



**EAST AFRICAN COMMUNITY**  
**LAKE VICTORIA FISHERIES ORGANIZATION**  
**SECRETARIAT**



Lake Victoria Fisheries Organization  
**DATA , INFORMATION AND  
KNOWLEDGE SHARING POLICY**



Lake Victoria Fisheries Organization  
LVFO Secretariat  
Jinja  
UGANDA

# **DATA, INFORMATION, AND KNOWLEDGE SHARING POLICY FOR LAKE VICTORIA FISHERIES ORGANIZATION**

## **Lake Victoria Fisheries Organization**

Bell Avenue,

Plot 7B/E Busoga Square

P. O. Box 1625

Jinja, Uganda

Telephone: +256 434 125 000

Email: [lvfo-sec@lvfo.org](mailto:lvfo-sec@lvfo.org)

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## ABBREVIATIONS

BMUs	Beach Management Units
CBOs	Community Based Organizations
CNSTI	Burundi National Commission on Science, Technology, and Innovation
CNSTI	<i>Commission Nationale de la Science, la Technologie et l Innovation</i> (Burundi National Commission on Science, Technology, and Innovation)
COSTECH	Tanzania Commission for Science and Technology
EAC	East African Community
ISABU	<i>Institut des Sciences Agronomiques du Burundi</i> (Institute of Agronomic Sciences of Burundi)
LVFO	Lake Victoria Fisheries Organization
NACOSTI	Kenya National Commission of Science and Technology
NGOs	Non-Governmental Organizations
TAFIRI	Tanzania Fisheries Research Institute
UNCST	Uganda National Council of Science and Technology

## GLOSSARY

For the purpose of this Policy the following terms shall mean, unless otherwise stated:

**Aggregate data:** Data in numeric or non-numeric form that is collected from multiple sources and/or on multiple measures, variables, or individuals and compiled into data summaries or summary reports, typically for the purposes of public reporting or statistical analysis.

**Analog data:** Data that represents a series of continuous streams of values. [Analog data can take any value within a range. For example, human voice, instrument sound, temperature, weight, height]

**Anonymous data:** Data achieved through combination or de-identification to hide the identity of a specific individual or location.

**Big data:** Data characterized by volume, velocity, veracity, and variability that traditional storage and processing methods cannot handle.

**Closed data:** Restricted data is only accessible to its owner, custodian, or holder.

**Creative Commons:** Licensing framework which facilitates open data and information sharing practices.

**Data sharing:** The provision of authorized access to the data held by the owner, custodian, or any other entity controlled to help deliver better outcomes to the stakeholders.

- Data asset:** A structured collection of data developed for a broad purpose. A data asset could also include models, methodologies, and algorithms.
- Data custodian:** The agency, body, or position designated with the custody of a specified dataset or information asset. The term “custodian” is synonymous with another term, “owner.”
- Data governance:** Implementation of policies, processes, structures, roles, and responsibilities to ensure that an agency’s data is managed effectively and can meet its current and future business requirements.
- Data management:** A set of activities involved with managing data from creation to final disposal/re-use to protect it from unauthorized use and inappropriate deletion.
- Data ownership:** The ability to exercise authorized rights and complete control over a single piece or set of data elements. Furthermore, data ownership provides information about the lawful owner of data assets and the acquisition, use, and distribution policy implemented by the data owner.
- Data stewardship:** The management and oversight of an organization's data assets to help provide business users with high-quality data that is easily accessible consistently.

**Data:** Facts and figures that can be represented as numbers, text, graphics, sound, or video, as well as how these are interpreted. Data can also take different forms, e.g., digital, and pertain to various topics or areas, e.g., people, systems, and the environment. For example, transactional and operational data can be broken down by type or purpose.

**Disaggregate data:** Broken down aggregated data into parts or smaller units of data, usually within a common branch of a hierarchy, to a more detailed level to that at which detailed observations are taken.

**Embargo:** An agreement between a source and a media outlet that information—often contained in a press release—will not be published until a predetermined time. Venture funding announcements are usually disclosed to journalists “under embargo.

**Formats:** A method of organizing data by its shape, size, and general makeup.

**Information sharing:** The process of making information possessed by one organization accessible to relevant stakeholders.

**Intangible Resources:** Stocks of strategic information and intangible assets that the organization can employ as needed to achieve its goals.

**Knowledge sharing:** The process of sharing organizational tacit (undocumented) and explicit (documented) knowledge.



**Protocols:** A set of rules or procedures for transmitting data between electronic devices, such as computers. For computers to exchange information, there must be a pre-existing agreement regarding how the information will be structured and how each side will send and receive it.

**Tangible Resources:** Stocks of strategic information and real assets that the organization can employ as needed to achieve its goals.

**Tools:** A device or software that is used to do a particular kind of work

## **ACKNOWLEDGEMENTS**

The Data, information, and knowledge sharing Policy for Lake Victoria Fisheries Organization (LVFO) is an output generated through the involvement of many stakeholders. LVFO recognizes the invaluable support from various stakeholders involved in developing this policy.

First, LVFO recognizes the East African Community (EAC) for reassuring the importance of fisheries and aquaculture data, information, and knowledge for economic, social, and environmental development. Second, LVFO recognizes and appreciates the local, regional, and international organizations and institutions for participation in information sharing that provided the much-needed baseline for shaping this policy. LVFO is thankful to regional organizations, universities, research institutions, Science Councils, and coordinating ministries in the Partner States of Burundi, Kenya, Tanzania, and Uganda. Other stakeholders are Beach Management Units, fish processors, and non-governmental organizations.

## **FOREWORD**

Lake Victoria Fisheries Organization (LVFO) is an institution of the EAC, established to coordinate management and development of Fisheries and Aquaculture in the Partner States. The LVFO is an Inter-Governmental Organization formed by a Convention in 1994, which was revised in 2016 to increase the scope and mandate of the Organization. LVFO has developed the Data, Information, and Knowledge Sharing Policy to guide for sharing of data, information, and knowledge among LVFO and its stakeholders.

The policy guides data, information, and knowledge sharing among stakeholders in the fisheries and aquaculture within and outside the EAC. Furthermore, the policy serves as a framework to guide data, information, knowledge organization, storage, preservation, and dissemination. Thus, it forms a basis for all stakeholders to share data, information, and knowledge on fisheries and aquaculture.

Improved accessibility of fisheries and aquaculture data, information, and knowledge will assist in creating collaborative research and increase the visibility of LVFO and Partner States. The effective implementation of this policy is expected to enhance the realization of the Vision and Mission of the LVFO and the Partner States regarding fisheries and aquaculture data, information, and knowledge sharing. This policy complements other relevant policies and guidelines.

**Dr. Shigalla B. Mahongo**

**EXECUTIVE SECRETARY**

## **1.0 INTRODUCTION**

### **1.1 Background**

The Lake Victoria Fisheries Organization (LVFO) is an institution of the EAC, established to coordinate management and development of Fisheries and Aquaculture in the Partner States. LVFO is an Intergovernmental Organization (IGO) registered with the United Nations (UN) under Article 102 of the UN Charter. It is also a Regional Fisheries Management Organization (RFMO). It comprises East African fisheries departments/ministries, fisheries research institutions, Beach Management Units/Landing sites Committees, and Industrial Fish Processors, coordinated by the Secretariat. The principal objectives of LVFO are to foster cooperation among the Contracting Parties, harmonize national measures for the sustainable utilization of the fish and related living resources, develop and adopt conservation and management measures, promote aquaculture, undertake research, and build institutional capacity.

Although the region has depended on Lake Victoria as a principal source of fish and fish products, the lake's production has been either stagnant or on a downward trend. Over the years, aquaculture has emerged as an augmented sub-sector to the fishery.

Similarly, developing fisheries in small water bodies, including rivers, dams, and satellite lakes, has become necessary to improve the livelihoods of the fisher communities within the EAC. However, the resilience of communities to adapt to climate changes has been affected by new threats to fishery development, including resultant perturbations of ecosystem health.

The LVFO Partner States collaborate on management and research through an ecosystem approach to harmonize guidelines and policies in fisheries and aquaculture. It also ensures that fish and fishery products are available sustainably for consumption in East Africa and continued

access to regional and international markets. Currently, LVFO has four (4) Partner States: the Republic of Burundi, the Republic of Kenya, the United Republic of Tanzania, and the Republic of Uganda.

## **1.2 Context**

The LVFO data, information, and knowledge comprise various informational materials, including, among others: the Convention of 1994 amended in 2016, Policies, Plans, Guidelines Standard Operating Procedures, Development Strategies, technical reports, studies, speeches, maps, photos, video, and documentaries of events and key milestones. Individual LVFO institutions across the Partner States and stakeholders keep their data, information, and knowledge. The institutions disseminate them using various strategies, including publications, websites, media outlets, stakeholder engagements, and Information Resource Centres. Therefore, a sharing policy is required to address visibility, availability, accessibility, archiving, harmonization, and effective dissemination of LVFO data, information, and knowledge to key stakeholders to inform sustainable management and development of fisheries and aquaculture in the EAC.

The LVFO Partner States have national policies, laws, and regulations that govern local and foreign nationals' acquisition and utilization of data, information, and knowledge. Research and Development (R&D) institutions in the Partner States are Kenya National Commission of Science and Technology (NACOSTI), Uganda National Council of Science and Technology (UNCST), Tanzania Commission for Science and Technology (COSTECH), and Burundi National Commission on Science, Technology, and Innovation (CNSTI). These authorities demand the submission of project proposals before collecting data and information. They also charge research clearance fees, contributing to the Partner States' national development.

### **1.3 Legal and Regulatory Framework**

The LVFO, like other Inter-Governmental organizations, is established by a legal document known as the LVFO Convention. The LVFO Convention was signed in June 1994 and later enforced in May 1996, whereby Tanzania, Kenya, and Uganda were the only Partner states of the LVFO. The LVFO Convention's signing happened before the East African Community (EAC) revival in 1999, which collapsed in 1977. Therefore, the early set-up of the LVFO was the primary effort of the Food and Agriculture Organization (FAO), especially its Committee for Inland Fisheries of Africa (CIFA). The LVFO activities were under the supervision of the “*Policy Steering Committee*,” an amendment done by the LVFO Council of Ministers meeting held in November 1998 at Nairobi, Kenya.

The LVFO witnessed EAC’s revival and its Treaty’s signing in 1999. Following this historic occasion, the FAO ceased its direct supervision of the LVFO. The sub-committee for the Development and Management of Fisheries of Lake Victoria, reporting to the Committee for Inland Fisheries (CIFA), officially ceased. The LVFO became a specialized institution of the EAC. The LVFO was registered and recognized as a Regional Fisheries Management Organization (RFMO) by the United Nations (UN). In 2010, new developments came up as the EAC Heads of States directed the EAC Council to address the integration of the LVFO activities in the EAC. The decision necessitated the amendment of the LVFO Convention, which widened the coverage and mandate of the LVFO to cover the EAC Fisheries and Aquaculture sector and line up institutional structures and organs with those of the EAC Institutions. After the said amendment and integration, the LVFO has legally worked under the EAC for over two decades. The EAC Partner States benefit from LVFO operations because the goal is to have sustainable growth of fish and fisheries

products in the EAC region, create wealth and maintain food and nutritional security for the citizens of East Africa.

Concerning data, information, and knowledge sharing between the LVFO and its stakeholders, the legal and regulatory framework can be deliberated on three levels: international, regional, and Partner State. This section shows how each one legally responds to data, information, and knowledge sharing.

### **1.3.1 The International Level**

At the global level, the main instrument that recognizes the existence of LVFO is the United Nations Charter established in 1945. The Charter under article 102 is to the effect that an international agreement or Treaty by the members of the UN shall be registered and published with it. Thus, according to the Charter, LVFO is internationally registered as a Regional Fisheries Management Organization (RFMO). Consequently, the LVFO possesses international recognition and certification in its operations in the legal context. Such status is highly significant to the Organization's legitimacy of the activities, including cooperation in data, information, and knowledge sharing between the LVFO Secretariat, the Partner States, and other stakeholders. Data, information, and knowledge sharing between the LVFO and its stakeholders may involve international organizations, institutions, associations, and other countries. Thus, data, information, and knowledge sharing transactions have a recognized international mandate which ensures the LVFO's legal capacity. It is crucial to afford the ultimate trust and confidence required for the international stakeholders to enter legal relations with the LVFO

### **1.3.2 The Regional Level**

The LVFO incorporation is adopted in the Treaty for establishing the East African Community. According to the EAC Treaty, the LVFO is recognized as a specialized community institution whereby its Convention is accommodated under article 9 of the EAC Treaty. The LVFO, among the surviving institutions of the East African Community, is deemed an institution of the Community. It is important to note that the 2016 LVFO Convention amendment enabled the extension of the coverage of the LVFO to all water bodies within the EAC region.

Article 110 (a)-(f) of the EAC Treaty obligates the Partner States to establish mechanisms for exchanging information on demand and supply surpluses and deficits, trade, forecasting, and state of food nutrition. This article gives rise to the independent duty of the Partner States to share data and information. Such data and information related to sustainable joint efforts to address food and nutrition security sustainability through fisheries and aquaculture products. The regulatory framework of the LVFO is provided therein the Convention, whereby five main organs are established for the regulation and operation of LVFO activities. The Fisheries and Aquaculture Sectoral Council of Ministers (FASCoM) is the Organization's governing body. It consists of the Ministers responsible for fisheries and aquaculture of the Contracting Parties or their authorized representatives. The Coordination Committee includes the Chief Executive Officers (Permanent/Principal Secretaries) of the Ministries in charge of fisheries and aquaculture management and development in each Contracting Party or their representatives. Other bodies include the Senior Officials, the Technical Committees, and the Secretariat. The FASCoM and the Coordination Committees are the two main organs set to make decisions and act as supervisory and regulatory bodies of the LVFO.



### **1.3.3 The Partner States Level**

The LVFO Convention establishes a specific national body in each contracting member to deal with fisheries and aquaculture activities. At the national level, sectoral ministries regulate fisheries and aquaculture activities. At this level, there are also existing domestic laws and policies in each Partner State that provide for the management of information on fisheries and aquaculture among the Partner States to the LVFO. However, a treaty is obligated to share the fisheries and aquaculture data and information from them with the other Partner States and the Organization. The LVFO Convention under article XIII.5 is that the Partner States shall provide access to all laws, regulations, documents, data, and reports about fish landings, stock assessments, and living resources of EAC water bodies and any other matter subject to the institution. Therefore, from this treaty obligation, states must ensure that data, information, and knowledge sharing among them is effectively guaranteed.

## 2.0 SITUATION ANALYSIS

### 2.1 Introduction

Data, information, and knowledge are essential for successful organizational performance. The performance capacity of any organization is becoming increasingly dependent on its ability to manage organizational data, information, and knowledge. Unfortunately, some organizations may face challenges in managing data, information, and knowledge; consequently, the benefits of data, information, and knowledge may not be reaped as it is supposed. Lake Victoria Fisheries Organization (LVFO) faces a similar scenario. In addressing the challenge, a study was conducted to review data, information, and knowledge management status across the four Partner States. The study adopted the Appreciative Inquiry (AI) approach involving the LVFO Secretariat, LVFO institutions, and stakeholders. The approach helps to explore and discover the strengths, weaknesses, opportunities, and challenges in data, information, and knowledge sharing. Therefore, the study findings were used to inform data, information, and knowledge sharing policy formulation. The study involved the following categories and activities:

**Organizations/institutions:** Identifying LVFO institutions and organizations involved in generating fisheries and aquaculture-related data and information.

**Data and Information:** Identifying the potential and existing sources, types, and categories of data and information, including establishing ownership of data and knowledge in the LVFO institutional framework.

**Systems:** Reviewing the status and management of various datasets across the LVFO Partner States; identifying the barriers to data, information, and knowledge sharing among agencies, institutions, and external collaborators and reviewing the existing tools, protocols, and formats for generating, digitizing, storing, and sharing data and

information.

**Policy and agreements:** Review the existing agreements between LVFO and development partners on data, information, and knowledge sharing, including the current institutional, national, regional, and international policies regarding data, information, and knowledge sharing.

The study findings are presented to inform data, information, and knowledge sharing policy. Brief discussions of the results are included to interpret and reinforce the understanding of the policy implications.

## **2.2 Stakeholders' Participation**

Stakeholders' participation is critical in implementing this policy. There were over 114 individual stakeholders identified as potential participants in fisheries and aquaculture data, information, and knowledge sharing. Among the identified stakeholders, some participated in the Focus Group Discussions (FGD), while others participated in the survey (face-to-face, online and hybrid). The findings were profiled against sex, age, professional, and education qualifications. The majority of the participants were men. The age categories demonstrated fair distribution among the participants. This combination helped to get insights enriched with experiences in handling data and information. As for educational qualifications, the majority of the respondents were holders of Masters degrees (50%), followed by Ph.D. holders (36.6%), bachelor's degrees (10%), and diplomas (3.3%). This allows incorporating the combination of operational (field-related) and strategic matters related to data, information, and knowledge sharing. The primary professionals were research scientists, management specialists, and ICT specialists. It implies that these professions are leading, even though data and information play cross-cutting roles. Other key professionals were lawyers, policy analysts, financial analysts, educators, fisheries and aquaculture experts, environment management specialists, fisheries

management experts, molecular geneticists, and agriculture & natural resource management experts. These professions are equally crucial for studying integrated data and information issues.

### **2.3 The Institutions and Organizations Generating Data and Information**

The implementation of this policy depends on the institutions and organizations involved in generating fisheries and aquaculture data and information. A total of 40 institutions and organizations were identified as stakeholders and categorized as LVFO Secretariat, LVFO institutions, Science Councils, CBOs/NGOs, BMUs, and regional and international organizations. From these institutions and organizations, individuals were identified and contacted. Engagement sessions were held conveniently through online, physical, or both means. Furthermore, secondary data were collected from the specified places and beyond to gain more insight into the fisheries and aquaculture data and information generated. A questionnaire was prepared and sent to 114 individuals. However, only thirty-one (31) responses were received from the identified individuals from institutions/organizations that generate fisheries and aquaculture data and information. Fortunately, the responses represented a fair distribution of the stakeholder categories.

### **2.4 Management of the Various Data Sets and Information**

Data management broadly entails activities from collecting to destroying or reusing a dataset. The current status of data management activities across the LVFO Partner States indicates that collection was the main activity (83.3%), followed by relevance evaluation (53.3%) and destruction/reuse (23%). The accessibility and visibility of data and information are affected by the level of investment in network infrastructure, hardware, software, people, and procedures. The situation analysis revealed that the top five barriers to managing the accessibility and visibility of data and information were ownership

(66.7%), security (60%), limited know-how (60%), and inhibiting privacy laws (56.7%), and inadequate standards (56.7%). Others were negative public perceptions (36.7%), liability (30%), and perceived purpose and value (26.7%). Therefore, investing in infrastructure, hardware, software, people, and procedures is essential for effectively sharing data, information, and knowledge among the LVFO stakeholders.

## **2.5 Ownership of Data and Information**

In the context of this policy, ownership refers to exclusive legal rights and control over the data and information. In the LVFO institutional framework, ownership can be categorized into three main types: (i) Ownership, (ii) Stewardship, and (iii) Custodianship. The current situation shows that most stakeholders perceive the data owners to be the institutions of the data collectors (64.5%), followed by the individual data collectors (48.5%), and very little is owned by data publishers (25.8%). Furthermore, the findings indicate that several organizations are stewards of data. They include data publishers and some national and regional organizations. Although the LVFO Secretariat was rated the least in stewardship, most respondents (50%) rated it as a data custodian.

Respondents had varied perceptions of the role of institutions and organizations in data and information management. Most respondents thought that the institution of the data collector should play the overall management role, followed by the LVFO Secretariat. In contrast, other institutions and organizations should play a partial management role. The perception of data stewardship in each category was less than 50% of respondents.

## **2.6 The Potential and Existing Sources, Types, and Categories of Data and Information**

The LVFO Secretariat coordinates the collection/generation of fisheries and aquaculture data and information within the EAC Partner States. The findings indicated that three main types of fisheries generated data and information. These were: (i) Catch assessment surveys (70%), (ii) Frame survey data (66.7%), and (iii) Fisheries socio-economic data (63.3%). Other types of fisheries data and information include; fish biological data and information, fish biomass and distribution, biodiversity, ecological and limnological data, fish post-harvest data, fish marketing, and trade data (i.e., Local/Regional & International/Export markets), harmonized guidelines, standards and protocols, and the basin population/demographics for the Lake Victoria Basin.

Aquaculture data and information generated included fish breeding (73.3%), fish feeds (70%), and fish production systems (63.3%). Aquaculture data and information included aquaculture production systems (fish breeding/hatchery management and fingerling production), fish health & diseases, fish feeds, and others. Other aquaculture data include Cost-Benefit Analyses (CBA); environmental, number of fish farmers, size of fish farms, number of fish cages, fish production, socio-economic data, species data, guidelines and policies, and surveys. The LVFO Secretariat coordinates the generation/collection of aquaculture data through the EAC Partner States. In addition, are coordinated records of the number of fish farmers, fish production information and trade information, aquaculture socio-economic data, fishpond water quality analysis, fish farmers distribution and production, and fish production. The scope of data and information coverage was mainly within the institutions (63.3%). Only 3.3% of the institutions had the Community and IGAD Partner States range, while 46.7% were within the EAC region.

The survey results showed that LVFO institutions were considered important sources of data and information regarding science (61.3%) and the environment (51.6%). Central government (77.4%) and regional organizations (64.5%) were leading sources of statistics-related data and information, whereas regional organizations (32.3%) were sources of weather and Governmental institutions (41.9%) for finance.

## **2.7 The Existing Agreements between LVFO and Development Partners on Data, information, and knowledge sharing**

The LVFO has existing agreements with other organizations on data and informing stakeholders. Supposedly, based on confidentiality, not many agreements were available for the review under this study. Consequently, one agreement on data sharing between LVFO and Database System provider was reviewed. The agreement indicates that LVFO can relate with other stakeholders on data and information sharing in different forms. First, the LVFO can enter specific data and information sharing agreements with desirable and relevant stakeholders. Secondly, it can propose data and information sharing clauses in its agreements with the relevant stakeholders.

The existing reviewed agreement on data processing reflects a model under which an organization can undertake data, information and knowledge sharing agreements. The agreement's approach is imperative as it represents the free will and consent of the stakeholders and owner of such data and information for official use of the LVFO. Therefore, they can reduce the harmful legal risks to the LVFO out of the use of such data and information. In that regard, the LVFO has the legal capacity to enter into such an agreement which must be prepared and negotiated with relevant authorities and stakeholders to enable data and information sharing. LVFO has two Europe Union (EU) funded projects that follow EU procedures on handling data and information.

Under the TRUEFISH project, LVFO developed a Communication and Visibility document that guides data, information, and knowledge sharing. Under the MECCA project (*Targeting Mental Models of Climate Change Risk to facilitate Climate Action*), LVFO has data processing agreements. Under the GIZ financing agreement, some clauses about data, information, and knowledge sharing exist.

## **2.8 The Existing Policies Regarding Data, information, and knowledge sharing**

The EAC has Data, Information, and Knowledge Management Strategy (2018). This strategy provides a basis for data, information, and knowledge sharing between the EAC, its institutions, and other stakeholders. This strategy defines data, information, and knowledge sharing, among other essential aspects. Secondly, it acknowledges the existing challenges regarding data, information, and knowledge sharing within the EAC and its stakeholders. Among other challenges is despite existing dissemination strategies in place, the Community data, information, and knowledge is not easily accessible and shared among the stakeholders.

The overall objective of this strategy is to increase the availability, access, and use of timely, high-quality EAC regional integration data, information, and knowledge for improved decision-making functions.

Additionally, The EAC has a draft Institutional Repository Policy (2018). The policy provides a framework for managing, utilizing, and increasing the visibility of EAC information and knowledge. It also guides EAC information and knowledge preservation and enhances collaboration with the global research community.

Furthermore, the LVFO Secretariat has an ICT Policy of 2016, which provides benchmarking to develop and manage a modern ICT infrastructure for internal operations; and linkages with LVFO



institutions and Partner States. It further offers guiding principles for optimal use, maintenance, security, and ethical use of organizational corporate ICT facilities and services.

In the Partner States, national policies aim to strengthen cooperation and collaboration in data, information, and knowledge sharing for sustainable economic development. Some of these policies include the National Agriculture Policy of 2013, National Fisheries and Aquaculture Policy of 2018, Intellectual Property Policy, National Information and Communications Technology Policy (Uganda); Intellectual Property Policy (Kenya); National Fisheries Policy of 2015, and National Information and Communications Technology Policy of 2016 (Tanzania). The policies provide the basis of data, information, and knowledge sharing regionally and internationally. ICT development initiatives promote knowledge transfer, including data, information, and knowledge sharing for sustainable economic development. These policies facilitate data and information management and exchange for mutual benefits to enable value-added services among various stakeholders.

## **2.9 The Existing Tools, Protocols, and Formats for Generation, Digitization, Storage, and Sharing of Data and Information**

**Tools:** Various tools exist at LVFO institutions, science councils, and coordinating ministries that support the entire value chain of data and information. LVFO Secretariat has acquired an electronic system that enables quality data collection, storage, and analysis. Regional/joint research activities have harmonized data collection tools that include software and access keys for specific categories of data. Examples include an Electronic Catch Assessment System (E-CAS) tool and Echo-view software applied in hydro-acoustics data collection. E-CAS is used regionally to collect fish catch information, analyze, and produce reports. LVFO has been responsible for developing and updating tools, which have been harmonized for collecting data on

other water bodies. Such efforts need coordination to avoid duplication of efforts and waste of scarce resources.

In Tanzania, TAFIRI and COSTECH have initiatives to support the data and information value chain. TAFIRI, with the support from LVFO, developed an intelligent system that enhances quality data collection with a consistent format, digitization, and storage mechanisms. COSTECH is developing a system to support data, information, and knowledge sharing, including research data and publications from its funded projects. The Tanzania Biodiversity Information Facility (TanBIF) is a biodiversity database, including fisheries-related information hosted by COSTECH.

In Kenya, new data collection tools and technologies have been progressively introduced with system improvements and capacity building of data collectors/enumerators. For instance, KMFRI utilized an electronic module in the regional eCAS platform to roll out the revamped Electronic Fish Marketing System (EFMIS). This is a tool kit for routine market data collection comprising a generic database and a smart mobile phone, which has transformed data collection, digitization, and storage beyond the provisions of manual data collection.

In Uganda, there are policies on data, information, and knowledge sharing, and technology has been utilized to enhance sharing of data and information. NaFIRRI has an online freshwater biodiversity portal that enables accessibility fisheries related data and information.

**Protocols:** Recent trends have shown that several publishers have adopted the open-access business model with policies that allow publishing data and making it available in the public domain. The push towards open data includes its advantages, such as enhanced transparency of the results and suppressed research frauds while also

allowing verification and reinterpretation of the original results. Furthermore, LVFO seeks to enhance data, information, and knowledge sharing among its stakeholders. Therefore, it is time to consider open data principles as part of its data-sharing policies. However, LVFO must consider critical issues such as embargoes and license schemes.

Storage mechanisms for data and information vary across the LVFO Secretariat and the Partner States. While some Partner States have advanced in establishing data storage infrastructures and telecommunication networks to support remote access and use, others are lagging. Institutions and LVFO Secretariat own their data storage facilities, including servers. Individual researchers keep their data on devices such as desktops, laptops, or even smartphones. Such practices produce silos of data (formats, locations, size, etc.) with risks of loss and difficulty sharing across a larger scale.

**Formats:** Common descriptions of data formats include tabular data with extensive metadata, tabular data with minimal metadata, image data, Adobe Portable Document, video data, MS Access, MySQL, and documentation and scripts. These different data formats provide varying opportunities for sharing. Data, information, and knowledge sharing rely on key principles of Findable, Accessible, Interoperable, and Reusable (FAIR). These principles are also the building blocks for open access. The metadata are indicators of the level at which these principles are applied. Metadata is simply data about data. Situation analysis shows that among the four principles, three (Findable, Interoperable, and Reusable) were the least applied by 35%, 43.3%, and 40%, respectively, by the institutions or organizations. Even where the principles were applied, there were variations in metadata management to bring wider sharing. Across the three principles, only Accessibility fared well, accounting for 33.3% on the level of

applicability. Inapplicability of the Findability, Interoperability and Reusability accounted for 36.7%, 43.3%, and 40%, respectively.

Other aspects of data format are aggregation and disaggregation. These activities happen at individual researchers or institution levels and thus are fragmented. The national or regional data master format well integrated into tools is being considered at national and regional levels. However, with planned deployment, all stakeholders involved in data, information, and knowledge sharing need to get involved.

### **3.0 THE RATIONALE FOR THE DATA, INFORMATION, AND KNOWLEDGE SHARING POLICY**

Technological development and digital transformation have resulted in the massive generation of data. The recent projection shows that by 2025 total global data production will be 175 Zettabytes (or 33 trillion gigabytes) (IDC/Seagate, 2017). Consequently, this vast amount changes the role of data in an organization. Alongside the data volumes, the organizations should consider its presentation, processing to generate information, and sharing. Therefore, this calls for organizations to prepare with a clear roadmap to benefit from the opportunity.

LVFO Secretariat and its institutions have generated a lot of data and information. However, the absence of a regional policy governing the sharing of data, information, and knowledge results in uncertainty in the procedures to follow, the type of data to be shared, and the custodian's responsibility, among others. The collected data and information are not adequately stored in user-friendly formats. The data and information are also scattered in various institutions in and outside the East African region. Currently, LVFO Secretariat and its institutions have databases and resource centers holding vital data, information, and knowledge that are not linked (linked data could allow data sharing and accessibility). In some cases, the information therein cannot be accessed externally. Where such data, information, and knowledge could be available, there are no arrangements for sharing. This results in duplication of efforts and resources, creating difficulties for informed policy and management decisions on fisheries and aquaculture matters. The lack of adequate records and information management results in the absence of standards for the recording, classifying, storing, and managing of information. Additionally, most of the region's data, information, and knowledge have inconsistent formats. They also lack metadata due to inadequate information

management, thus making it difficult for a third-party user to assess them.

Currently, large amounts of data are in paper-based format or stored as soft copies in different formats resulting in inefficient viewing, accessing, transferring, and integration with electronic datasets. The situation hinders efficient data sharing. For data, information, and knowledge to be efficiently shared, they must be identifiable, retrievable, interoperable, and in a consistent format.

On the other hand, there are concerns from the Partner States on the engagement of East Africans in regional projects coordinated by the LVFO Secretariat, whereby regional scientists participate in collecting data and information that mainly benefit external collaborators with no clear benefit to the region. Partner States have also been concerned about sharing data and information generated by national institutions with external collaborators. The lack of a well-known sharing mechanism has occasionally caused concern among national institutions, demanding to get a clear picture of the benefits to the region. Based on the scenario, there is a need to review the status and management of the various data sets across the Partner States and develop a clear policy on sharing data, information, and knowledge for the LVFO.

## **4.0 STRATEGIC DIRECTION OF THE POLICY**

### **4.1 Mandate**

The mandate of the LVFO Data, information, and knowledge sharing Policy is derived from the resilient commitment of the LVFO as enshrined in Article II (1), II (2), II (3), and XI of the Convention for the establishment of Lake Victoria Fisheries Organization. These articles provide for the establishment and objectives of the LVFO, including fostering cooperation among the Partner States, providing a forum for national consultations, and harmonizing national measures for sustainable utilization of fisheries and aquaculture resources of the East African Community water bodies.

### **4.2 Vision**

A competitive and sustainable fisheries and aquaculture industry in the EAC supported by an efficient data, information, and knowledge sharing system

### **4.3 Mission**

To facilitate data, information, and knowledge sharing among LVFO stakeholders for promoting sustainable management and development of fisheries and aquaculture for food security and wealth creation in the East African Community.

### **4.4 Goal**

To enhance data, information, and knowledge sharing between the LVFO and its stakeholders for sustainable fisheries and aquaculture management and development in the EAC region.

### **4.5 Objective**

The main objective of the policy is to provide a framework for data, information, and knowledge sharing among the LVFO stakeholders to

inform sustainable management and development of fisheries and aquaculture in the EAC. The policy will address visibility, accessibility, archiving, harmonization, and effective dissemination of LVFO data, information, and knowledge. In addition, it will guide implementation procedures for data, information, and knowledge sharing. The specific objectives include:

- i. To set standards on the type and quality of data, information, and knowledge to be shared.
- ii. To guide on ownership and access rights of the shared data, information, and knowledge.
- iii. To provide roles and responsibilities of LVFO stakeholders on data, information, and knowledge sharing.
- iv. To enhance accessibility and visibility of the shared data, information, and knowledge.
- v. To strengthen the capacity of stakeholders to support data, information, and knowledge sharing.

#### **4.6 Guiding Principles**

In the context of EAC, DISP links upwards with LVFO policy and legal framework, as well as EAC policy and legal framework, including EAC Convention; it further links downwards with policy and legal frameworks in the Partner States and related stakeholders. The Policy should be read with implementation tools and standards, which may be updated from time to time to reflect recommended practices. Unless specific procedures are required under this Policy, the sharing of data, information, and knowledge shall be guided by the principles provided under the EAC- Policy Framework for Sharing Data, Information, and Knowledge. The principles include a commitment to sharing information, confidentiality, integrity, and authenticity. In addition, the following principles will apply:



### **4.6.1 Cooperation**

The policy promotes data, information, and knowledge sharing as an important area of cooperation and collective efforts toward attaining a joint and mutual goal of development. Standard solutions can be raised to address existing challenges through data, information, and knowledge sharing. Comparative approaches will be directed and implemented through collective efforts; hence, adequate measures will be employed to address the existing challenges.

### **4.6.2 Subsidiarity and Complementarity Principle**

This policy adopts the Community's principle of subsidiarity and complementarity to enhance flexibility between state parties' mandates and the LVFO. The policy recognizes the role of each party in data, information, and knowledge sharing to achieve the objectives of the Community.

### **4.6.3 FAIR Principles**

These FAIR (Findable, Accessible, Interoperable, and Reusable) data principles guide the sharing of data resources amid increasing volume, velocity, veracity, and variability of data. It emphasizes the computational supported systems to find, access, interoperate and reuse data with minimum human efforts. This policy partly focuses on data sharing, to which the FAIR principals have a guiding role.

## **5.0 PRIORITY ACTION AREAS**

Seven priority action areas have been identified to enhance data, information, and knowledge sharing among LVFO Secretariat, Partner States, and stakeholders. The strategic areas align with the specific objectives of the policy. The priority areas include preservation and accessibility; data, information, and knowledge sharing; security and ethical issues; integrated infrastructure for sustainable availability; institutional and legal frameworks; and human resource development and empowerment.

### **Priority No. 1: Preservation and Accessibility of Data, Information, and Knowledge**

LVFO coordinates research and practices in fisheries and aquaculture that generate much data and information. The global trend toward open access has implications for researchers and publishers of fisheries and aquaculture data and information. Thus, it is essential to have a guiding framework for the preservation and accessibility of data, information, and knowledge.

**Policy Statement No. 1:** LVFO shall archive its data, information, and knowledge in secured form, ethically sound, adequately curated, and accessible to relevant stakeholders.

#### **Strategies:**

- 1.1 To develop an integrated LVFO data, information, and knowledge repository.
- 1.2 To impose reasonable restrictions and controls on data, information, and knowledge in response to genuine concerns over sensitivity and privacy.
- 1.3 To provide reasonable backup solutions for data, information, and knowledge considering the security and privacy issues.
- 1.4 To provide reliable means of conservation and accessibility of data, information, and knowledge.

## **Priority No. 2: Data, Information, and Knowledge Sharing**

The FAIR (Findable, Accessible, Interoperable, Reusable) principles and Creative Commons (CC) licenses guide data, information, and knowledge sharing. The LVFO stakeholders have varying views on FAIR principles and CC licenses. Most stakeholders preferred a less restrictive CC and FI components of FAIR principles for fisheries and aquaculture data, information, and knowledge sharing. The practice elsewhere of organizations with similar mandates indicates that the most open CC license is adopted, and at least three FAIR principles are mandatory in the policies.

**Policy Statement No. 2:** LVFO shall adopt a creative commons license that advocates at least three FAIR principles.

### **Strategies**

- 2.1 To advocate for adopting at least three FAIR principles is sharing data, information, and knowledge.
- 2.2 To adopt a Creative Commons license in sharing data and information, considering privacy and confidentiality.
- 2.3 To forge a partnership with the publishers to recognize the LVFO data, information, and knowledge repository.

## **Priority No. 3: Security and Ethical Issues in Data, Information, and Knowledge Sharing**

One of the hindrances of data, information, and knowledge sharing involves ethical and security issues. Low trust in ethical and security procedures, breach of data and information before the embargo, breach of participants' privacy and their locations, and exposure of sensitive information such as the location of endangered species may harm the will to share. Furthermore, the shared data, information, and knowledge are subject to reuse or citation. The improper citation of the resources amounts to unethical practice. It is necessary to have proper

ethical considerations regarding data, information, and knowledge sharing.

**Policy Statement No. 3:** LVFO shall observe security and ethical conduct in sharing fisheries and aquaculture data, information, and knowledge.

### **Strategies 3**

- 3.1 To address measures to close the security gaps in sharing data, information, and knowledge.
- 3.2 To institute mechanisms for internal ethical review and monitoring.
- 3.3 To guide the proper citation of data, information, and knowledge from LVFO.

### **Priority No. 4: Data Collection and Storage**

Sharing data begins with the collection process. It is found that although information systems are already adopted to support data quality, including the development process, it is not applied throughout the data sources. There are also fragmentations where more than one system exists without knowing its capability to produce harmonized data.

**Policy Statement No. 4:** LVFO shall ensure the collection and storage of standard data using a harmonized standard framework for easy sharing and manipulation.

### **Strategies**

- 4.1 To develop the standard methods and tools for fisheries and aquaculture data collection.
- 4.2 To create awareness among the stakeholders on using the standard methods and tools.
- 4.3 To monitor the process of implementation of standardized data collection and storage.

## **Priority No. 5: Integrated Infrastructure for Sustainable Availability of Data, Information, and Knowledge**

Continuous access to data, information, and knowledge is a critical value proposition. Therefore, LVFO Partner States must have sufficient infrastructure to ensure the constant availability of data, information, and knowledge. There are issues with the quality of hardware, software, networks, procedures, and skilled personnel. It is necessary to consider sustainability to ensure the continuous availability of data, information, and knowledge. Also, there is a need to integrate various existing systems for efficient and effective data, information, and knowledge sharing.

**Policy Statement No. 5:** LVFO and stakeholders shall ensure that they build integrated infrastructure for sustainable data, information, and knowledge availability.

### **Strategies**

- 5.1 To ensure that existing systems' components support the continuous availability of data, information, and knowledge.
- 5.2 To ensure infrastructures for data, information, and knowledge sharing are regularly reviewed and upgraded to remain relevant and effective.

## **Priority 6: Institutional and Legal Frameworks**

The mandate of LVFO is to foster cooperation among the Partner States, harmonize national measures for the sustainable utilization of the fisheries and aquaculture resources of the East African Community water bodies and develop and adopt conservation and management measures. However, the institutional and legal frameworks supporting data, information, and knowledge sharing are still fragmented and underdeveloped.

**Policy statement No. 6:** LVFO shall coordinate harmonization and development of institutional and legal frameworks for data, information, and knowledge sharing.

### **Strategies**

- 6.1 To develop standards and procedures for sharing data, information, and knowledge among LVFO stakeholders.
- 6.2 To coordinate the development of agreements on data, information, and knowledge sharing for mutual benefits.
- 6.3 To negotiate data, information, and knowledge sharing provisions in existing and incoming agreements.
- 6.4 To coordinate institutional harmonization and development of legal frameworks for data, information, and knowledge sharing.

### **Priority No. 7: Human Resource Development and Empowerment**

Human resource capacity enhances data, information, and knowledge sharing. Human resources capable of supporting data, information, and knowledge sharing are inevitable in the changing environments. Relevant skills are vital for successful data, information, and knowledge sharing to keep up with technological developments. Capacity building with emerging skills accelerates transformation, retains talents, and promotes success.

### **Policy statement No. 7**

LVFO shall promote human resource development and empowerment to enhance data, information, and knowledge sharing.

### **Strategies**

- 7.1 To put in place and implement capacity-building programs for data, information, and knowledge sharing.
- 7.2 To facilitate and promote capacity development and empowerment programs.

- 7.3 To establish enabling work conditions for efficient and effective data, information, and knowledge sharing.
- 7.4 To develop internal capacity on custodianship to safeguard the interests of the Partner States and other stakeholders.
- 7.5 To build capacity in developing, reviewing, and using the standard methods and tools for data collection and storage.

## **6.0 IMPLEMENTATION ARRANGEMENTS OF THE POLICY**

### **6.1 Institutional Arrangements**

The policy implementation will be the responsibility of the Partner States and the LVFO Secretariat, who will collaborate to ensure that the policy objectives are met successfully. Therefore, it is necessary to implement processes that will support the translation of policy provisions into actionable activities and projects. Among these processes is creating and implementing a Data, information, and knowledge sharing Plan. This section describes the policy implementation arrangements, including stakeholders' roles and responsibilities. The LVFO Secretariat and the Partner States shall create an enabling environment to promote the region's data, information, and knowledge sharing practice. The following organogram depicts LVFO institutional arrangement:



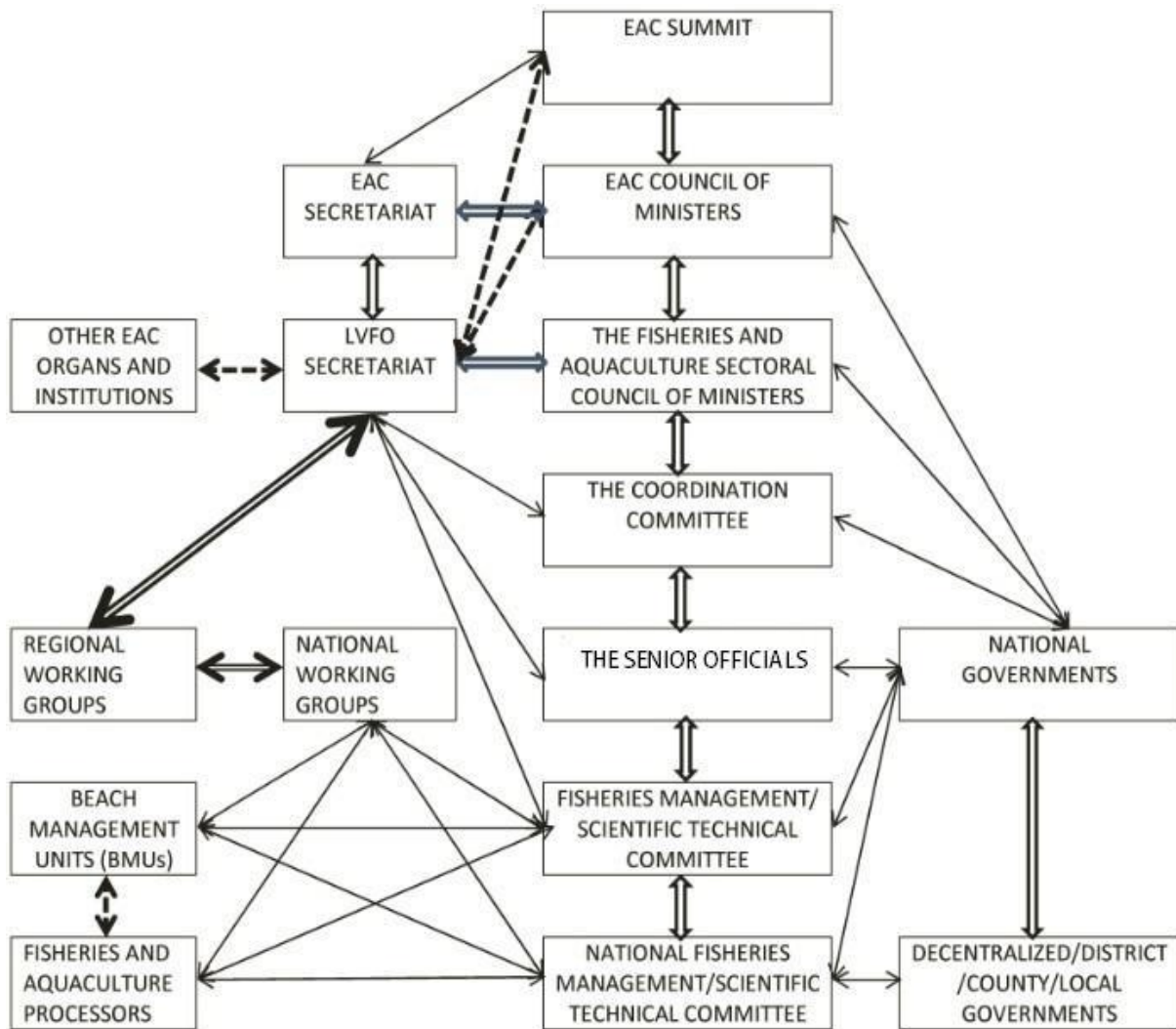


Figure 1: LVFO Organogram (Source: LVFO, 2022)

- i. All datasets in the LVFO scheme shall be accessible centrally or through direct access to an LVFO institution.
- ii. The LVFO centralized repository shall allow for centralized access, where all shareable datasets in the LVFO scheme will be amassed and accessed.
- iii. LVFO Secretariat shall formulate a technical committee responsible for overseeing the centralized LVFO data portal.

- iv. Before submitting data, information, and knowledge to LVFO, the National Focal Institutions ensure that all data and information provided to LVFO has been quality assured by the relevant source institution.
- v. The Partner States agree that harmonized quality standards will be developed when required. Accordingly, the LVFO Secretariat will facilitate such harmonization.

## **6.2 Roles of Key Players and Actors**

Key players and actors in implementing this policy are LVFO Secretariat, Central Government, Governmental institutions, non-Governmental organizations, LVFO institutions, regional organizations, and international institutions. Each of these has a role to play in achieving the objectives of this Policy. The following sections summarize the role of the key players and actors.

### **6.2.1 LVFO Secretariat**

LVFO Secretariat shall set up effective supporting structures and mechanisms for implementing and monitoring the data, information, and knowledge sharing policy across the Partner States. The following are the roles of the LVFO Secretariat for successfully implementing the policy.

- i. LVFO shall create a data portal to be accessed by various stakeholders
- ii. LVFO Secretariat may enter into MoU with relevant multi-national organizations to facilitate direct data, information, and knowledge transfer between these organizations and LVFO.
- iii. LVFO Secretariat shall maintain an updated record of the National Focal Institutions.
- iv. LVFO Secretariat shall facilitate the harmonization of data and information quality standards if needed.

- v. LVFO Secretariat shall confirm when data and information are well received to the National Focal Institutions.
- vi. LVFO Secretariat shall remind respective National Focal Institutions when receipt of data and information is delayed.
- vii. LVFO Secretariat shall assist the National Focal Institutions in the Partner States with technical backstopping and training and capacity building when needed

### **6.2.2 LVFO Institutions**

LVFO institutions shall set up effective institutional structures and mechanisms for implementing and monitoring the data, information, and knowledge sharing policy and allocating adequate resources to facilitate the implementation.

- i. The LVFO Institutions shall promptly ensure that all agreed data, information, and knowledge are shared with LVFO.
- ii. The LVFO Institutions shall build an internal mechanism to institutionalize data, information, and knowledge sharing policy.

### **6.2.3 Research Institutions and Universities in the Partner States**

Collaborate in capacity building for fisheries and aquaculture data, information, and knowledge sharing.

### **6.2.4 Coordinating Ministries in the Partner States**

- i. The coordinating ministry in the Partner State shall serve as a National Focal Institution, responsible for carrying out the Partner State's duties concerning data, information, and knowledge sharing described in the Rules and Procedures of this policy.
- ii. Suppose a national LVFO institution does not provide the agreed data to the designated LVFO state coordinating ministry within the agreed timeframe. In that case, the National Focal Institution

will contact the respective provider to facilitate prompt data delivery.

- iii. The LVFO state coordinating ministry will appoint a national contact person(s) to facilitate the data exchange between the Partner State and LVFO.
- iv. The LVFO state coordinating ministry ensures that all data, information, and knowledge provided to LVFO has been quality assured by the relevant source institution before submission.

### **6.2.5 Private Sector and Other Non-State Actors**

- i. The private sector actors shall access the open data through the LVFO data portal or fill in data request forms to access closed datasets.
- ii. The private sector may share its datasets through National Focal Institution.

## **7.0 MONITORING, EVALUATION, AND REPORTING**

### **7.1 Monitoring Implementation**

The LVFO Secretariat shall coordinate the Monitoring and Evaluation (M&E) of the implementation of this policy. The monitoring and evaluation (M&E) shall be based on the key performance indicators. The LVFO Secretariat shall provide a standard M&E reporting procedure that responsible stakeholders shall use to report this policy's implementation. The M&E reports will inform the LVFO Secretariat and other stakeholders on the implementation status of the policy.

### **7.2 Policy Evaluation**

This policy shall be evaluated from time to time as deemed necessary to ensure it is up to date and serves its purpose. In any case, the entire policy shall be reviewed after every five years. Any amendment to this policy shall be approved by the LVFO Secretariat and relevant approval organs.

### **7.3 Reporting**

The reporting shall be based on the progress of implementing various activities as stipulated in the seven priority areas of this policy. The reporting shall include all responsible stakeholders, whereby they shall submit their implementation reports to the LVFO Secretariat. The LVFO Secretariat shall report the implementation of this policy to the East African Community.

## **8.0 ALLOCATION OF RESOURCES**

### **8.1 Tangible Resources**

Tangible resources are vital in implementing this policy. The LVFO Secretariat and the Partner States shall support the allocation of substantial resources needed to implement this policy.

### **8.2 Intangible Resources**

The intangible resources may be needed to support the implementation of this policy. LVFO Secretariat and the Partner States shall support the allocation of intangible resources for the performance of this policy

## **9.0 CONCLUSION**

This policy has been developed as part of the mandates of LVFO to promote fisheries and aquaculture in the EAC region. It strongly emphasizes stakeholders' demand for shared fisheries and aquaculture data, information, and knowledge. The policy recognizes the current trends characterized by the massive generation of digital data, which changes the role of data in an organization. The changing data ecosystems require organizations to prepare a clear roadmap to benefit from the opportunity. In achieving this goal, the policy provides a roadmap with seven priority action areas, policy statements, and implementation strategies. The strategic areas align with the specific objectives of the policy. The priority areas include preservation and accessibility; data, information, and knowledge sharing; data collection and storage; security and ethical issues; integrated infrastructure for sustainable data, information, and knowledge availability; institutional and legal frameworks; and human resource development and empowerment. The policy also includes the implementation plan and the requirements for resource mobilization. The policy assures a highly satisfying fisheries and aquaculture data, information, and knowledge sharing framework for LVFO.

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Lake Victoria Fisheries Organization  
Bell Avenue, Plot 7B/E Busoga Square  
P.O. Box 1625 Jinja, Uganda  
Telephone: +256 434 125 000 Email: [lvfo-sec@lvfo.org](mailto:lvfo-sec@lvfo.org)