village governments.

As noted above, adopting a regional approach is another key point for future projects. Therefore, it is important to maintain awareness not only of the Mara River Basin and Kenya and Tanzania, but also of other basins within the Lake Victoria Basin and of Uganda, Rwanda, and Burundi. As necessary, training and workshops could involve participants from outside the Mara River Basin, thereby ensuring that the benefits of the project are shared across the entire region. Such an approach is considered consistent with the principles of ILBM.

4. Other Considerations

In this survey, certain issues were not sufficiently examined and require further consideration, as well as points that should be taken into account in future project formulation. These are summarized below.

4.1. Activities Integrating Climate Change Considerations

According to analyses of the impacts of climate change in the Lake Victoria Basin,²⁵ regardless of climate scenario, the areas affected by drought are expected to expand by the end of the 21st century. It is projected that 40 percent of current maize cultivation areas will no longer be suitable, and that pastureland and livestock will also be significantly affected. At the same time, in some parts of the lake basin, rainfall events are expected to become more intense, leading to an increase in flood damage.

As such extreme weather events are projected to increase in the future, it is necessary, for example in the Mara Wetlands in Tanzania, to devise livelihood strategies that assume the occurrence of river flooding. However, flooding does not necessarily occur every year; the level of flooding may vary significantly from year to year; and there is also the possibility of drought occurring instead of flooding. Therefore, it is necessary to design flexible and diversified activities that take into account this range of climatic variability.

4.2. Gender

This survey did not conduct substantial investigation into gender-related issues; however, gender mainstreaming is an indispensable perspective, and gender-related surveys will be essential in future project formulation.

The EAC Treaty recognizes the importance of gender equality, and the LVBC Strategic Plan (2021–2026) clearly states that gender mainstreaming shall be integrated into LVBC projects and programs. While efforts are underway, it is reported that gaps still remain²⁶. Accordingly, it will be necessary to conduct further studies on the gender situation and gender mainstreaming efforts within LVBC and in both Kenya and Tanzania.

4.3. Project Request Process

On the premise that this will be a regional project spanning two countries, the request process for the project is organized as follows. In considering the future request processes, these points require due consideration:

1. In considering the request for a technical cooperation project, the basic assumption is bilateral cooperation; thus, the project would be formulated in response to requests from the governments of both Kenya and Tanzania.
2. In considering training programs targeting countries in the Lake Victoria Basin, requests would be obtained from the five target countries.
3. If the arrangement were limited to the dispatch of experts to LVBC only, a request from LVBC would be envisaged; however, consultation would be required within JICA and with the Ministry of Foreign Affairs of Japan.

END

²⁵ LVBC Secretariat (year unknown) Synopsis of Lake Victoria Basin Sectoral Status, Prevailing Challenges and Broad Investment / Intervention Priorities.

²⁶ Ibid.