Action Plan for a multi-annual Aquaculture development program in Uganda

Concrete guidance on design of a multi-annual aquaculture development program in Uganda

Issued to : Embassy of the Kingdom of the Netherlands
Issued by : Lattice Consulting Limited
Date : 16 April 2025

LATTICE
INSIGHT. ADVICE. IMPACT

Executive summary [1/3]

Supporting Uganda's aquaculture sector for food security and economic opportunities

Uganda's aquaculture sector is one of the most promising in Sub Saharan Africa. However, the majority of fish consumed still comes from wild capture fisheries. With a population of 49.3 million projected to grow to 100 million by 2050, the demand for **affordable white protein** is expected to increase significantly.

This rising demand cannot be met through wild fisheries alone, as fish stocks are already under serious pressure. Aquaculture, particularly cage farming which accounts for 99 percent of national production, offers an important opportunity to **improve food security, create jobs, and support inclusive economic growth** in response to these demographic trends and ecological constraints.

Despite progress in recent years, Uganda's aquaculture sector faces critical challenges that prevent it from realizing its full potential. Recognizing these constraints and building on their long-standing **partnership** in food security and agricultural development, the Netherlands and Uganda have expressed a joint commitment to tackle these issues through coordinated action.

On 15 October 2024, this commitment was formalized through a **Letter of Intent** signed by both governments. The agreement outlines four key areas of collaboration:

- Increasing aquaculture production and productivity
- Improving post-harvest handling and value addition
- Expanding market access and enhancing competitiveness
- Cross-cutting systemic barriers across the value chain

This study examines seven key bottlenecks identified through extensive consultation with industry stakeholders, including major These focus areas reflect the **most pressing challenges** currently facing Uganda's aquaculture sector:

- Zoning and regulation
- Trade and market access barriers
- Capacity building across the value chain
- Strengthening of producer associations
- Market development and distribution systems
- Quality of fish genetics and other critical inputs
- Access to financing and investment mechanisms

Building on the identified focus areas, additional interviews and desk research were conducted to pinpoint the most high-impact intervention points - those with the greatest potential to strengthen **food security** and drive **private sector** development.

The result is a structured and **actionable program design** aimed to leverage public-private partnerships to enhance productivity, catalyze sector investment, and support the sustainable development of the aquaculture value chain.

Through consultations with stakeholders across the sector and a review of comparable initiatives in East Africa, the best practices and lessons learned have been distilled into a **theory of change (page 3).**

The theory of change forms the foundation for a proposed six-year, six-million-euro public-private partnership program.

The initiative is specifically designed to address **gaps not** currently **covered by existing projects** and to focus on **areas** with the **highest** potential for transformational **impact**. With this funded program, the private sector players will be enabled to match and surpass the amount in private sector investment, which further catalyses the sector for industry players of all sorts.

The preliminary program design responds to the key concerns raised by industry stakeholders through an **integrated value chain approach,** inclusive of both large and small-scale producers to foster sustainable employment across the entire value chain.

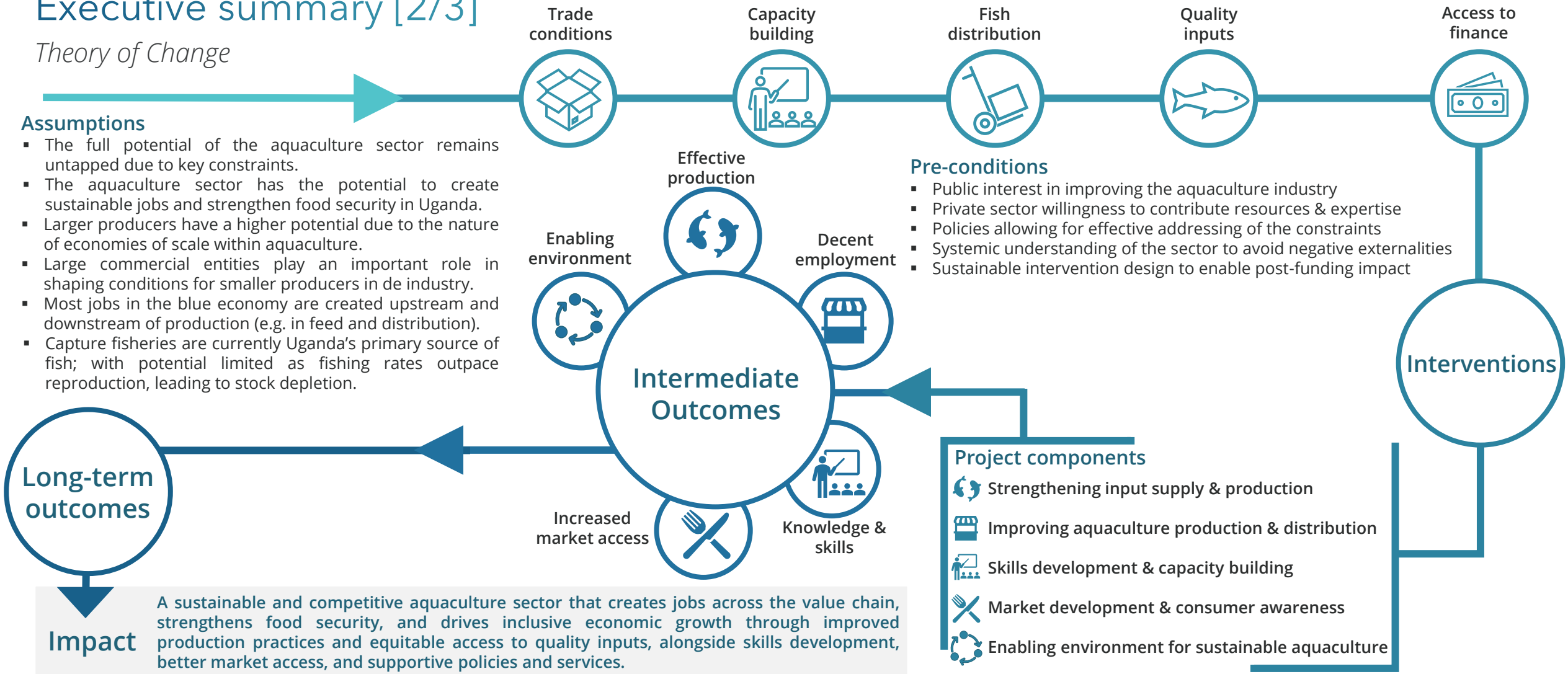
The proposed project comprises **five core components**. These are designed not only to improve production efficiency for all scales of producers, but also to **reduce post-harvest losses**, **facilitate** regional **trade**, support **food security**, and **leverage** the expertise of Dutch **private sector** actors which directly contribute to Uganda's economic development. The components are:

- Strengthening input supply and production
- Enhancing aquaculture production and distribution systems
- Skills development and capacity building
- Market development and consumer awareness
- Supporting enabling environment for sustainable aquaculture

This initiative has the ability to create an enabling environment for all actors in the sector, positioning Uganda's aquaculture industry for **long-term growth and resilience**.

Executive summary [2/3]

Theory of Change



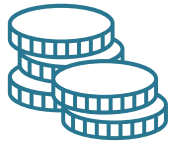
Cross cutting themes

Gender & youth inclusion – Food and nutrition security - Sustainable employment – Responsible consumption & production - Life underwater

Executive summary [3/3]

Aquaculture ecosystem approach



Fingerlings

a) **Establish modern hatchery:** Enhance availability of high-quality fingerlings.
b) **Operationalise breeding program:** Improve the genetic quality of indigenous fish species.
c) **Supply fingerlings:** Provide fingerlings to market (MSMEs), if possible at a cost-plus model.
d) **Research & development**: Connect Dutch and Ugandan private sector to drive critical input supply.

Feed

a) **Improve accessibility**: Partner with producers and distributors.
b) **Establish input hubs:** Set up input distribution hubs for aggregation, storage, and training.
c) **Develop curriculum:** Focus on feed management and efficient feeding.
d) **Policy work:** support with industry policy advisory for feed and ingredient imports.

Equipment

a) **Advocate for reduced non-tariff trade barriers:** Ease importation of aquaculture equipment and feed.
b) **Upgrade demo farms:** Select model farms to demonstrate best practices in equipment use and farm management.
c) **Enhance cold-chain:** Reduce post-harvest losses through cold chain infrastructure and equipment.
d) **Training hubs**: Establish training hubs for hands-on learning led by local trainers.

Finance

a) **Strengthen financial instruments:** Facilitate access to finance for equipment and working capital.
b) **Master trainers:** Build capacity on business development and financial literacy for producers & traders.
c) **Educate financial institutions:** Improve understanding of aquaculture financing needs, risks and opportunities.
d) **Industry connection**: Connect FinTech with emergent producer clusters and sector organizations.

Production

a) **Practical training:** provide practical aquaculture skills and best practices to farmers and traders across the value chain.
b) **Fingerling management:** guide producer (clusters) that source fingerlings from the newly established hatchery. Support creation of contract farming models.
c) **Strengthen farmer clusters:** Identify and support emergent farms with the ability to drive sector development.
d) **Aqua employment**: support lakeside communities with the development of aquaculture skillsets

Market

a) **Facilitate trade agreements:** Strengthen enforcement of agreements for fish and feed exports & imports in the EAC.
b) **Cold chain:** Implement local-led chilled fish distribution networks of entrepreneurs for urban and underserved rural markets.
c) **Route to market:** Develop market linkages and distribution networks between producers, traders and re-sellers in key area's.
d) **Consumer awareness:** Conduct campaigns to promote the benefits of farmed fish.
e) **School feeding program:** Introduce affordable white fish protein programs in collaboration with producers and local schools.

Training & capacity building: sectoral skills to assure increased productivity and income generation

- **Develop vocational training facilities:** Equip learners with practical industry skills on-site, combining theory with practice at operational aquaculture farms.
- **Integrate training programs:** Align skills with market needs through industry and educational partnerships.
- **Develop financial literacy courses:** Improve finance access for aquaculture stakeholders.
- **Expand e-learning platform:** Incorporate local languages and financial literacy content for greater accessibility and engagement.
- **Enhance programs:** Strengthen trainer capacity through hands-on, practical training, as well as embedding new financial literacy curriculum.
- **Internships:** Facilitate smooth transitions from theoretical education to industry practice in collaboration with private sector industry leaders.
- **Raise awareness among financial institutions:** Highlight investment potential and financial needs of the aquaculture sector.
- **Educate consumers:** Promote the nutritional and economic benefits of farmed fish and advocate for smaller-sized fish to enhance sustainability.

Cross cutting themes

Gender & youth inclusion – Food and nutrition security - Sustainable employment – Responsible consumption & production - Life underwater

Table of contents

Abbreviations

AfCFTA	African Continental Free Trade Area
AfDB	African Development Bank
BN	Billion
CISU	Civil Society in Development
CMP	Common Market Protocol
CUP	Customs Union Protocol
DRC	Democratic Republic of Congo
EAC	East African Community
EKN	Embassy of the Kingdom of the Netherlands
EU	European Union
EUR	Euros
FAO	Food and Agriculture Organization of the United Nations
FTI	Fisheries Training Institute
GIZ	German Agency for International Cooperation
GOU	Government of Uganda
GDP	Gross Domestic Product
LOI	Letter of Intent
IRDC	International Development Research Center
ICT	Information and Communication Technology
LVFO	Lake Victoria Fisheries Organization
MAAIF	Ministry of Agriculture, Animal Industry and Fisheries
MN	Million
MOTIC	Ministry of Trade, Industry and Cooperation
MSME	Micro, Small and Medium Enterprises
MT	Metric tons
NaFIRRI	National Fisheries Resources Research Institute
NEMA	National Environmental Management Authority
NGO	Non-Governmental Organization
Norad	Norwegian Agency for Development Cooperation
NTB	Non-Tariff Barriers
PADEO	Programmatic Approach Sustainable Economic Development
PESCA	Promoting Environmentally Sustainable Commercial Aquaculture
PPP	Public-Private Partnership
PSD	Private Sector Development
RAS	Recirculating Aquaculture Systems
SDGs	Sustainable Development Goals
SHF	Small holder farmers
TVET	Technical and Vocational Education and Training institutions
UG	Uganda
UN	United Nations
USD	United States Dollar
WB	World Bank
WEEB	Women Economic Empowerment Group Bugiri

Disclaimer

Confidentiality statement

The information in this document is confidential to whom it is addressed and should not be disclosed to any other person or organization. The information contained herein may not be disclosed without the prior consent of the embassy of the Kingdom of the Netherlands to Uganda (hereinafter 'EKN') or Lattice Consulting Ltd. A (hereinafter 'Lattice'). Any form of reproduction, dissemination, copying, disclosure, modification, distribution and or publication of this material is strictly prohibited.

Disclaimer

Although the information contained herein is believed to be reliable, Lattice makes no representation as to the accuracy or completeness of any information contained herein or otherwise provided. The terms set forth herein are intended for discussion purposes only.

To the best of the knowledge of Lattice, the information contained in this report is correct. The projections referred to in this document are based upon assumptions which are considered reasonable, but any projections do not constitute forecasts and are subject to variation.

Lattice has exerted all reasonable efforts to execute the underlying assignment to the highest quality possible, however no guarantees or assurances whatsoever, either implicit or explicit, as to the results of the assistance performed. Lattice cannot be held responsible for any decision and its consequences that have been made based upon information that is provided in the underlying report. However, it is with full confidence in our ability to have conducted this analysis to the highest quality standard and provide useful and accurate information.

No representation, warranty or undertaking, expressed or implied is or will be made or given and no responsibility or liability is or will be accepted by Lattice or by any of its directors, employees or advisors in relation to the accuracy or completeness of this document or any other written or oral information made available.

1. Study introduction

1.1 Introduction

Working together to create an enabling environment for aquaculture

Aquaculture is one of the fastest-growing sectors in Uganda, offering significant potential to contribute to **food security**, **economic growth**, and **employment**. The strategic importance of Lake Victoria, with its conducive environment, has made Uganda a hub for fish farming, particularly through cage production operations.

However, despite the notable improvements in aquaculture development over the recent years, Uganda's sector is still underperforming relative to its potential. **Structural** and systemic **barriers**, such as insufficient infrastructure, limited access to markets, weak regulatory frameworks, and gaps in technical expertise, constrain growth and hinder the realization of sustainable aquaculture practices.

On December 4th, a workshop was organized by the Dutch Embassy in Kampala to identify key areas for a multiannual aquaculture program, emphasizing the need to address sector gaps Potential **focus areas** for the program include, addressing trade barriers, training mid-level fish farmers, improving fish genetics, and enhancing distribution networks, with funding contributions from private sector and non-governmental organizations like Gatsby, Trademark Africa and others.

The purpose of this project is to provide a **roadmap** for a **multi-annual sector program**, with interventions, solutions and synergies between stakeholders. The primary focus will be on fostering public-private partnerships (PPPs) that can play a transformative role in addressing selected barriers. This initiative aligns with the Uganda-Netherlands Aquaculture Letter of Intent, which envisions a collaborative framework to enhance sustainable aquaculture development through knowledge exchange, investment, and capacity building.

Ultimately, the project seeks to support the creation of an enabling environment that will unlock the sector's full potential, contributing to **sector investment, sustainable employment** and **regional food security.**

1.2 Background & scope of work

This Uganda-Netherlands Aquaculture Development Action Plan aims to provide a structured and actionable roadmap for a multi-annual aquaculture development program in Uganda. This initiative is aligned with the Uganda-Netherlands Aquaculture Letter of Intent and the BZ/PSD Results Framework, ensuring that interventions contribute to sustainable economic growth, food security, and private sector engagement in Uganda's aquaculture sector.

The Netherlands and Uganda have a long-standing partnership in food security and agricultural development. On 15 October 2024, a Letter of Intent was signed between the governments of the Netherlands and Uganda, marking a significant step towards strengthening Uganda's aquaculture sector. This agreement underscores the shared ambition and commitment of both countries to collaboratively develop the aquaculture value chain, a sector with immense potential to drive Uganda's sustainable economic growth.

The Letter of Intent outlines key areas of focus for collaboration:

1) **Enhancing aquaculture production and productivity**
2) **Improving post-harvest handling and value addition**
3) **Expanding market access and competitiveness for aquaculture products**
4) **Addressing overarching systemic challenges**

innovation, sustainability, and resilience within Uganda's aquaculture sector. By targeting critical bottlenecks within the value chain within the value chain, the collaboration aims to enhance the enabling environment, creating the conditions for the industry to thrive. The action plan will outline priority intervention areas that contribute to a more competitive, sustainable and inclusive aquaculture sector in Uganda:

- **Zoning & regulation** – Identifying optimal locations for aquaculture development (on both land and water).
- **Strengthening associations** – Enhancing fish farmers' collective action for better market access and advocacy.
- **Trade barriers** – Addressing regional (EAC) and domestic regulatory challenges for fish, feed, ingredients and equipment.
- **Capacity building** – Training programs for fish farmers to improve productivity and sustainability.
- **Financing mechanisms** – Exploring innovative financial instruments, including matching grants and investment incentives.
- **Fish genetics** – Strengthening Uganda's genetic research and breeding programs to improve yields.
- **Market & distribution -** Networks – Strengthening domestic and regional fish trade, creating employment opportunities across the value chain.

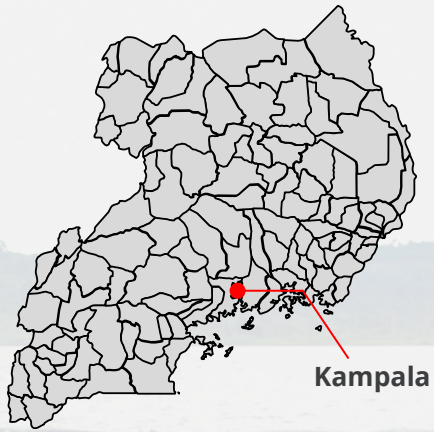
develop this action plan through a comprehensive assessment of Uganda's aquaculture sector, identifying critical gaps, investment opportunities, and best practices from both regional and international programs. This formulation process is guided by the following methodological components:

- **Sector analysis:** Reviewing existing aquaculture programs in Uganda to define areas for strategic investment.
- **Stakeholder assessment:** Improving collaboration between public and private sector actors.
- **Financial assessment:** Exploring additional funding opportunities to maximize program impact.
- **Alignment with PADEO & PSD framework:** Ensuring the approach aligns with Dutch development policies, focusing on sustainability and scalability.
- **Private sector engagement:** Identifying areas where Dutch businesses can contribute expertise and investment.
- **Policy & governance advisory:** Recommending strategies for effective reporting and collaboration with the Government of Uganda at both technical and political levels.

Lattice offers specialized finance, strategy, training and research services to clients across Africa. Lattice has a strong presence in Kenya and has accumulated rich local knowledge in multiple industries, particularly food and feed. Lattice provides services to agribusiness and initiatives intended to promote sustainable development in Kenya, Tanzania, Uganda, and Rwanda.

2. Sector introduction

2.1 Uganda Introduction



49.3
Population in MN (2024)

3.2%
Population growth (2024)

19.1
Labour force in MN (2023)

48.8
GDP USD in BN (2023)

5.3%
Real GDP Growth rate (2023)

8,460
Real GDP per capita in USD (2023)

116/190
Ease of doing business rank (2019)

159/193
Human Development rank (2022)

140/180
Corruption perception rank (2024)

- **Geography**: Uganda is a landlocked country in East Africa, located on the equator. The country is known for its fertile land and major lakes. In the south lies Lake Victoria, which is the largest water body and the main aquaculture hub of the country. The lake, is shared with Tanzania and Kenya, with Tanzania having the largest share followed by Uganda and January respectively. Other important lakes include Lake Albert, Lake Kyoga and Lake Edward, though less central in commercial aquaculture production.

- **State of the economy:** The Ugandan economy recorded robust growth of 5.3% in 2023, reflecting a steady upward trajectory. Key industries include agriculture—particularly coffee, tea, sugarc, and cotton—and natural resources, with gold standing out as the most significant export commodity. Although Uganda's oil reserves in the Albertine Rift Basin are relatively modest compared to global producers, they may increasingly shape the country's resource exploitation strategy and economic emphasis in the near future. Uganda is part of the East Africa Community (EAC) and the African Continental Free Trade Area (AfCFTA), which is further detailed in the following chapter.

- **Government & leadership:** Uganda is a presidential republic where the executive president serves as both head of state and head of government. The country operates under a multi-party political system, though the ruling party has maintained dominant for decades. President Museveni has been in power for over 39 years, shaping Uganda's political landscape. The next general elections are scheduled for January 2026.

- **Population:** Uganda's population density is relatively high, especially around Lake Victoria and Lake Albert in the central and southern regions. The country also has one of the fastest-growing populations in the world, expected to increase from approximately 49.3 million in 2024 to around 100 million by 2050[1]. This rapid growth places substantial pressure on critical resources—most notably food security, healthcare, and employment—highlighting both the challenges and opportunities for Uganda's future development.

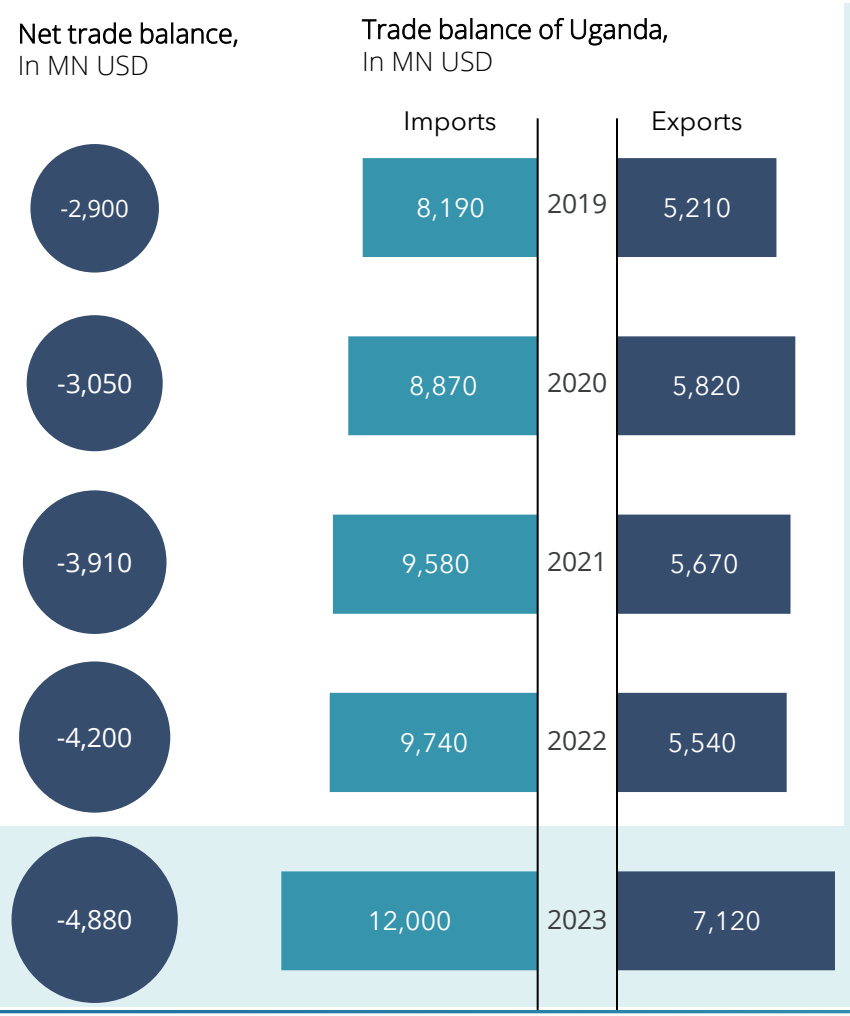
- **Food security & nutrition:** Uganda has made significant progress in improving food security over the past decades, supported by increased public investment in the sector. However, challenges remain, particularly for vulnerable populations. Child stunting rates have seen a notable decline, dropping from 40% in 2000 to 25.4% in 2020, reflecting improvements in nutrition and healthcare. However, food insecurity remains a pressing issue, particularly among refugees, including those from South Sudan and the Democratic Republic of Congo.

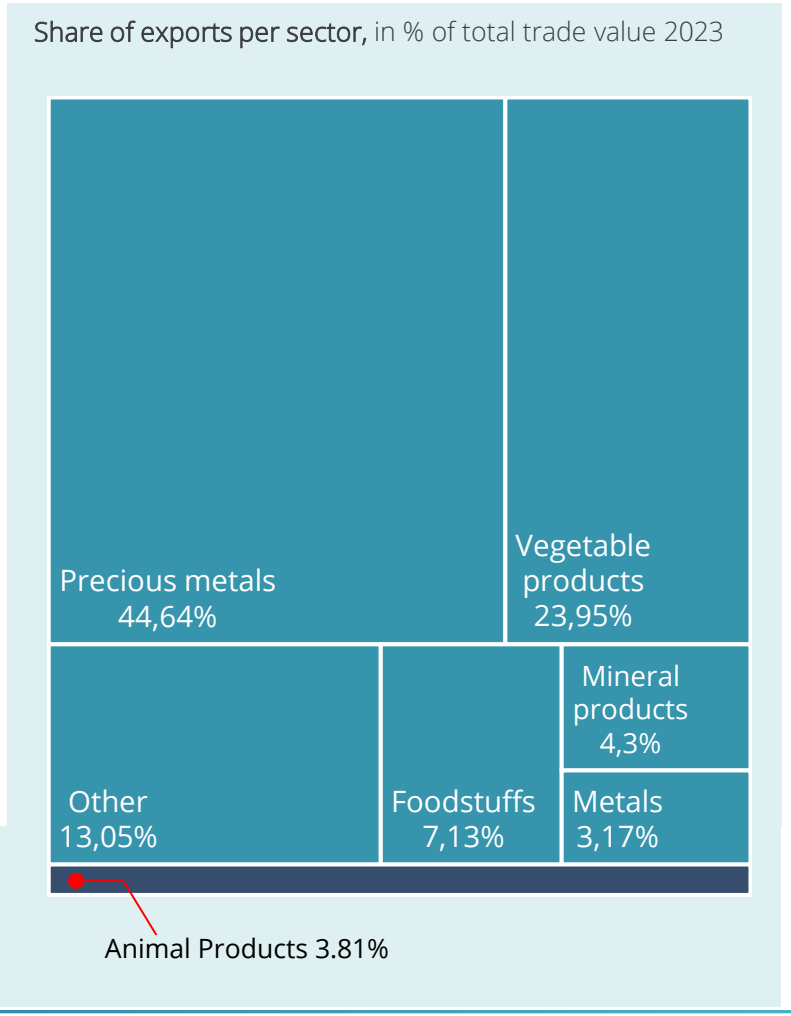
- **Private sector development:** The Ugandan government actively promotes private enterprise and foreign investment, while maintaining significant stakes primarily in key strategic sectors such as energy, mining, and telecommunications. There are no restrictions on full foreign ownership of locally incorporated entities. As outlined in its national development plan, the government emphasizes public-private partnerships, positioning the private sector as the primary driver of economic growth and development while committing to creating a supportive business environment.

Notes: 1. FAO, 2. GOU (2022). Estimates of revenue and expenditure (recurrent and development) (FY 2022/23): Volume III: State owned enterprises and public corporations for the year ending on the 30th June 2023. 2.

2.2 Trade profile Uganda

Aquaculture represents 2.4% of the total formal export value of Uganda.





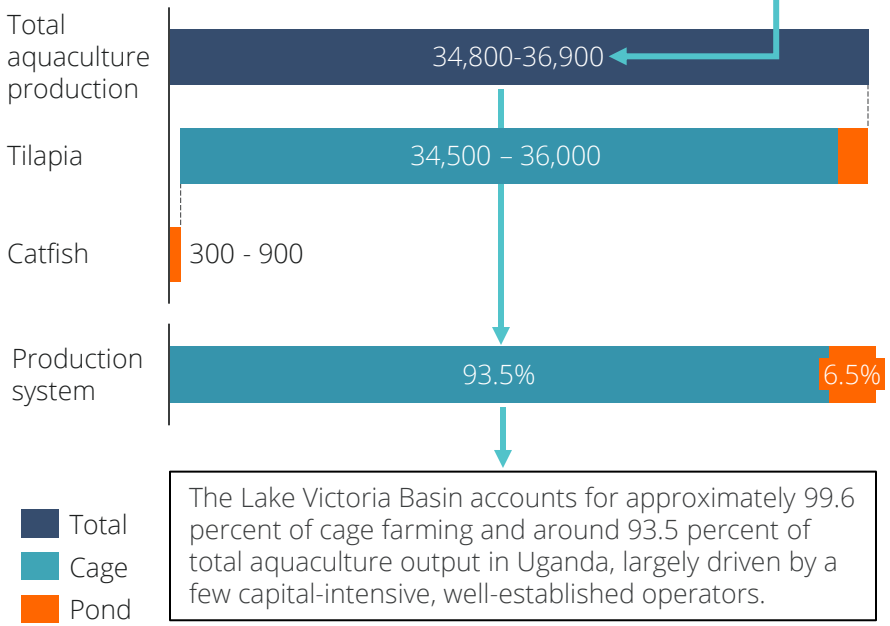
- **Economic complexity**: Uganda's trade portfolio reflects a low level of economic complexity, with the country ranking 91 out of 131 globally. This suggests a reliance on a narrow range of exports with limited technological sophistication or value addition.
- **Extraction industry**: The extraction industry of Uganda is the main contributor to the export profile of the country. The main export products from the extraction industry include gold, and petroleum respectively.
- **Agricultural sector**: The agricultural sector remains vital to Uganda's economy, with vegetable products contributing 24% of the country's total export value and livestock accounting for 3.8%. Despite these figures, agriculture is of paramount importance for both food security and employment in Uganda.
- **Trade partners**: when considering formal trade, In 2023, India ($1.5BN) emerged as Uganda's largest **export** partner, closely followed by the United Arab Emirates ($1.13BN), Hong Kong ($727MN), and South Sudan ($536MN). For **import**, China ($2.32BN) is the largest partner, followed by the United Arab Emirates ($1.45BN), Tanzania ($1.35BN) and India ($1.23BN).

2.3 Aquaculture in Uganda

Fish farming is primarily concentrated around the Lake Victoria basin.

Estimates of fish production in Uganda, in MT in (2020)

Aquaculture roadmap estimates of aquaculture production in Uganda, in MT in (2020)



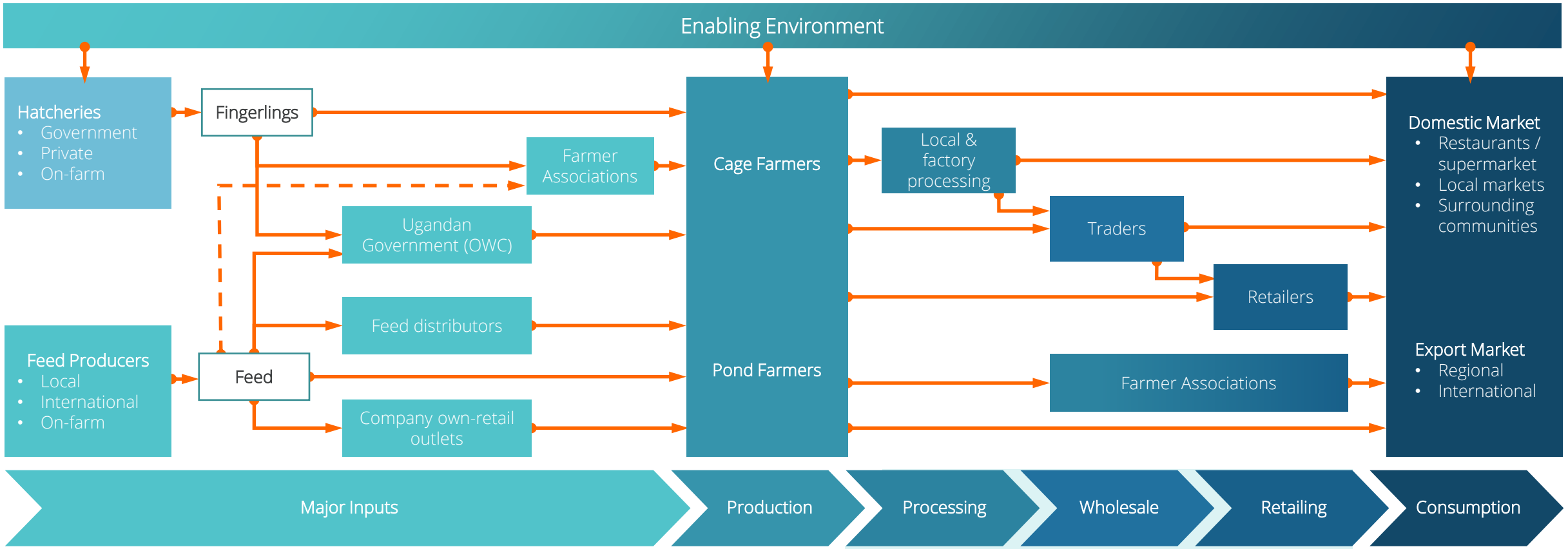
The Lake Victoria Basin accounts for approximately 99.6 percent of cage farming and around 93.5 percent of total aquaculture output in Uganda, largely driven by a few capital-intensive, well-established operators.

- The aquaculture and fisheries sector plays a vital role in Uganda, contributing to food security, employment, and economic growth. In Vision 2050, the government underscores the sector's importance and affirms that aquaculture and capture fisheries are complementary—investment in one does not diminish the value of the other. Uganda is expected to face a growing demand for fish, outpacing production, driven by rapid population growth. This underscores the continued importance of capture fisheries, but the carrying capacity of the lake is already reached. **Aquaculture offers a strategic opportunity to help meet this rising demand** without placing additional pressure on already stressed wild fish stocks and concurrently reducing reliance on fish imports.
- According to the FAO, Uganda's wild fish capture has remained relatively stable over the past 15 years, averaging approximately 400,000 metric tons annually. However, reported spikes to 600,000 metric tons between 2019 and 2021 raise questions about the reliability of these figures. Similarly, experts have noted that the FAO estimates of aquaculture production may also be overstated. The figures presented on the left are based on the **2022 Aquaculture Roadmap study by Larive International**, considered a reliable reference point for current production levels.
- There is a significant gap between the number of registered ponds and cages and those that are actively in use. This is particularly evident among pond farms established through support programs, many of which are **abandoned once** external (financial) **donor assistance ends.**
- The data consistently shows that aquaculture remains a relatively minor contributor compared to wild capture fisheries. However, one key insight emerges: investment in **aquaculture** is essential as a complementary strategy to the fisheries sector, helping to **reduce pressure on Uganda's lake-based wild fish stocks** and its **communities**. With the Fisheries Protection Unit, enforcing fishing licensing and seizing fishing gear and vessels from the fishermen that are illegally operating on Ugandan waters, (estimated to be 76% of fishermen), aquaculture is seen as potential alternative, as the Permanent Secretary of MAAIF advocates. Fishermen which adopt aquaculture practices have the ability to gain viable alternative livelihoods.
- Rather than displacing jobs in the fisheries sector, aquaculture investments serves as **a crucial supplement** and creates opportunities to fishing communities that currently have little alternatives to their unlicensed operations. Given the capital-intensive nature of cage farming, growth is likely to be driven primarily by larger players who employ individuals and leverage economies of scale to remain price competitive to sell fish to the market in both Uganda and regionally.
- The **government's strategic priorities** include strengthening feed processors in producing high-quality fish feed domestically. Additionally, there is significant interest in establishing aquaculture hatcheries and cage culture facilities to support large-scale fingerling production for commercial purposes.

Notes: An overview of aquaculture producer categories is included in Annex 3

2.4 Aquaculture value chain structure overview

Over 77% of jobs in Uganda's aquaculture are in fish trade, transportation, and processing, not in production of fish

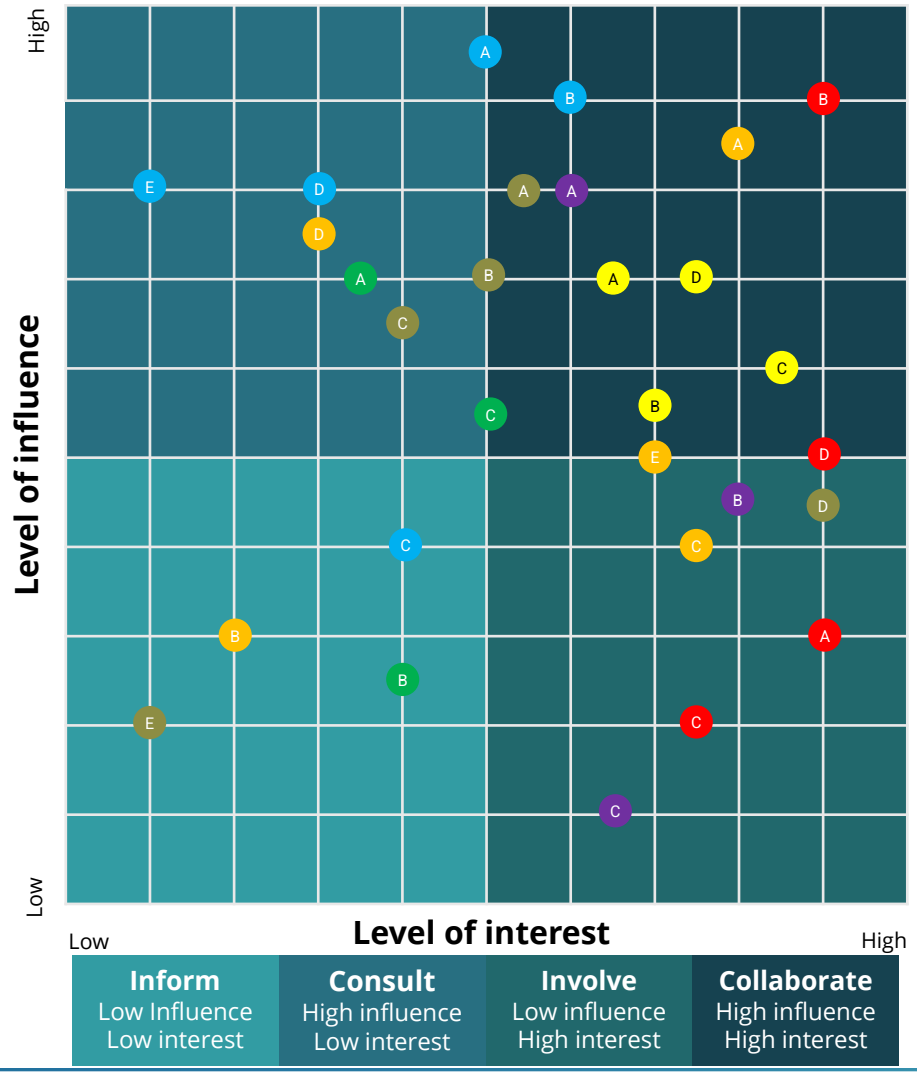


In both capture fisheries and aquaculture, the great majority of employment is found upstream and downstream from primary production. Activities such as trade, processing, and transportation are predominantly carried out by women and youth, while men tend to dominate the primary production stage. However, these secondary and tertiary roles typically yield lower financial returns. A lack of access to appropriate equipment, capital, and knowledge in handling and processing often leads to high levels of spoilage, food waste and financial risk. This not only causes financial losses but also contributes to a negative perception of product quality and aquaculture in general. Targeted support for women and youth engaged in these activities—particularly in the form of skills development in handling and value addition, access to credit, and affordable cooling equipment—could significantly improve their livelihoods and enhance the overall efficiency and quality of the sector.

Notes: 1. Overview adapted from: Aquaculture Roadmap Map Uganda - Opportunities in the aquaculture value chain (2022)

2.5 Stakeholder mapping

A system-wide snapshot of the key players in the sector



Stakeholder mapping

The stakeholder analysis provides a comprehensive overview of the key actors within the aquaculture sector. While not exhaustive, it offers valuable insights into the primary stakeholders. Each stakeholder is assessed on a scale of 1 to 10 for two dimensions: Influence and Interest. Influence measures the extent to which a stakeholder has resources or can exercise power within the system, while Interest scores the impact an intervention or project has on the stakeholder. Based on these scores, stakeholders are categorized into one of four quadrants in the stakeholder analysis matrix, indicating the appropriate level of engagement: inform, actively consult, involve, or collaborate.

Category	Stakeholder
Producers & Farmers	A MSME fish farms
	B Large commercial farms & hatcheries
	C Fishermen
	D Farmer cooperatives / associations
Private sector	A Feed producers
	B Formal retailers and supermarkets
	C Informal traders
	D Aggregators & exporters
	E Cold chain & logistics
Research & Education	A NaFIIRRI & FTI
	B Universities
	C TVET Institutions
	D Aquaculture Extension Services
Finance	A Formal financial institutions
	B Informal finance providers
	C Microfinance institutions

Category	Stakeholder
Government	A MAAIF
	B Directorate of fisheries resources
	C NEMA
	D MOTIC
	E Fisheries Protection Unit
Development & NGO	A International development agencies
	B Local NGOs & foundations
	C International NGOs & foundations
Other	A Diplomatic representations
	B Lake Victoria Fisheries Organization
	C Local consumers
	D Media & community radio stations
	E Youth and women (associations)

FTI: Fisheries Training Institute
NAFIRRI: National Fisheries Resources Research Institute
NEMA: National Environment Management Authority

MAAIF: Ministry of Agriculture, Animal Industry and Fisheries
MOTIC: Ministry of Trade, Industry and Cooperation

3. Strategic priorities

3.1 Strategic priorities for aquaculture

Aligning with the Uganda–Netherlands Letter of Intent: seven focus area

To address the **key priorities** set out in the Letter of Intent between Uganda and the Netherlands, seven strategic focal areas have been identified to collectively tackle major bottlenecks in the aquaculture industry. Chapter 3 delves into these areas in detail, drawing on desk research and interviews with industry stakeholders (see Annex 1 for the list of key informants) to validate and explore the underlying challenges.

Chapter 4 then examines which of these issues are currently being adequately addressed by ongoing, **recent or planned projects in Uganda**, and highlights where gaps remain. It also looks at relevant initiatives outside of Uganda to identify best practices that could be replicated or adapted. This analysis lays the groundwork for designing a multi-year aquaculture development project focused on aquaculture in Uganda—pinpointing where additional efforts can have the greatest impact in terms of food security and to elevate private sector engagement in the region.

Building on the areas of focus outlined in the Letter of Intent between Uganda and the Netherlands, seven key priority topics have emerged. The only deviation from the Letter of Intent is in the area of quality inputs. While the agreement specifically mentions genetics and quality fingerlings, expert interviews consistently highlighted significant challenges related to feed, an issue too critical to overlook in a multi-annual project. Therefore, feed and seed quality, along with their availability, have been consolidated under the broader category of **quality inputs**.

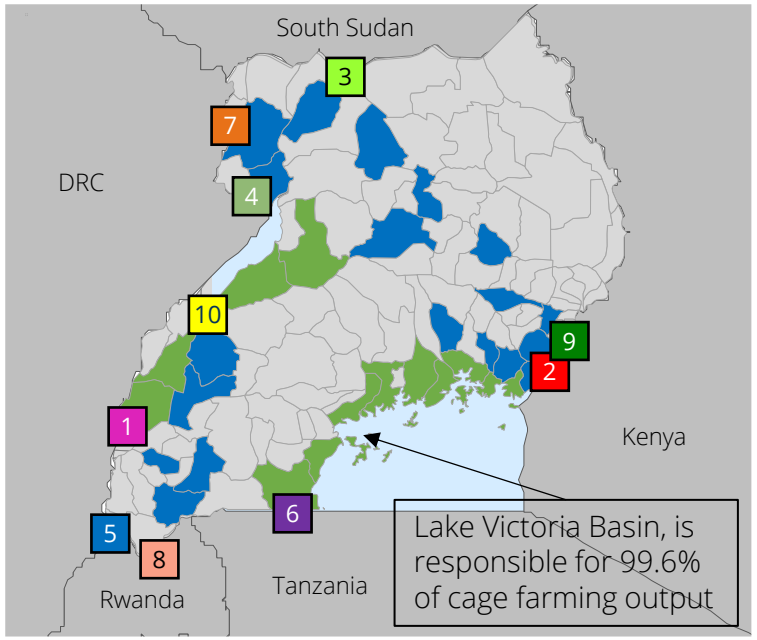
These seven focus areas will be addressed in more detail throughout the following chapters

1. Trade and trade barriers
2. Training & capacity building along the value chain
3. Strengthening of associations
4. Supporting fish distribution and post harvest handling
5. Quality inputs
6. Zoning of Lake Victoria
7. Access to finance for investment

3.2 Trade and trade barriers

While formally removed, non-tariff barriers often resurface, hindering trade in the East African Community

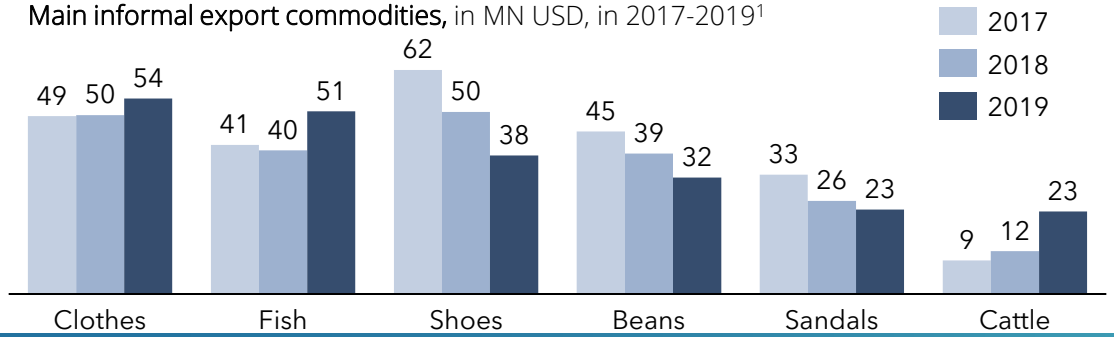
Regions where aquaculture is practiced



Key border crossings

1. Mpondwe
2. Busia
3. Elegu
4. Paidha
5. Bunagana
6. Mutukula
7. Odramachaku
8. Katuna
9. Malaba
10. Ntoroko

Main informal export commodities, in MN USD, in 2017-2019[1]



- **The East African Community (EAC)** is a regional intergovernmental organization established with the vision to create a prosperous, competitive, secure stable and politically united East Africa. Besides Uganda, the EAC is comprised of Kenya, Rwanda, Tanzania, South Sudan, Burundi, DRC, and Somalia. Free trade among partners is one of the initiatives undertaken to achieve this vision. In 2005 the Customs Union Protocol (CUP) was established, aiming at liberalizing cross-border trade among partners. In 2010 the Common Market Protocol (CMP) came into effect, which allows for free movement of people, goods, capital, labor and services, to promote trade within the region. In 2018, all EAC members also joined the AfCFTA which aims to extend the single-market ambition to the greater African continent.
- **Non-tariff barriers (NTB)** are the obstacles to cross-border trade that are not import of export duties. Through article 13 of the COP, EAC partner states commit to remove existing non-tariff barriers and refrain from imposing new ones. Since 2005, significant progress has been made, yet, some barriers remain or (re)appear. NTBs can be classified as follows:
  - **Tax Like measures**
  - **Quality and safety standards**
  - **Import bans**
  - **Customs and trade facilitation measures**
- Cross-border trade plays a crucial role in Uganda's aquaculture sector. Kenya and DRC are particularly significant markets, with some of the large commercial farms exporting more than 70% of their production.
- At the same time, the sector remains highly dependent on **imports for aqua feed, and aquaculture equipment**, with more than 70% of feed being imported, which is still not sufficient to fulfil demand. While Uganda is a producer of different key ingredients for feed, some producers are still required to import ingredients e.g. soy to be assured of availability and quality.
- The main challenge in cross-border trade arises from the **improper application of duties** by some countries, leading to increased costs and time to export/import. For instance, Kenya imposes tariffs on fish imported from Uganda, despite such duties being intended only for fish originating outside the EAC. Similarly, feed and feed ingredients moving from Kenya to Uganda face unnecessary levies, raising production costs and reducing competitiveness.
- While producers and exporters are generally aware of their rights under EAC trade regulations, many lack the resources, influence, or time to challenge these **trade policy violations** effectively. This makes it difficult to dispute unfair practices, leaving businesses with no alternative but absorb the costs or sell to traders on the border. Clear policies must be developed alongside the establishment of a formal reporting mechanism. This will enable the swift resolution of trade disputes without placing additional financial strain on businesses.

Cage and pond farming
Pond Farming

Note:1. The informal cross border trade survey report 2019 – Uganda Bureau of Statistics
2. Order based on informal exports (all products) per border station

LATTICE
INSIGHT. ADVICE. IMPACT

3.3 Training of fish farmers

Building sustainable capacity development and professionalism in Uganda's aquaculture sector

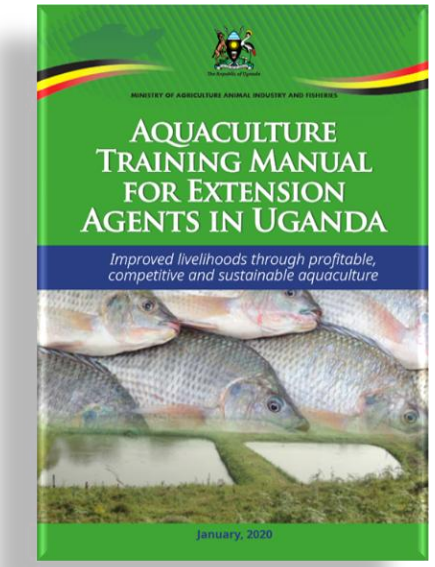
- **Limited professionalism** characterizes Uganda's fish farming industry, particularly among small- and medium-scale farmers, while the large-scale sector tends to maintain more consistent standards. The wider aquaculture value chain faces significant gaps in both technical expertise and business acumen, impeding the sector's growth and productivity. This challenge is further compounded by poor coordination among key stakeholders, including government agencies, NGOs, universities, and private sector actors, who frequently operate in isolation. The absence of a unified training framework results in duplicated efforts and inconsistent training content, creating inefficiencies and limiting the effectiveness of capacity-building initiatives.

- **Limited access to formal training opportunities and demonstration farms** remains a major constraint for fish farmers in Uganda. Most farmers rely heavily on on-farm learning, occasionally supported by technical officers, but the absence of structured training creates a ripple effect that amplifies other challenges within the sector. Without adequate training, many MSMEs struggle to build awareness, acquire key business and technical skills, and effectively utilize available information and resources. As a result, both the technical and commercial aspects of fish farming are affected, with the issue rooted in deeper systemic challenges. Financial institutions in Uganda often lack the expertise to properly assess the commercial potential of aquaculture, leading to frequent rejection of financing requests in the sector. This limited understanding creates a significant barrier to investment, restricting the growth and modernization of aquaculture in the country.

- Additionally, smallholder farmers **heavily rely on aid** for support. However, a common pitfall is that this aid assistance often leads to dependency, reducing farmers' initiative and self-sufficiency in adopting sustainable aquaculture practices. A common pattern is the abandonment of fish farming activities once aid programs conclude, underscoring the urgent need for more sustainable, resilience-building approaches. There is a critical need to shift towards capacity-building models that empower farmers to take ownership of their operations. Equally important is identifying alternative pathways to strengthen workforce skills beyond a sole reliance on formal training, promoting self-reliance and adaptability within the sector.

- **Smallholder farmers struggle to effectively reach extension services,** limiting their access to critical technical support and up-to-date aquaculture knowledge. Despite recent reforms, Uganda's state-run agricultural extension system continues to face persistent challenges, including a low extension staff-to-farmer ratio, understaffing at district and sub-county levels, limited funding, and ineffective outreach methods, as noted by the FAO and other studies. While the government is working to strengthen the capacity of extension staff in aquaculture technologies, fish marketing, and value addition, significant knowledge gaps remain, limiting productivity and profitability in the sector. Theoretical resources, such as the *Aquaculture Training Manual for Extension Agents in Uganda* by the Ministry of Agriculture, Animal Industry, and Fisheries, provide detailed guidance, but the real challenge lies in translating this knowledge into practical application. Many farmers still lack the necessary expertise in proper production practices, underscoring the need for a more hands-on, well-funded, and farmer-focused extension approach.

- The use of **ICT solutions** is receiving more attention in aquaculture when talking about extension services. ICT is a significant contributor to extending the reach of extension services into remote locations where the networks exist-and to diverse populations. ICT solutions can boost Uganda's aquaculture sector by improving efficiency, productivity, and sustainability. Mobile apps can provide farmers with market access and expert guidance, while sensors enable real-time water quality monitoring, reducing fish mortality. Digital platforms can connect farmers directly with buyers, increasing profits, and online training enhances skills.



Nuwansi, K. K. T., Agaba, H., & Veverica, K. (2021). Aquaculture development and Uganda's agricultural extension system: The case of fish farmers in Central and Northern regions.
Atukunda, G., Atekyereza, P., Walakira, J., & State, A. (2020). Increasing farmers' access to aquaculture extension services: Lessons from Central and Northern Uganda.
Atukunda, G., & State, A. (2020). Potential for enhancing and sustaining commercial aquaculture in Uganda: Producer organizations, contract farming schemes, and public-private partnerships.

3.4 Strengthening associations

A market-based approach offers opportunities for collaboration among producers

- In contrast to more developed agricultural sectors like sunflower, rice, and sugarcane, Uganda's aquaculture producers **remain loosely organized**. By coming together, fish farmers can significantly enhance their productivity, profitability and market access, while sharing equipment, knowledge and resources.
- Additionally, **formal organization** allows producers to secure better terms when applying for credit or grants. Two approaches already proven in other agricultural commodities in Uganda—producer organizations and contract farming—offer promising options for the aquaculture sector.
  - **Producer organizations**: Producers can form cooperatives or farmer groups to strengthen their collective capacities. By pooling resources and effort, they can purchase inputs at lower costs, secure technical and financial support, and negotiate more effectively for higher prices. Producer organizations also facilitate bulking of products, which can be particularly valuable in meeting volume and consistency requirements for larger buyers.
  - **Contract farming**: Formal or informal agreements between producers and buyers or processors can further boost aquaculture development. These arrangements guarantee stable markets for farmers while ensuring a consistent supply of quality fish for buyers. Adapting these to aquaculture can foster improved quality control, better incomes, and more reliable market connections for fish producers.
- Successful fish farmer associations prioritize hands-on support that strengthens their operations, focusing on self-reliance through a **market-based approach** rather than becoming dependent on direct subsidies. They drive collective initiatives such as joint training, knowledge-sharing, cost-sharing mechanisms, and sector-wide advocacy and lobbying to government bodies. However, many of these associations still face challenges related to leadership capacity and financial management. In contrast, some farmer groups tend to rely heavily on external funding, fostering a dependency mindset that often undermines commercial objectives. Additionally, donor-funded programs may follow priorities that are not always aligned with the actual needs of commercial fish farmers, potentially steering them away from their core mission of building productive and sustainable aquaculture enterprises.
- By prioritizing **industry-led initiatives** and building resilience, successful associations can serve as a catalyst for sustainable growth in the aquaculture sector. Cooperatives offer valuable platforms for pooling resources and sharing risks; however, limited access to formal credit remains a significant barrier, driven by insufficient collateral and a perception of high risk among financial institutions. In addition, a lack of trust and cohesion among producers, who often view each other as competitors rather than collaborators, continues to hinder efforts to organize and scale collective action.

Case 1: Empowering Women in Aquaculture

While Uganda's aquaculture sector has traditionally been male-dominated, women are increasingly breaking barriers and taking on pivotal roles across the value chain. They are heavily involved in fish handling, processing, and trading, with a significant presence in marketing and retail. however, their contributions are expanding beyond processing and distribution, as more women are actively engaging in production, reshaping the industry's landscape. The UN Women's Economic Empowerment Programme, in 2019, is a key initiative aimed at advancing women's participation in the fish farming sector. One of its standout successes is the establishment of the **Women Economic Empowerment Bugiri (WEEB) cooperative**, which engages women across multiple segments of the fish value chain. Through WEEB, women in Bugiri Uganda have not only gained technical skills in smart fish farming but have also strengthened their financial independence and improved social cohesion within their households and communities. Even after the program concluded, the cooperative continued to operate as the business thrived. This success story demonstrates how targeted support can enable women to overcome gender barriers, drive growth within the aquaculture sector, and achieve meaningful economic empowerment.

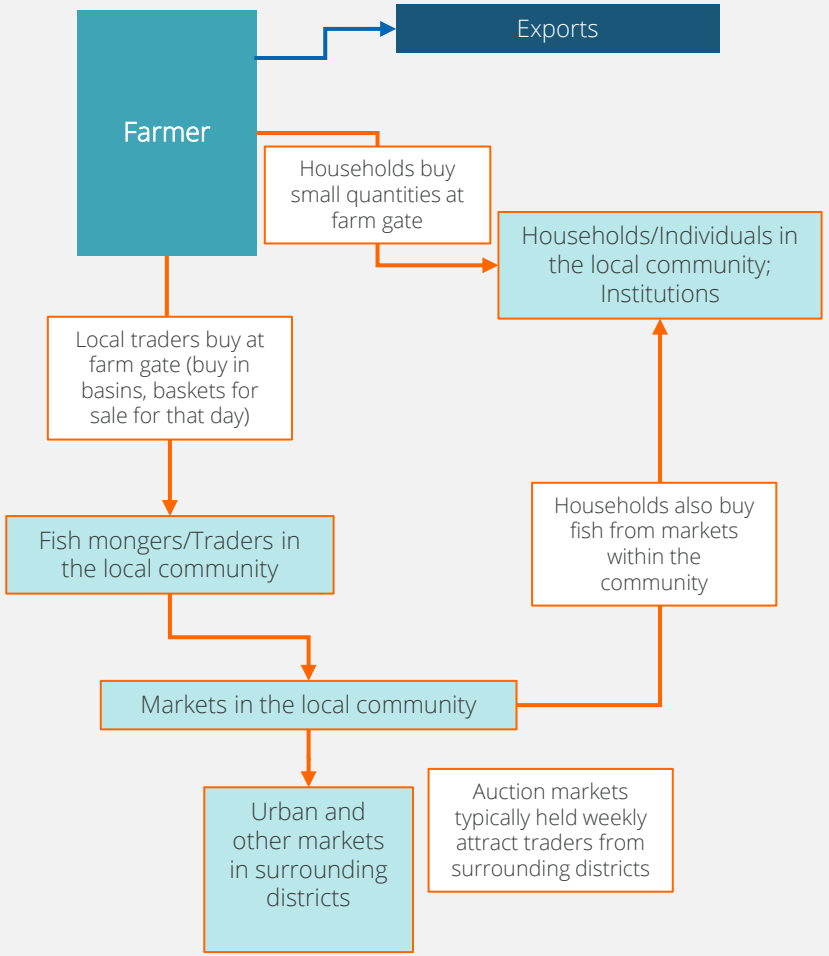
WEEB

UN WOMEN

3.5 Supporting fish distribution networks

Farmed fish' ability to compete with wild catch is impacted by high production costs, weak cold chain, and low consumer awareness

Domestic route to market (simplified)



- **Fish is an integral part of Ugandan cuisine**. A 2020 study revealed that more than 63% of the animal protein consumed by Ugandans comes from fish— amounting to 10.5 kg per capita (FAO), which is still well below the global average of 20.5kg kg per capita. As the country's population is projected to grow from 49 million in 2024 to 102 million in 2050, and with fish stocks from capture fisheries declining, expanding aquaculture production and raising awareness about cultured fish consumption have become increasingly important.
- **Wild-caught fish** continue to dominate Uganda's fish market, maintaining a steady supply that keeps overall fish prices low. This abundance creates a difficult competitive landscape for farmed fish producers, who face substantially higher production costs per fish, making it challenging to compete on price and profitability. Despite the large and growing demand for fish, farmed fish struggles to compete due to price sensitivity, lack of consumer awareness, and logistical barriers. Addressing these distribution challenges is critical to ensuring that aquaculture can scale sustainably and become a competitive alternative to wild catch.
- **Farmed fish** reach the domestic market through various distribution channels, as shown on the right. While large commercial farms primarily focus on exports, the local market is mainly supplied through direct sales—via farm gate sales, retail outlets, or indirectly through smaller traders and middlemen who supply fishmongers at local markets. However, the domestic share of farmed fish consumption remains relatively low. Experts estimate that only 10-30% of total aquaculture production is sold locally, with the majority being exported to Kenya and the DRC. This is largely because professional traders serving export markets can purchase in larger quantities than local traders, making exports the more commercially viable option for the farms.
- **The cold chain infrastructure** remains a key bottleneck in Uganda's fish distribution system, especially when moving fish beyond the lake regions. Inadequate cooled transport increases spoilage risks, restricting the market reach of farmed fish. Strengthening cold chain networks—through improved access to ice, cooler boxes, and targeted training for traders and middlemen—can help extend shelf life and open up new, underserved markets.
- Uganda's fish market is **highly price-sensitive**, with frequent fluctuations in supply and demand that create uncertainty for aquaculture producers. Because wild-caught fish is often cheaper, farmed fish struggles to establish a stable market position A key challenge for farmed fish is the lack of consumer awareness and differentiation from wild-caught fish. According to some interviewees, consumers maintain a degree scepticism about the quality, taste, and nutritional value of farmed fish.
- In addition to price, **fish size** is also a consideration. Ugandan consumers often prefer larger fish, fitting family style meals, rather than the individual "one small fish per person" portioning, more prevalent in Kenya. While large fish are caught in abundance in the wild, producing them via aquaculture is possible but relatively less economical. In later growth stages, fish require disproportionately more feed for marginal weight gains, which also lengthens production cycles. Producing smaller fish is a more resource-efficient approach, as it reduces both absolute and relative costs by lowering feed requirements. To support this shift, initiatives aimed at addressing the negative perception of farmed fish and encouraging a transition from wild-caught to farmed fish consumption could help align consumer expectations with what is both feasible and sustainable. This, in turn, would create benefits for both producers and consumers.

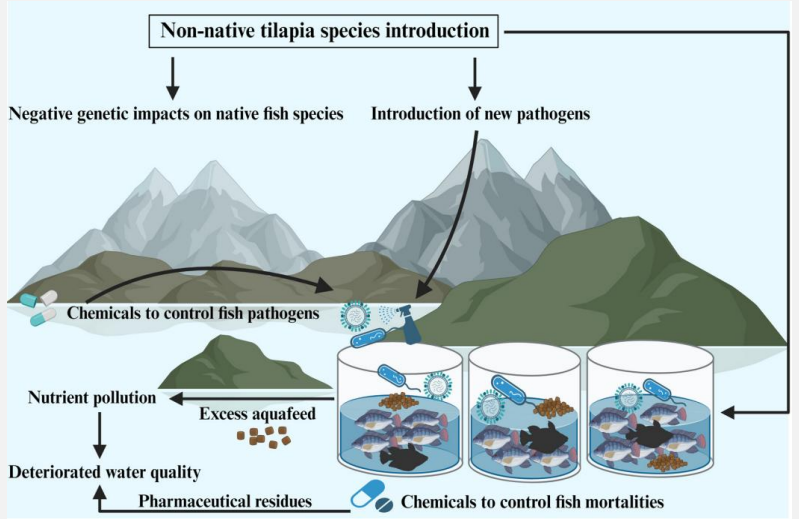
Note: 1. Visualisation by adaptation of Aquaculture roadmap (2022)

3.6 Quality inputs

Addressing critical challenges in Uganda's fish seed and feed supply chains

- **The availability and quality of fish seed (fingerlings)** in Uganda remain significant challenges for the aquaculture sector. While Aanyu et al. (2020) estimate that national hatcheries produce around 300 million fry/fingerlings per year—drawing on Mwanja et al. (2015)—the Aquaculture Roadmap presents a lower estimate for the number of hatcheries and their combined output. Recent developments, such as the closure of production at Source of the Nile, further suggest that the actual figure may be even lower than previously thought.
- **The shortage of fingerlings** in Uganda is driven largely by large-scale hatcheries prioritizing their own grow-out operations, leaving smaller farmers with limited access. This shortfall is further compounded by inconsistencies in broodstock management, poor hatchery practices and a lack of capacity to properly operate hatcheries. High operational costs and inadequate infrastructure further restrict investments in new or expanded hatcheries. Addressing these bottlenecks requires the establishment of stronger quality-control standards, greater capacity building through training and technical support, and improved distribution networks to ensure farmers have consistent access to affordable, high-performing fingerlings.
- As Lake Victoria is a shared resource between Uganda, Kenya, and Tanzania, **introducing genetically improved farmed tilapia** into the lake must be approached with extreme caution. The risk of escapees from aquaculture cages is significant, and such events could have serious genetic, ecological, and economic consequences for all countries bordering the lake, if the introduction does not happen in controlled manner. All interviewed stakeholders emphasize the potential of using local varieties for breeding programs to improve access to fingerlings. This approach addresses the issue at hand while avoiding the potential ecological and economic risks that could arise from foreign strains.
- **Feed** remains a significant constraint in the sector, particularly in terms of cost, availability, and quality. Some interviewees emphasized that availability is the most critical factor. Feed typically accounts for up to 70% of a fish farm's operational costs, making any price fluctuations highly impactful. Stakeholders argue that some of the domestically produced feed often falls short of required quality and nutritional standards, reinforcing reliance on imported feed, which constitutes approximately 70% of total commercial feed used. High import prices, further inflated by NTB, contribute to cost volatility.
- Although **total feed sales in Uganda are increasing**, the number of commercial fish farms is declining, signaling continued consolidation within the industry. Investments in local feed production, such as De Heus's planned 100,000 MT capacity for the East African market, are expected to improve feed availability. Previously, literature estimated the country's annual feed output at 75,000 MT. However, challenges remain. There are currently no plans to produce locally scarce starter feeds, which are still subject to import taxes. Additionally, feed manufacturers continue to rely heavily on imported ingredients and equipment, with tax exemptions that remain unclear, further complicating the cost and accessibility of essential inputs.
- **Home-formulated feeds** are commonly used by farmers facing challenges with cost and feed availability. However, these feeds often lack proper nutritional balance and are poorly processed, resulting in low-quality pellets that break apart in water, causing waste and deteriorating water quality. The consequences include poor fish growth, reduced feed conversion efficiency, longer production cycles, and ultimately, diminished profitability and business sustainability for farmers.

Case 2: Introduction of non-native genetics in Ghana[1]



Lake Volta in Ghana, the largest human-made lake in the world, provides about 90% of the country's tilapia and catfish production thanks to its suitable depth, optimal water flow, and high-quality water. Despite these advantages, aquaculture on the lake has faced significant challenges. After more than a decade of growth, fish production experienced a sharp decline in 2018 as a result of persistent disease outbreaks and unusual mortalities, creating stressful conditions for both fish and farmers.

Although this decline stem from an interplay of factors, one suspected cause is the introduction of (unapproved) fish species and genetics, which may have introduced diseases to native stocks. Production eventually recovered after 2020 and even surpassed pre-outbreak levels. Nevertheless, the notion that importing foreign genetics—or introducing non-indigenous species, such as in the Lake Victoria ecosystem—would yield superior results is firmly opposed by interviewed stakeholders. Instead, they emphasize dedicating resources to enhancing local strains, already demonstrating strong potential.

Note:1. visual from: Zornu, J., Tavornpanich, S., Brun, E., Zwieten, P. A. M. van, Leemput, I. van de, Appenteng, P., Anchirinah, J., & Cudjoe, K. S. (2023). Understanding tilapia mortalities and fish health management in Lake Volta: A systematic approach. Frontiers in Sustainable Food Systems,.

3.7 Zoning of water bodies

Effective aquaculture zoning is critical for balancing productivity, conservation and other priorities

- **Effective aquaculture zoning** entails carefully designating specific areas within Lake Victoria for fish farming, while protecting key zones reserved for wild fish breeding, navigation, and conservation. This structured method helps optimize resource use, reduce environmental impact, and prevent conflicts among users. By aligning aquaculture development with ecological and economic priorities, zoning promotes sustainability, strengthens regulatory oversight, and supports the long-term growth of the industry.
- As a **shared resource** between Kenya, Tanzania, and Uganda, Lake Victoria requires a harmonized, multi-stakeholder approach to balance competing interests while ensuring its long-term ecological and economic viability by focusing on it carrying capacity. The Lake Victoria Fisheries Organization (LVFO), a specialized institution established by the partner states, plays a critical role in advancing sustainable fisheries and aquaculture practices. Its mandate includes resource management, research and monitoring, trade facilitation, and institutional capacity-building, ensuring that aquaculture and fisheries contribute to both economic development and environmental preservation.
- Under the **EU-TrueFish** project, significant progress has been made in zoning Lake Victoria through the LVFO Zoning Working Group, which focuses on spatial planning to optimize resource management. The LVFO Spatial Dataset Platform enhances these efforts by providing data-driven decision-making tools, facilitating informed planning and zoning. This initiative is further strengthened by water circulation modelling and water quality monitoring, ensuring a holistic approach to the sustainable management of Lake Victoria.
- **Local governments** around Lake Victoria play a key role in ensuring that designated aquaculture zones are enforced and integrated into permitting and licensing processes. Their involvement is essential for long-term sustainability of aquaculture activities in the region. Stakeholders note that permits in Uganda are issued by the national Ministry, often with limited consideration of local environmental impacts and that of other regional farmers. For example, a new cement factory in Jinja has raised concerns over water quality risks to nearby fish farms. Stronger coordination between national and local authorities is needed to align zoning with both sustainability and sector growth.
- **Rising fish demand**, climate change, and shifting aquatic habitats make it essential to manage aquaculture within the carrying capacity of water bodies. While the LVFO guides zoning on Lake Victoria, other major Ugandan lakes lack such data.
- **To ensure long-term sustainability**, Uganda and its neighbors must adopt science-based zoning, strengthen regional cooperation, and improve governance. Updating regulatory frameworks and protecting ecosystems are key to sustaining production and securing food and economic goals.
- The 2021 Fisheries & Aquaculture Bill enforces a "de facto" zoning system by requiring site approval based on **environmental suitability**. Understanding carrying capacity helps limit environmental degradation and ensures aquaculture remains a reliable, sustainable source of protein.

Lake Victoria is the hot-spot for aquaculture in Uganda, due to its good conditions for cage aquaculture, including depth, size, and water quality. It already hosts the majority of Uganda's fisheries and aquaculture activity, with established infrastructure, market access, and logistical support.

Lake Kyoga is a very shallow water body, with a maximum depth of around 5 meters and an average depth of approximately 3 meters. This makes it unsuitable for cage aquaculture, which typically requires deeper waters to ensure proper water exchange and fish health. Any zoning activity in Lake Kyoga would likely focus on the limited fishing activities or ecological management rather than aquaculture.

Lake Albert is a cross-border lake shared between Uganda and the DRC. Developing aquaculture or conducting zoning on this lake would necessitate bilateral agreements between the two countries. Given the ongoing political volatility in DRC, this process would be highly bureaucratic and costly. While there is interest from the Government of Uganda—such as the establishment of a gene bank—actual implementation of aquaculture initiatives on Lake Albert would be complex and slow-moving.

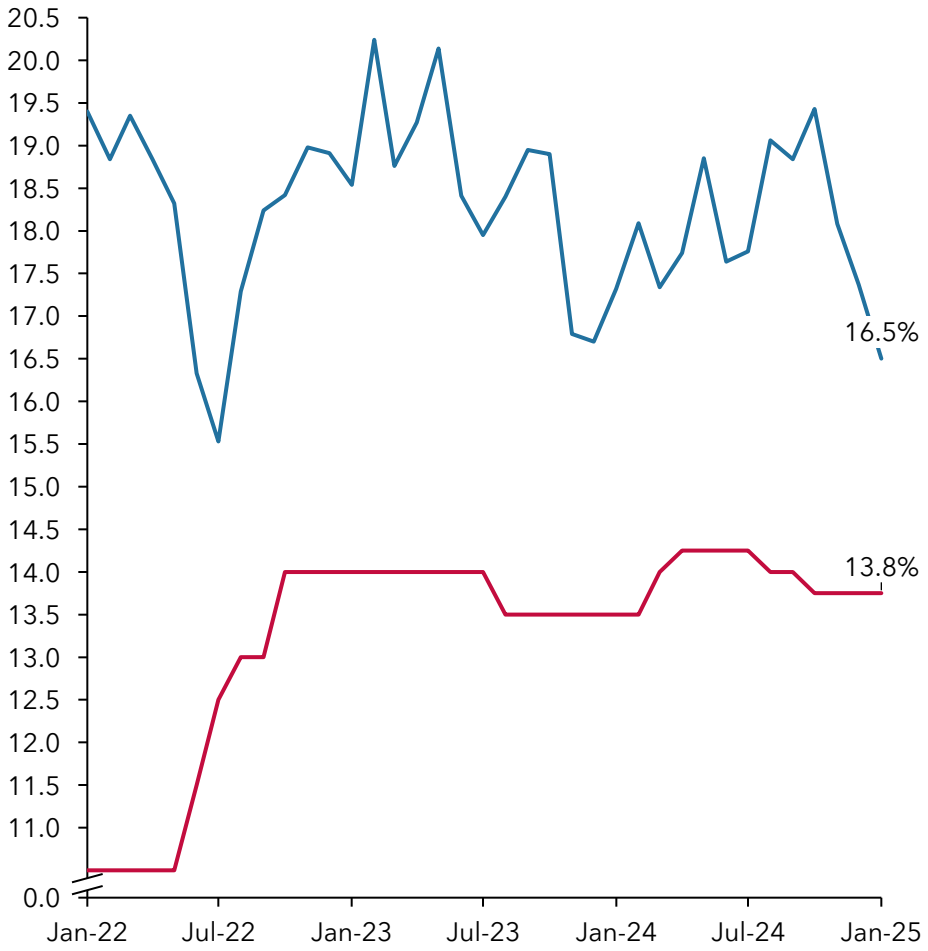
Lake Edward, like Lake Albert, is shared between Uganda and the DRC and faces similar diplomatic and shared management challenges. Moreover, its proximity to environmentally sensitive areas such as Queen Elizabeth National Park adds an additional layer of regulatory and ecological concerns. Its cross-border positioning also presents bottlenecks deterring potential investors, due to the risks posed to sustainability of activities resulting from a higher cost to address domestic consumer hubs and risks related to safeguarding assets on the lake.

Note: 1. While not bordering Lake Victoria, Burundi is one of the partner states of the LVFO. FAO. 2025. Regional Fishery Bodies summary descriptions. Lake Victoria Fisheries Organization. Fishery Governance Fact Sheets. In: Fisheries and Aquaculture. https://www.fao.org/fishery/en/organization/lvfo/en

3.8 Financing opportunities

Access to finance remains a major barrier in aquaculture as the traditional lending models often do not match the sector's needs

Lending rates, in %, period 2022-2025



- **Access to finance** has improved in recent years with the rapid growth of mobile money and increased access to formal banking services. However, statistics on financial inclusion vary widely—while the National Financial Inclusion Strategy estimates that 66% of the population has access to formal financial services, a 2018 survey reports a much lower figure of just 9%. Despite these advancements, access to finance remains a critical challenge for Uganda's agriculture and aquaculture sectors. While large commercial farms also face financing difficulties, the issue is particularly severe for micro, small, and medium-sized enterprises (MSMEs). Although the sector holds immense potential for enhancing food security and driving economic growth, several financial constraints continue to hinder its expansion and long-term sustainability.

- **Significant capital investment** is required to establish and scale an aquaculture business, covering inputs such as seed and feed, equipment, and ongoing operational expenses. However, without access to affordable credit options, many small-scale farmers struggle to invest in productivity-enhancing technologies that could improve efficiency and profitability.

- Many small and medium-sized aquaculture and agricultural producers face significant challenges in securing financing due to **the sector's perceived high risk**. Traditional loan structures are often misaligned with the cyclical nature of farming, resulting in repayment terms that are impractical for producers whose income fluctuates throughout the year. Compounding these challenges are high fluctuations in the availability and cost of feed, as well as the volatile fish prices.

- These uncertainties make financial planning even more difficult, increasing the financial vulnerability of small-scale producers and limiting their ability to make long-term investments, trapping them in a cycle of low productivity and financial vulnerability.

- Many producers struggle with **basic financial management skills**, making it difficult for them to access and effectively access and utilize financing. The lack of proper bookkeeping and financial records not only hinders their ability to prove profitability to attain credit but also creates challenges in managing loan repayments. Even when loans are theoretically available, many smallholder farmers have limited visibility into their own expenses and earnings due to poor recordkeeping practices. This lack of financial transparency increases the perceived risk for lenders, making financial institutions hesitant to extend credit. Additionally, documentation requirements for credit applications further disadvantage smaller producers, as they often lack the necessary paperwork.

- Hence, a key barrier is the **lack of sector-specific expertise** among banks and lenders. This knowledge gap leads to lending criteria that fail to account for the unique financial cycles and risks associated with aquaculture. Without tailored loan products or risk-sharing mechanisms, financial institutions remain hesitant to invest in the sector, further restricting access to much-needed capital. Addressing these bottlenecks requires targeted financial products, improved risk-sharing mechanisms, and financial literacy capacity building, to create a more inclusive and supportive financial ecosystem.

4. Lessons learned

4.1 Lessons learned

Global lessons can strengthen Uganda's aquaculture project design and impact

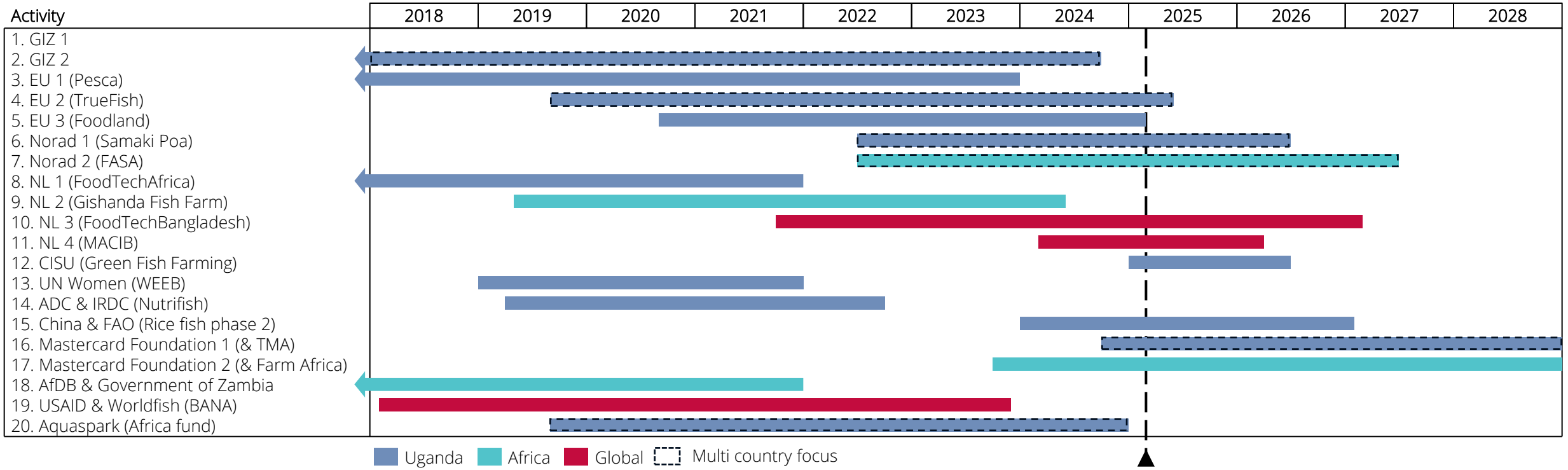
- To avoid duplication and capitalize on insights from similar programs, this chapter provides an in-depth review of existing aquaculture initiatives across the EAC region and globally. The goal is to extract **actionable lessons learned and best practices** that can be integrated into the design of future aquaculture projects in Uganda. This analysis also seeks to uncover **potential synergies** with other funding mechanisms and initiatives, offering opportunities to enhance the reach, coherence, and impact of the Dutch Government's aquaculture strategy in Uganda. An overview of relevant and active aquaculture-related projects, both within Uganda and internationally, is included in Annex 3.

- During the research process and key stakeholder interviews, several public and private sector initiatives stood out due to their **sustainable outcomes, strong partnerships, and measurable success**. One notable example is Zambia's national aquaculture strategy, launched in 2010, which has driven impressive growth in domestic fish production. In comparison, Uganda's National Plan of Action, introduced in 2023, remains in its early stages but can draw inspiration from such regional models. These case studies underscore the importance of learning from established programs to strengthen Uganda's aquaculture sector.

- All reviewed projects—whether public or private of a combination—reveal a combination of success factors, challenges, and inclusive approaches that are vital considerations for any new intervention aiming to achieve meaningful and lasting impact. From this review, a set of **key principles** has been developed to guide future project design. These principles are essential for maximizing project effectiveness, fostering long-term impact, and supporting systemic sustainability, while also minimizing unintended negative consequences. They serve as a framework for optimizing resource allocation, helping to target high-leverage areas within the sector. By embedding or aligning with these principles, future projects will be better positioned to achieve tangible, efficient, and enduring outcomes.

4.2 Ongoing and recent aquaculture projects

Several major aquaculture projects are ending, creating an opportunity and need for new, well-aligned interventions



Identified projects

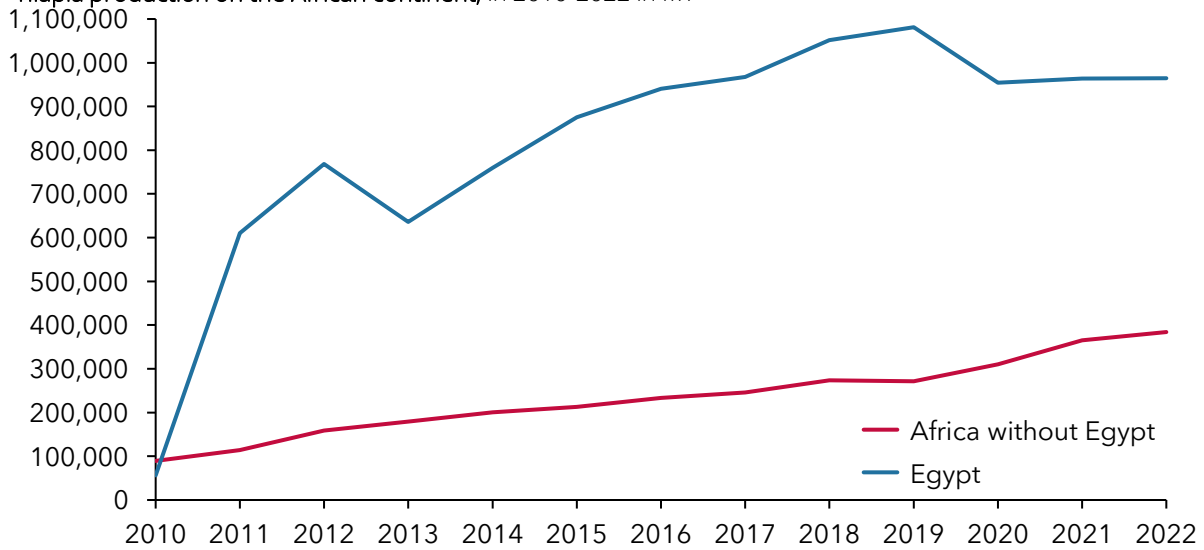
1. GIZ - Global Programme Sustainable Aquatic Food
2. GIZ – More fish and income from sustainable fisheries and aquaculture
3. EU 1 – The Promoting Environmentally Sustainable Commercial Aquaculture (PESCA) project in Uganda
4. EU 2 – EU-EAC True Fish
5. EU 3 – Foodland – Food and Local Agricultural and Nutritional Diveristy
6. Norad 1 – Samaki Poa
7. Norad 2 – FASA
8. NL 1 – FoodTechAfrica
9. NL 2 – Gishanda Fish Farm
10. NL 3 - FoodTechBangladesh
11. NL 4 – Making Aquaculture Cooperatives in the Mekong River Delta Inclusive and Bankable
12. CISU - Aquaculture and Advocacy for Green Fish Farming in Central Uganda
13. UN Women - Increasing women economic empowerment through cage fish farming in Bugiri District
14. China & FAO - Rice Fish Culture project (Phase 2)
15. ADC & RDC - Harnessing dietary nutrients of underutilised fish and fish-based products in Uganda
16. Mastercard Foundation 1 – TradeMark Africa Women and Youth Economic Empowerment in Fisheries
17. Mastercard Foundation 2 – Farm Africa Empowering Youth for Sustainable Aquaculture Markets and Job Creation
18. AfDB & Government of Zambia - **Aquaculture enterprise development project**
19. USAID & Worldfish - Feed the Future Bangladesh Aquaculture and Nutrition Activity
20. Aquaspark – Africa Fund

More detailed descriptions, budgets and links to the websites of the diferent projects / IFI can be found in Annex 3.

4.3 Best practices - Public

Case 3: Egypt: the blueprint for aquaculture in Africa

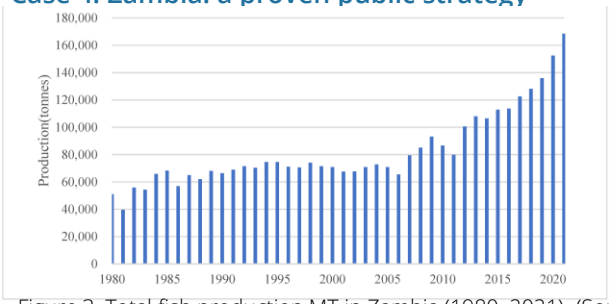
Tilapia production on the African continent, in 2010-2022 in MT[1]



Egypt serves as the benchmark for aquaculture production in Africa, ranking third globally yet accounting for nearly 80% of the continent's tilapia output. The industry's rapid expansion began in the late 1990s, when traditional production methods were replaced by intensive systems featuring innovations in feed formulation and production (such as extrusion technology), best-practice farm management, and advanced water circulation systems.

Central to this transformation was the Egyptian government's prioritization of aquaculture: it created an enabling environment for private-sector investment through land allocation, extension services, and research centers that promoted selective breeding and improved farming techniques. Entrepreneurs recognized the profitability of tilapia farming—driven by rising export demand and the sufficient availability of better feed, seed, and grow-out methods—which led to further investments and boosted production efficiency. Through these initiatives and strategic interventions, Egypt established a self-reinforcing system that generated positive feedback loops, propelling the country to the forefront of African aquaculture, producing more than the rest of the continent combined.

Case 4: Zambia: a proven public strategy



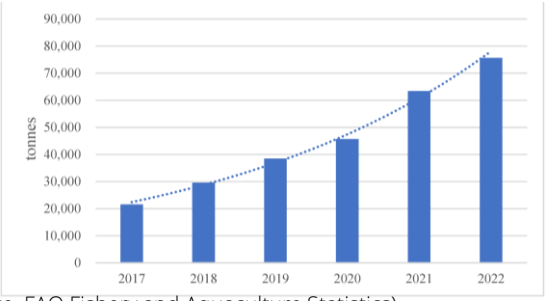


Figure 3. Total fish production MT in Zambia (1980–2021). (Source: FAO Fishery and Aquaculture Statistics).
Figure 4. Trends in fish production MT from aquaculture in Zambia (2017–2022). (Source: DoF Zambia).

Zambia's aquaculture sector has expanded significantly due to phased public interventions starting in the early 2000s. The 2003 Fisheries Policy marked a shift toward diversifying fish production by promoting aquaculture alongside the traditionally dominant capture fisheries, which have stabilized around 100,000 MT annually. Despite this, Zambia continues to face a fish supply deficit, with domestic production unable to meet rising demand. In response, the government, with World Bank support, launched the USD 50 million Zambia Aquaculture Enterprise Development Project (ZAEDP) in 2016 to scale up aquaculture, particularly in rural areas. Between 2017 and 2022, ZAEDP provided soft financing, developed infrastructure such as hatcheries and processing facilities, and trained thousands of smallholder farmers in modern aquaculture practices. Around the same time, public-private partnerships gained momentum, with organizations like the African Development Bank and USAID offering technical assistance and capacity-building programs focused on sustainable and environmentally responsible aquaculture. As a result, aquaculture production rose from just over 10,000 MT in 2006 to more than 47,000 MT by 2021, positioning Zambia as one of the fastest-growing aquaculture markets in sub-Saharan Africa. However, this growth, while impressive, still falls short of bridging the national fish supply gap. With the population continuing to grow, demand is expected to rise further, placing more pressure on the aquaculture sector to fill the gap left by the plateauing capture fisheries.

Understanding the interaction between aquaculture and capture fisheries is essential to grasp the transformation of Zambia's fish sector. Continued investment and innovation in aquaculture will be critical to meeting domestic demand, reducing import dependence, and supporting food security and rural livelihoods.

Note:[1] Food and Agriculture Organization of the United Nations. (n.d.). Global aquaculture production: Quantity (1950–2022).
Source: **Aquaculture in Zambia: The Current Status, Challenges, Opportunities and Adaptable Lessons Learnt from China**

4.4 Best practices - Private

Case 5: Gishanda Fish Farm: a vision of sustainability

Gishanda Fish Farm is a standout case study of private sector-community collaboration, blending sustainable aquaculture with socio-economic impact. Developed through a partnership between Larive International, FoodTechAfrica, African Parks, and local entrepreneurs near Akagera National Park, the farm showcases how business can drive shared value.

Gishanda is in essence a hatchery that specializes in the production of high-quality fingerlings, of which a percentage are sold to local fish farmers for a fraction of the price, enabling the growth of aquaculture beyond the farm itself and strengthening the regional fish farming ecosystem. In addition to fingerlings, Gishanda produces table-size fish that are supplied to local markets, and a part of the production to the surrounding communities at 50% of the price of beef to enhance food security and provide affordable, nutritious protein to surrounding communities.

The project also creates direct employment, offers aquaculture training to locals, and promotes eco-friendly fish farming techniques that support both livelihoods and environmental conservation. Gishanda Fish Farm demonstrates how profitable private sector initiatives, when paired with meaningful community engagement, can build resilient local economies and foster long-term sustainability.

Case 6: Chicoa: the future of fish-farming

Chicoa Fish Farm is a leading example of private sector-led aquaculture that integrates tilapia cage farming with strong commitments to community empowerment, gender inclusion, and environmental sustainability. Based on Lake Cahora Bassa in Mozambique, Chicoa has developed pioneering offshore breeding techniques that reduce reliance on electricity and lower the farm's carbon footprint to below that of common crops like tomatoes.

The farm plays a catalytic role in the regional tilapia value chain by producing high-quality fingerlings, which are sold to and benefit over 1,000 smallholder fish farmers in the region. In partnership with funders and investors, Chicoa strengthens rural economies by building direct sales channels to informal market vendors, with a deliberate focus on supporting women traders, who now earn up to ten times the minimum wage by trading Chicoa's sustainably produced fish.

Chicoa's model not only reduces pressure on wild fish stocks but also contributes to SDGs on Zero Hunger, Gender Equality, and Climate Action, proving that commercial aquaculture can drive both profit and deep social impact across Southern Africa.

Source Gishanda : Developing Rwanda's aquaculture sector: three years at Gishanda Fish Farm | Nieuwsbericht | Agroberichten Buitenland
Source Chicoa: Chicoa Fish Farm

4.5 Best practices – PPP – example for uganda

Case 7: FoodTechAfrica: an integrated value chain approach

FoodTechAfrica is a public-private partnership comprising 14 companies and universities dedicated to enhancing food security in East Africa by establishing a fully integrated aquaculture value chain. Initiated in 2012, the project addresses the region's growing demand for sustainably produced, protein-rich food by leveraging local resources and innovative technologies. Since inception, the FoodTechAfrica partners have established four innovative fish farms, two hatcheries, a feed factory and a large-scale vocational training program in East Africa. The results are obtained within the allocated timeframe and budget of EUR 8 million. The follow-up investment by private sector has surpassed EUR 20 million. The project was awarded the title "Best FDOV, by the dutch ministry of foreign affairs (2016).

Project overview

The primary objective of FoodTechAfrica is to demonstrate the effectiveness of a fully integrated fish value chain in East Africa. By combining the strengths of Dutch companies, knowledge institutions, government entities, and African counterparts, the partnership developed local capacity through investment, knowledge transfer and input supply, achieving higher production, improved infrastructure and enhanced capacity.

Key initiatives include:

- Establishing demonstration farms: Implementation of Recirculating Aquaculture Systems (RAS) in Kenya, Tanzania, and Rwanda to showcase sustainable fish farming practices.
- Developing aquaculture academies: Providing practical training to over 300 individuals in fish farming, entrepreneurship, and feed production to address the lack of hands-on, practical training in East Africa.
- Promoting sustainable practices: Aligning projects with the UN SDGs (sustainable development goals) to ensure environmentally friendly and socially responsible aquaculture development.

Impact of the project

FoodTechAfrica's initiatives have led to significant advancements in East Africa's aquaculture sector:

- Economic growth
- Increased fish production
- Infrastructure development
- Regional expansion

Through these efforts, FoodTechAfrica has played a pivotal role in transforming East Africa's aquaculture sector, enhancing food security, and creating sustainable economic opportunities for local communities. It serves as a key example (best practice) for a multi-annual aquaculture approach in Uganda.

Developement of value chains with direct local impact

Total years	Project focus	People trained	Followup investm.
2013-2021	Improving food security in East Africa	Over 600 equipped with practical skills	> 20 MN EUR

Additional feed production (year)	Additional fingerlings (year)	Additional fish products (year)	Total project funds
>5.000 tonnes aquafeed	>2.000.000/annum	>1 million KG/annum	8 MN EUR

4.6 Key principles

Guideline to achieve tangible, efficient, and enduring project outcomes

1. Ensure sustainability
2. Trust and consistency
3. Technical know-how is not enough
4. Collaboration and communication
5. Quality over quantity
6. 'Skin in the game'

Based on interviews with industry experts, lessons from previous projects in Uganda and globally, desk research, and sector experience, eight key principles have been formulated to guide the design of new interventions. These principles are essential for ensuring effectiveness, long-term impact, and systemic sustainability while minimizing negative externalities. Additionally, they help optimize resource allocation by targeting high-leverage points within the industry. Incorporating or acknowledging these principles can enhance project outcomes, ensuring they are embedded in the design of potential initiatives for greater efficiency and lasting success. Three of the key principles are elaborated on below. The elaboration on the other 3 principles can be found in Annex 4.

1. Ensure sustainability

The economic sustainability of interventions is crucial to ensuring lasting impact beyond the project's duration. While some activities can transition to self-sufficiency with initial subsidies and financial support, others may collapse once external funding is withdrawn. To prevent this, it is essential to establish a strong business case for each intervention, ensuring that job creation and economic benefits endure over time. A proactive, market-driven approach is key to designing effective interventions. By embedding a solid business rationale, initiatives can foster sustainable market linkages, securing long-term productivity gains and improved conditions. Aligning interventions with market dynamics not only addresses immediate needs but also extends their impact beyond the project's timeline and budget constraints.

4. Collaboration and communication

Ensuring alignment between donors and development agencies is crucial to minimizing duplication and maximizing resource efficiency. To achieve this, silos must be dismantled, and knowledge must be actively shared among stakeholders. Maintaining ongoing dialogue between donors, government entities, and implementing partners—initiated during this study—will facilitate the exchange of best practices and insights.

Additionally, knowledge-sharing within the industry is essential, fostering collaboration among stakeholders at all levels, from small and large-scale producers to feed suppliers, exporters, processors, and researchers. Increased transparency will ultimately help create an enabling environment for the sustainable growth of the aquaculture sector.

6. 'Skin in the game'

When aiming to develop the private sector, initiatives must prioritize economic sustainability to avoid fostering dependency on aid. Insights from interviewed stakeholders suggest that projects should refrain from providing free inputs, such as feed or fingerlings, as beneficiaries may not fully appreciate their value compared to those obtained through market transactions, hampering adoption after the provision of free-inputs stops. Instead, fostering self-reliance within the target group is essential, ensuring that access to inputs is not conditional on external support. This can be achieved by implementing cost-sharing models, such as offering inputs at a slightly discounted rate until the business case is clearly observable or requiring in-kind (time, logistics) contributions for training, rather than simply providing financial incentives to beneficiaries for their participation.

5. Project design

5.1 Project design

Translating strategy into action

Drawing from a comprehensive analysis of identified challenges, desk research, and validation through key informant interviews, a structured approach has been developed to address key constraints and advance the professionalization of Uganda's aquaculture sector. This framework builds on insights from previous projects, integrating key principles to provide strategic guidance on effectively engaging the Dutch private sector while fostering sustainable aquaculture development in Uganda. The initiative is designed to contribute meaningfully to both economic growth and food security in the country.

The project consists of five interrelated components, covering **five of the seven identified focus areas**. The exception is **zoning**, which falls under the LVFO, supported by the EU-EAC TrueFish project. These initiatives specialize in spatial planning to ensure the sustainable management of lake resources. The LVFO Aquaculture Zoning Working Group has made significant progress in this area, including capacity-building efforts such as training on drone-based mapping, monitoring, and data analysis. The other focus area which will only be partly addressed, is the **strengthening of associations** as this has been addressed in detail through the efforts of other donors, such as the EU Pesca program. Given these ongoing initiatives and the expertise already in place, zoning has been excluded from the project design to avoid duplication and ensure resources are allocated to other critical focus areas that remain insufficiently addressed.

The project is designed to reflect the key strategic frameworks and policy priorities, ensuring alignment with both national and international objectives of the partners involved, for both private sector development and food security. The following policy documents have guided the shaping of the project:

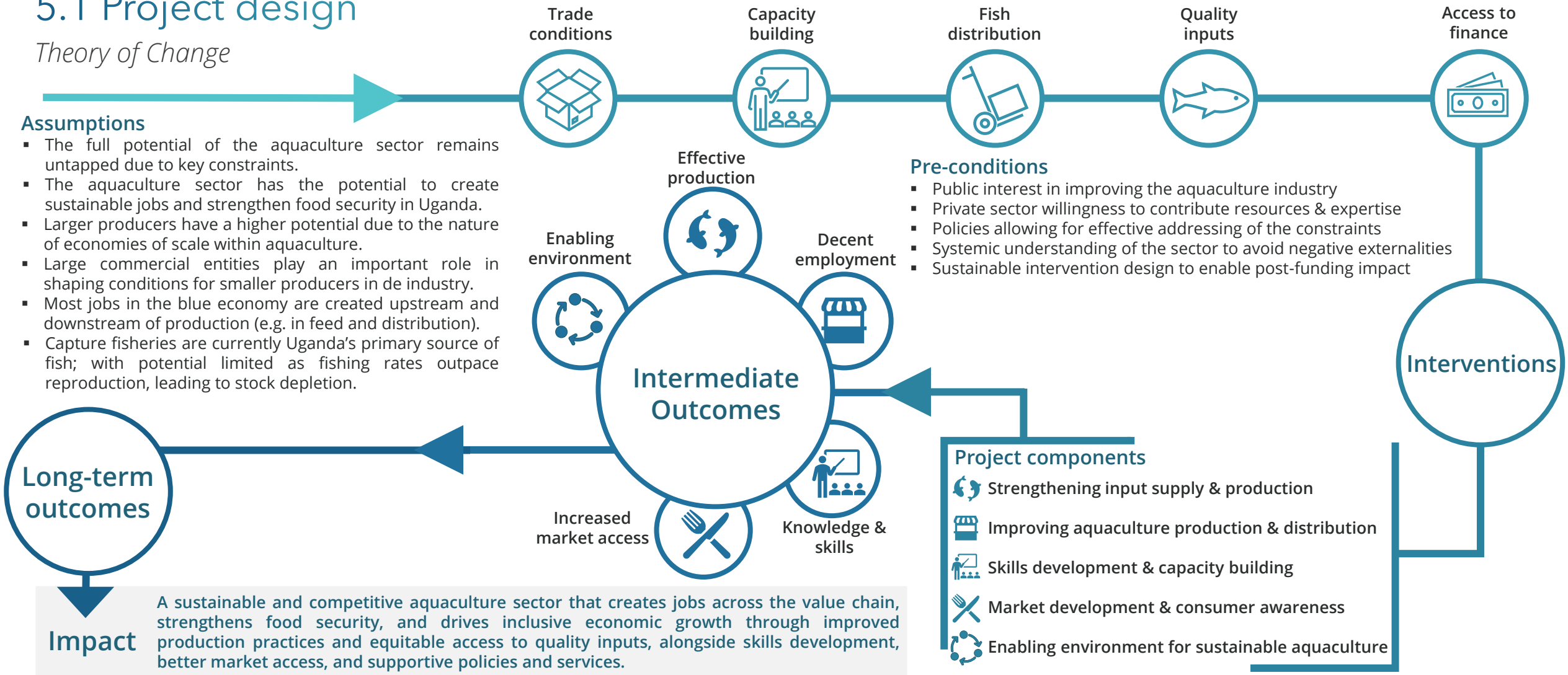
- The "Beleidsbrief Ontwikkelingshulp" from the Dutch Ministry of Foreign Affairs
- PADEO - a joint approach for sustainable economic development
- Uganda's National Aquaculture Strategy

The following sections will provide a detailed breakdown of the **five project components**, outlining the core interventions, key activities, expected outcomes, and primary stakeholders involved. Additionally, it will illustrate how these components directly address the challenges identified across the focus areas in the previous chapters. This will be followed by a one-page project summary, offering a concise overview before delving deeper into the strategic alignment of the project design.

1. **Trade and trade barriers**
2. **Training & capacity building along the value chain**
3. **Quality inputs**
4. **Supporting fish distribution and post harvest handling**
5. **Access to finance for investment**

5.1 Project design

Theory of Change



Cross cutting themes

Gender & youth inclusion – Food and nutrition security - Sustainable employment – Responsible consumption & production - Life underwater

5.2 Strategic project components

Detailed breakdown of project components and related insights [1/3]

Component 1: Strengthening input supply for aquaculture production

Activity and impact

Component 1 focuses on strengthening the supply of critical inputs to enhance aquaculture production. Key activities involve constructing and operationalizing a **modern hatchery** to produce high-quality local fingerlings, helping to address a critical bottleneck for farmers. A portion of the fingerlings will be supplied to MSMEs at a cost-plus pricing model, offering them access to fingerlings at a reduced and more affordable rate.

The component will also improve feed accessibility through strategic partnerships with feed producers and distributors, while establishing **input distribution hubs** to ensure reliable accessibility to feed and equipment for farmers. The input distribution hubs will not only function as access points to key inputs and resources, but will also be a location for training and capacity building, to further facilitate the professionalization of farmers.

Additionally, efforts will be made to **improve the genetics** of indigenous fish species, contributing to more resilient and productive fingerling stocks. These targeted interventions will result in increased availability of essential inputs, leading to improved efficiency, productivity, and profitability across aquaculture farms.

Relevant stakeholders

- De Heus Fish Feed
- Yalelo Uganda
- Rocksprings hatchery
- MSME farmers

Focus areas adressed

Component 2: Improving aquaculture production and distribution

Activity and impact

Component 2 focuses on improving aquaculture production and distribution to enhance efficiency and market access. Key activities involve **identifying farmer clusters** to promote farm management practices, collective bargaining and economies of scale, strengthening market positioning, and improving farmers' ability to negotiate with buyers and suppliers.

The component will also reduce post-harvest losses by establishing **cold-chain distribution networks**, facilitating efficient transport to untapped markets across the country. **Route-to-market facilitation** will develop strong market linkages and distribution networks between producers and female traders, promoting inclusive economic participation.

Additionally, **outgrower production** will be promoted through contract farming agreements between large-scale farms and MSMEs, increasing sector inclusion and access to market for smaller producers. At the same time, the transfer of expertise is facilitated through the scheme.

Demonstration sites will also be established as centres of excellence, showcasing advanced production techniques and promoting knowledge transfer. These interventions will improve efficiency, productivity, and market access across aquaculture farms.

Relevant stakeholders

- Yalelo Uganda
- MAAIF
- Kazi Food Logistics
- MSME farmers
- Fish traders

Focus areas adressed

5.2 Strategic project components

Detailed breakdown of project components and related insights [2/3]

Component 3: Skills development & capacity building

Activity and impact

Component 3 focuses on skills development and capacity building to enhance productivity and professionalism in Uganda's aquaculture sector. Key activities involve developing a robust **training curriculum** and delivering **vocational training** on best practices for sustainable aquaculture; including not only technical and farm management training to effectively grow fish, but also all skills required to do it profitably ensuring economic sustainability.

Training will target **fish farmers, farmer clusters, extension officers, and TVET instructors** to ensure widespread adoption of modern techniques. **E-learning modules** will be developed to support continuous learning, integrating practical digital "HowToDoAquaculture" content tailored for Uganda.

Practical **training hubs** will be established to deliver hands-on learning at local farms, fostering real-world skills application. Gender and youth inclusion will be promoted by training **women entrepreneurs** in processing, last-mile delivery, and sales techniques; those area's where most direct jobs can be created in the value chain. These interventions will collectively strengthen training institutions, enhance farmer skills, and build a resilient aquaculture workforce.

Relevant stakeholders

- Aquaculture Academy
- Fisheries Training Institute (FTI)
- MAAIF
- Yalelo Uganda
- Traders
- Financial institutions

Focus areas adressed

Component 4: Market development & consumer awareness

Activity and impact

Component 4 focuses on strengthening market development and **raising consumer awareness** to boost the uptake of farmed fish. Key activities include implementing targeted consumer awareness campaigns to promote the benefits of farmed fish as a sustainable and nutritious option, reducing reliance on wild fish stocks.

Additionally, the component will introduce an affordable **fish-based protein into school feeding programs** by supplying table-size fish to schools at a cost-plus price. These efforts are designed to shift consumer preferences toward locally farmed fish, stimulate market demand, and contribute to improved food security and dietary diversity for school children. The expected outcomes include greater acceptance of farmed fish, increased sales of locally produced fish, and a positive nutritional impact on young learners.

By supporting traders and fishmongers in effectively addressing local markets, this approach goes beyond just raising awareness—ensuring quality assurance, maintaining the cold chain, and providing a **reliable route to market** through a network of last-mile distributors and connected retail outlets. Farmed fish will be actively promoted and positioned as a preferred choice in the market.

Relevant stakeholders

- MAAIF
- Yalelo Uganda
- Local schools

Focus areas adressed

5.2 Strategic project components

Detailed breakdown of project components and related insights [3/3]

Component 5: Enabling environment for sustainable aquaculture

Activity and impact

Component 5 aims to create an enabling environment that supports the growth of sustainable aquaculture through targeted **policy and regulatory interventions**. This includes facilitating dialogue and negotiations for trade agreements between Uganda, Kenya, and the DRC to enhance **cross-border trade of fish and feed**. The current free trade zone does not effectively facilitate the trade of fish and feed, with traders facing uncertainty and inconsistencies related to tariffs at border points.

To develop a clearer understanding of Uganda's water bodies and their potential for aquaculture/fisheries, we strongly recommend initiating a **comprehensive carrying capacity study** across key aquatic systems. This will help identify both opportunities and constraints for fish production, providing the necessary insights to finalize the program's target locations.

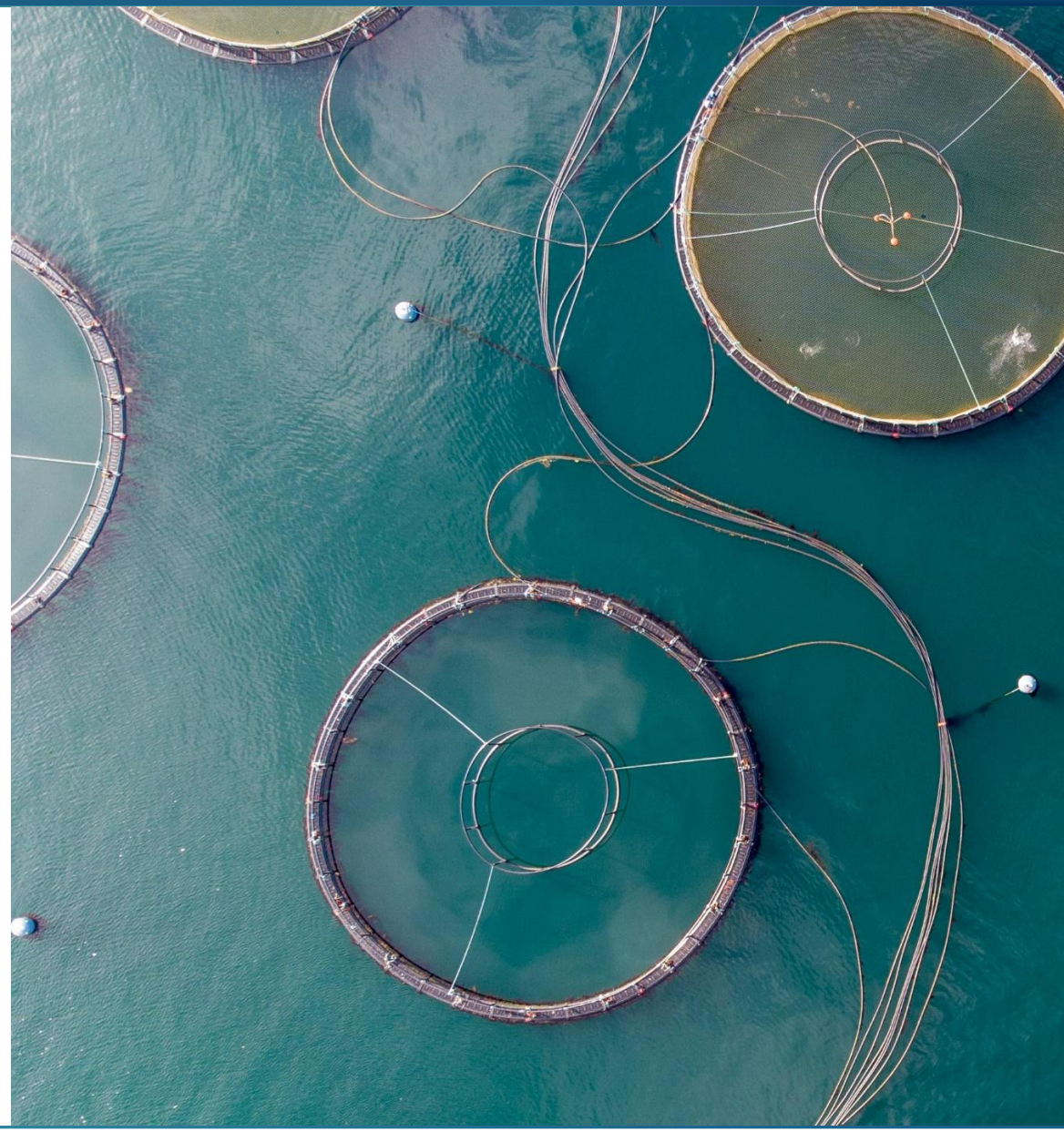
The component will also advocate for the reduction of **non-tariff barriers and the simplification of import processes** for essential aquaculture equipment, helping farmers and businesses access the tools they need more efficiently.

Additionally, it will work to identify and promote **financial instruments** from local financial institutions to improve access to credit and investment within the aquaculture sector. These activities are expected to result in more supportive policy frameworks, streamlined trade regulations, and improved financial inclusion, ultimately strengthening the competitiveness and bankability of fish farmers and businesses across the value chain.

Relevant stakeholders

- Trademark Africa
- Financial institutions like DFCU foundation
- MAAIF
- WUR

Focus areas adressed



5.3 Small-scale actor inclusion

Project components supporting small-scale actors in aquaculture and fisheries

Fisheries

1. **Strengthening input supply for production**
   Local hubs will give fishers access to essential inputs and serve as training centers to build skills and improve their productivity and sustainability.
2. **Improving production and distribution**
   Cold-chain networks and improved transport will reduce post-harvest losses and open new markets. Strengthened links with traders, especially women, will boost income and promote inclusive economic growth.
3. **Skills development & capacity building**
   The program promotes sustainable fishing, basic bookkeeping, and market access, while connecting fishermen to value chain actors and alternative business opportunities.
4. **Market development & consumer awareness**
   Drives demand for fish through awareness campaigns and school feeding programs, creating stable markets. It also strengthens market access by supporting traders and building reliable distribution networks.

Aquaculture

1. **Strengthening input supply for aquaculture production**
   Better access to quality inputs, training, and improved fish breeds will boost smallholder farmers' productivity and profitability.
2. **Improving aquaculture production and distribution**
   Forming clusters of small producers and outgrowers strengthens their collective bargaining power, expands their networks, and improves access to markets.
3. **Skills development & capacity building**
   Practical training—both vocational and online—should focus on sustainable farming techniques, basic bookkeeping, and market access. Internships and demonstrations with established farms can provide hands-on experience, while improving farmers' understanding of value chains and how to connect with buyers.
4. **Market development & consumer awareness**
   By increasing demand through awareness campaigns and school programs, and strengthening distribution networks, component 4 creates reliable markets and better income opportunities for smallholder fish farmers.
5. **Enabling environment for sustainable aquaculture**
   Identify and promote financial products from local institutions to improve credit access for the aquaculture sector, including smallholders. Equally important is building awareness and capacity to navigate and access these financing options.

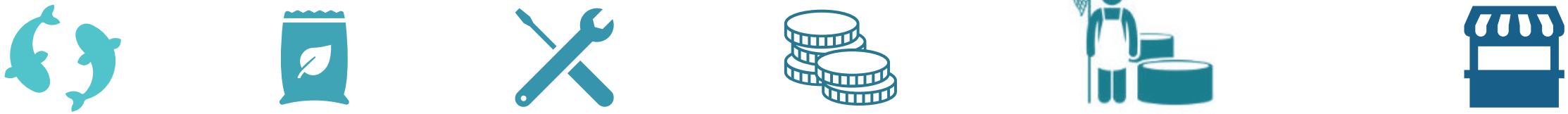
Fish traders

This program is designed to train fish traders and create downstream employment opportunities through the implementation of cold chain distribution systems. The training focuses on building efficient distribution networks by connecting traders directly with producers, while also equipping them with essential bookkeeping and business management skills. By strengthening these linkages and reducing post-harvest losses, the initiative contributes to enhanced food security and a more resilient fish value chain.

A key priority of the initiative is to ensure inclusive economic participation, with a strong emphasis on engaging women and youth. Their active involvement is essential to the program's success. Market demand for fish is strong—the critical need is to strengthen the value chain and connect supply with market access.

5.4 Aquaculture ecosystem approach

From seed to market: supporting Uganda's aquaculture sector for food security and economic opportunities



Fingerlings

a) **Establish modern hatchery:** Enhance availability of high-quality fingerlings.
b) **Operationalise breeding program:** Improve the genetic quality of indigenous fish species.
c) **Supply fingerlings:** Provide fingerlings to market (MSMEs), if possible at a cost-plus model.
d) **Research & development**: Connect Dutch and Ugandan private sector to drive critical input supply.

Feed

a) **Improve accessibility**: Partner with producers and distributors.
b) **Establish input hubs:** Set up input distribution hubs for aggregation, storage, and training.
c) **Develop curriculum:** Focus on feed management and efficient feeding.
d) **Policy work:** support with industry policy advisory for feed and ingredient imports.

Equipment

a) **Advocate for reduced non-tariff trade barriers:** Ease importation of aquaculture equipment and feed.
b) **Upgrade demo farms:** Select model farms to demonstrate best practices in equipment use and farm management.
c) **Enhance cold-chain:** Reduce post-harvest losses through cold chain infrastructure and equipment.
d) **Training hubs**: Establish training hubs for hands-on learning led by local trainers.

Finance

a) **Strengthen financial instruments:** Facilitate access to finance for equipment and working capital.
b) **Master trainers:** Build capacity on business development and financial literacy for producers & traders.
c) **Educate financial institutions:** Improve understanding of aquaculture financing needs, risks and opportunities.
d) **Industry connection**: Connect FinTech with emergent producer clusters and sector organizations.

Production

a) **Practical training:** provide practical aquaculture skills and best practices to farmers and traders across the value chain.
b) **Fingerling management:** guide producer (clusters) that source fingerlings from the newly established hatchery. Support creation of contract farming models.
c) **Strengthen farmer clusters:** Identify and support emergent farms with the ability to drive sector development.
d) **Aqua employment**: support lakeside communities with the development of aquaculture skillsets

Market

a) **Facilitate trade agreements:** Strengthen enforcement of agreements for fish and feed exports & imports in the EAC.
b) **Cold chain:** Implement local-led chilled fish distribution networks of entrepreneurs for urban and underserved rural markets.
c) **Route to market:** Develop market linkages and distribution networks between producers, traders and re-sellers in key area's.
d) **Consumer awareness:** Conduct campaigns to promote the benefits of farmed fish.
e) **School feeding program:** Introduce affordable white fish protein programs in collaboration with producers and local schools.

Training & capacity building: sectoral skills to assure increased productivity and income generation

- **Develop vocational training facilities:** Equip learners with practical industry skills on-site, combining theory with practice at operational aquaculture farms.
- **Integrate training programs:** Align skills with market needs through industry and educational partnerships.
- **Develop financial literacy courses:** Improve finance access for aquaculture stakeholders.
- **Expand e-learning platform:** Incorporate local languages and financial literacy content for greater accessibility and engagement.
- **Enhance TVET programs:** Strengthen trainer capacity through hands-on, practical training, as well as embedding the new financial literacy curriculum.
- **Internships:** Facilitate smooth transitions from theoretical education to industry practice in collaboration with private sector industry leaders.
- **Raise awareness among financial institutions:** Highlight investment potential and financial needs of the aquaculture sector.
- **Educate consumers:** Promote the nutritional and economic benefits of farmed fish and advocate for smaller-sized fish to enhance sustainability.

Cross cutting themes

Gender & youth inclusion – Food and nutrition security - Sustainable employment – Responsible consumption & production - Life underwater

5.5 Guiding frameworks and strategic priorities

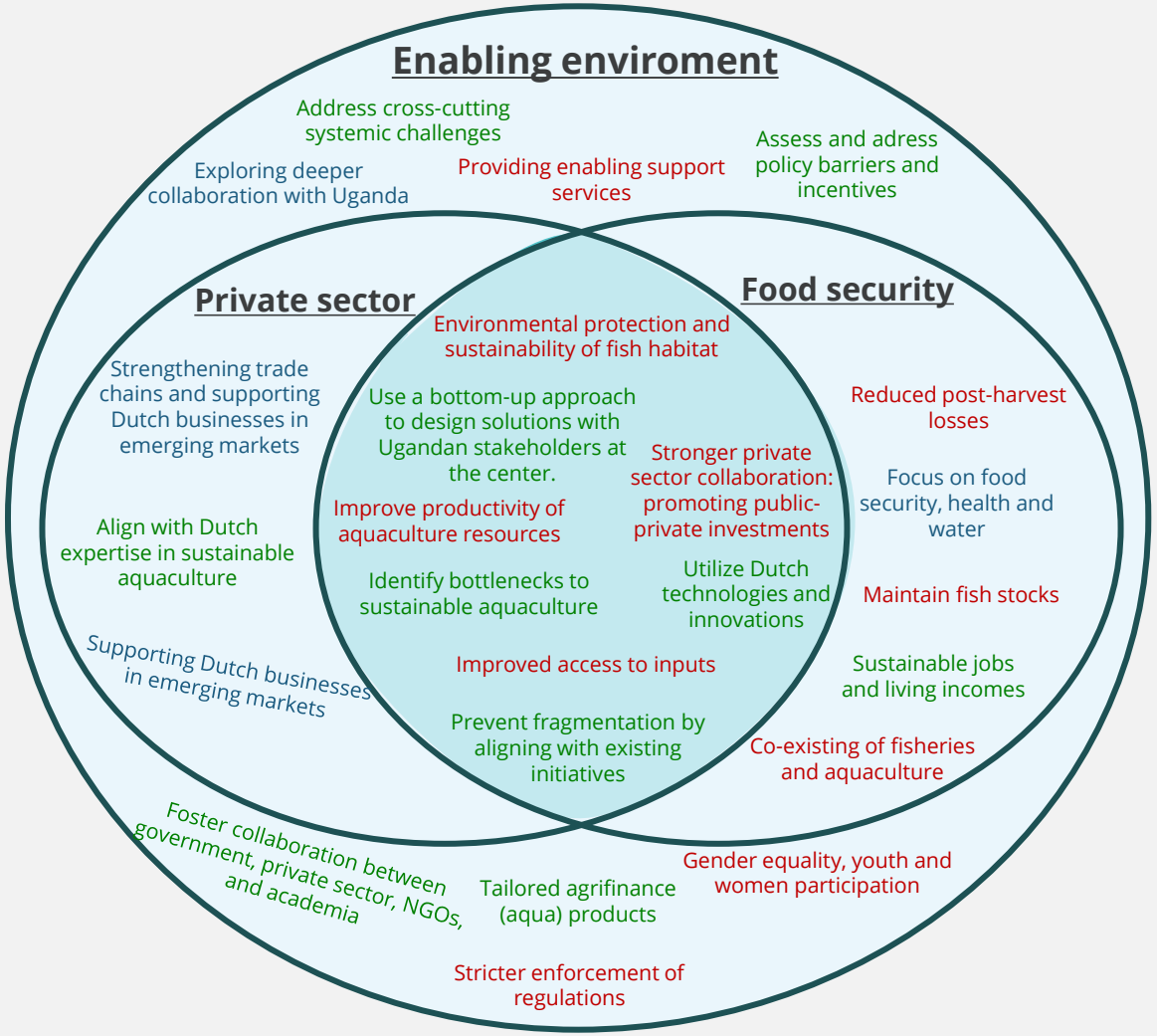
Aligning market incentives with food security goals through targeted interventions

The project design has been carefully developed with a strong focus on alignment with key strategic frameworks and priorities at both the Ugandan national and Dutch focus. Several foundational documents served as guiding references to ensure that the project not only responds to sectoral needs but also contributes to broader development goals. These include:

- The "Beleidsbrief Ontwikkelingshulp" from the Dutch Ministry of Foreign Affairs, which outlines the Netherlands' foreign aid priorities, emphasizing trade, economic development, and partnerships that generate mutual benefits.
- PADEO – a joint strategy for sustainable economic development, which promotes inclusive and resilient economic growth through partnerships between public, private, and knowledge sectors.
- Uganda's 2040 vision and National Plan of Action and The National Fisheries and Aquaculture Policy Strategy and Implementation Plan, which set out the Ugandan Government's vision and roadmap for the development and professionalization of the aquaculture sector, highlighting the importance of food security, livelihoods, and sector competitiveness.

The proposed project approach is built on the lessons learned, key principles, and recommended activities, drawing from the guidance of the aforementioned documents. The integration of (1) private sector engagement, (2) food security objectives, and the supporting of a (3) strong enabling environment is essential to ensuring the success and sustainability of any future program. Uganda's aquaculture sector holds significant potential, provided the project is designed with a long-term vision that enables growth and resilience beyond the project's duration.

This document serves as a strategic blueprint to guide the development of an approach that advances sustainable aquaculture, strengthens food security, promotes effective public-private partnerships, and remains well aligned with the Dutch and Ugandan policy priorities.



Lattice Consulting Ltd.

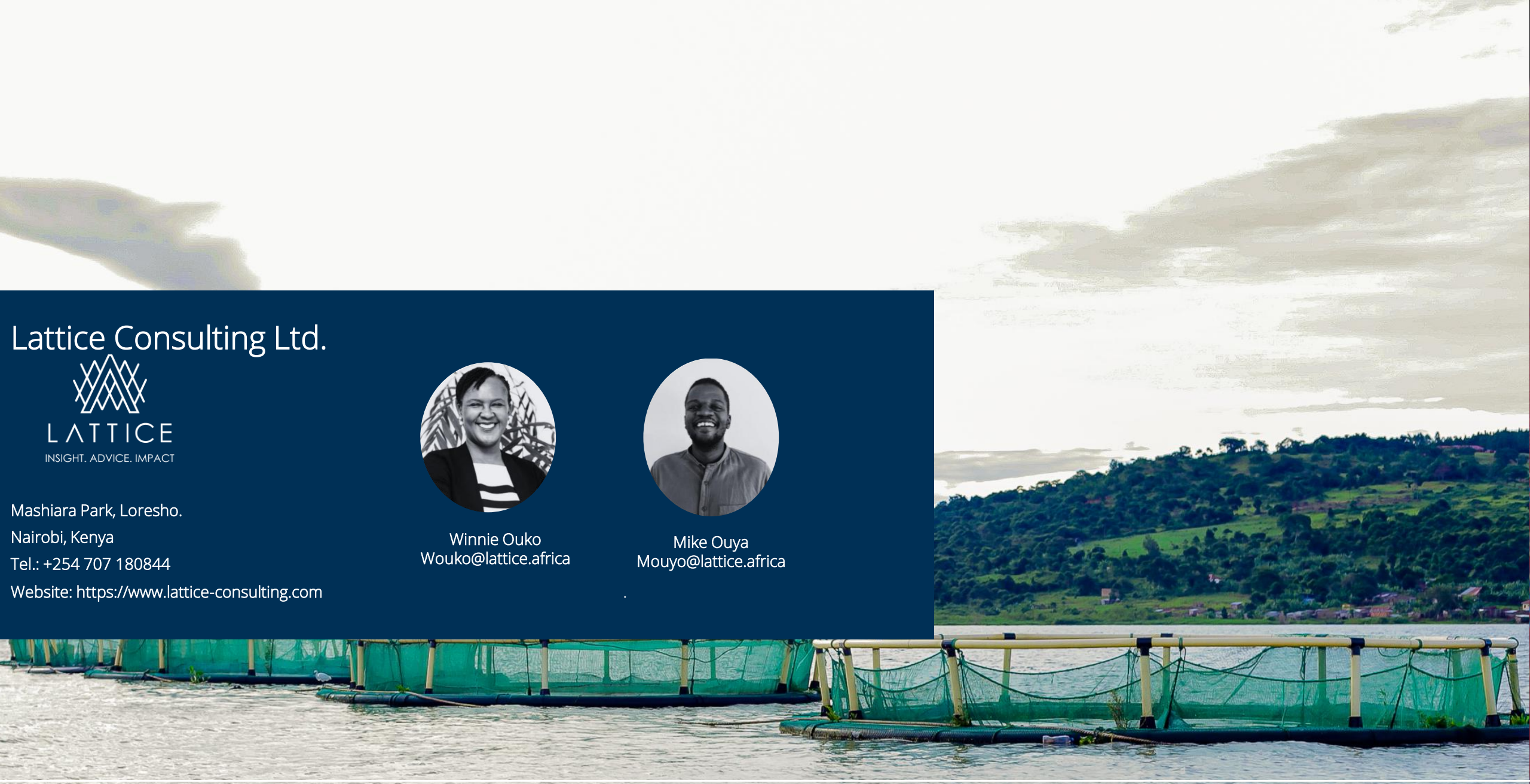
LATTICE
INSIGHT. ADVICE. IMPACT

Mashiara Park, Loresho.
Nairobi, Kenya
Tel.: +254 707 180844
Website: https://www.lattice-consulting.com

Winnie Ouko
Wouko@lattice.africa

Mike Ouya
Mouyo@lattice.africa

.



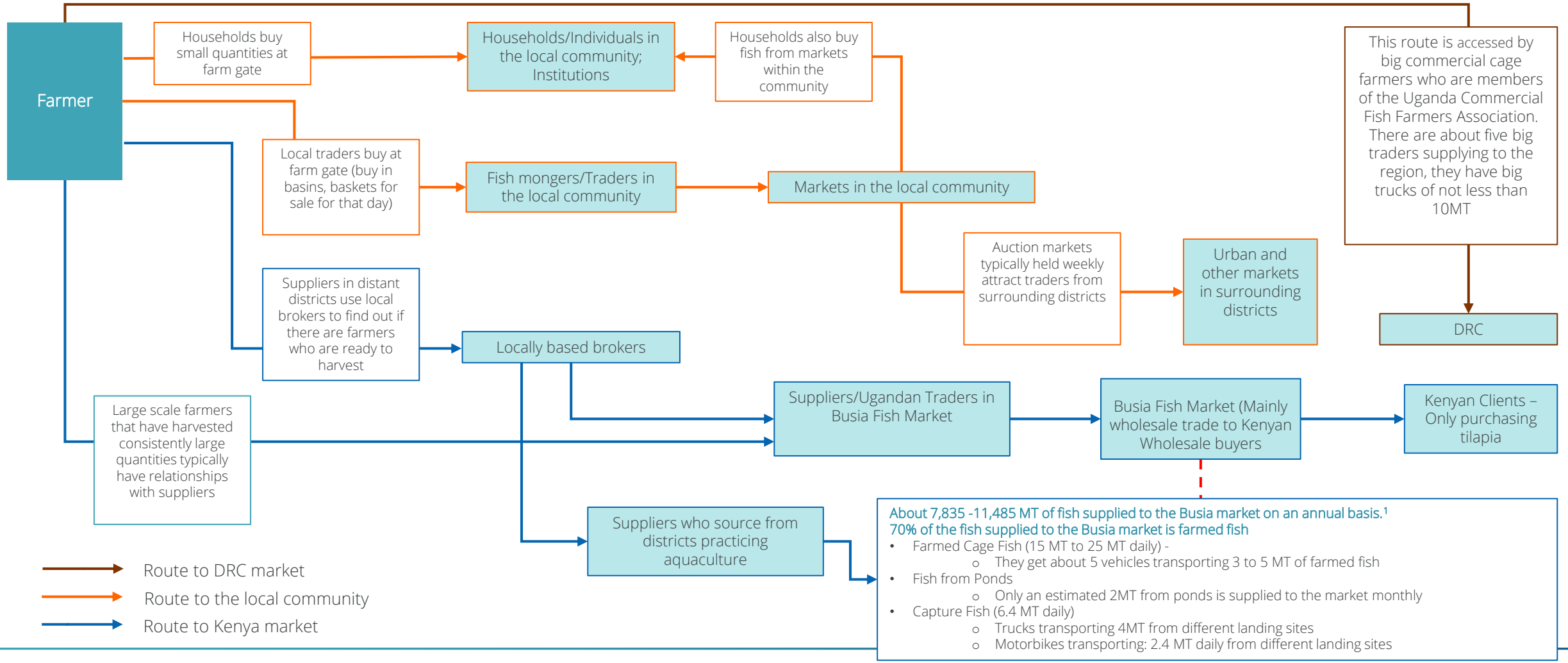
Annex

Annex 1 – Interviews

Organisation	Sector	Public/Private
De Heus	Feed production	Private
GIZ	German Enterprise Agency	Public
Yalelo	Cage producer	Private
Trademark	NGO	Public
Enabel	Belgium Enterprise Agency	Public
Gatsby	NGO	Public
Rockspring Hatchery	Hatchery and cage producer	Private
Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)	Ugandan Government	Public
Embassy of the Kingdom of the Netherlands Kampala	Dutch Government	Public

Annex 2 Route to market - overview

>67% of cage tilapia production is estimated to be sold in the large regional markets and export markets through traders.



Notes: 1. Overview adapted from: Aquaculture Roadmap Map Uganda - Opportunities in the aquaculture value chain (2022)

Annex 3 – Aquaculture producer categories

	Small-scale cage	Large scale cage	Small scale ponds	Large scale pond
Type of production systems	Metallic cages, homemade cages or smaller HDPE cages are common in this segment.	Mid-to-large size HDPE cages are mostly used in this segment. Some farmers also have breeding ponds or concrete tanks.	Primarily earthen ponds, with some concrete ponds.	
Size	Smaller cage farmers produce from 2 to 10 MT per year.	Larger cage farmers produce more than 10 MT per year, up to over 4,000 MT per year.	Small-scale pond farmers have an average of 2 - 3 ponds with unstable production throughout the year. Median annual production is between 0.05 - 1.9 MT.	Reported median pond size for large scale farmers is 775 square metres and farmers report to own up to 16 ponds. Median production is 3.6 MT of fish per year
Fish type	Tilapia	Tilapia	Tilapia, catfish	Tilapia, catfish
Feed usage	Imported floating commercial feeds, sometimes complemented with alternative feed ingredients such as caridina shrimp.	Floating.	Most farmers in this segment venture into pond farming as beneficiaries of the OWC initiative. OWC provides fingerlings and starter feed to the farmers for three months. After this period, farmers use on-farm feed production using ingredients such as maize bran, silver fish and leftover food. As such, their commercial feed usage is limited.	Predominantly using imported floating commercial feeds.
Sales channels	Traders and surrounding communities.	Integrated distribution channels and traders.	Small scale pond farmers predominantly practise fish farming at a subsistence level and sell to surrounding communities.	Surrounding communities, through local auctions and to traders.

Notes: Overview adapted from: Aquaculture Roadmap Map Uganda - Opportunities in the aquaculture value chain (2022)

Annex 4 - Ongoing projects and programs in Uganda

Nr	Duration	Funding organization	Project/Program	Focus area	Geographic scope	Budget
1	2016 - 2024	GIZ	Sustainable Fisheries in Uganda More fish and income from sustainable fisheries and aquaculture (completed) - giz.de	Aquaculture production, income generation, capacity development	Uganda	12 MN EUR (est.)
2	2024 - 2028	GIZ	Promoting sustainable aquatic food - giz.de	Aquatic food systems, biodiversity, climate-smart fisheries	Uganda, East Africa	15 MN EUR (est.)
3	2018-2024	EU	PESCA - Promoting Environmentally Sustainable Aquaculture	Applied research and training in feed, seed and production systems with a commercial perspective	Uganda	
4	2019 -2025	EU-EAC	EU-EAC true fish farming story in Lake Victoria Basin (TRUE-FISH)	Aquaculture, climate resilience, livelihoods improvement	Lake Victoria Basin, EAC countries	7 MN USD
5	2020-2025	EU	The Food and Local, Agricultural and Nutritional Diversity (FoodLAND) Project	The project aims to enhance local food systems in six African countries through innovative agricultural and aquaculture technologies. It focuses on improving nutrition, agro-biodiversity, and sustainable food production while addressing malnutrition, particularly in women and children	Uganda, Morocco, Tunisia, Ethiopia, Kenya, Tanzania	7 MN EUR
6	2022-2026	Norad	Samaki Poa African fish farmers go digital	Capacity building across the aquaculture value chain, improving food security, and providing practical expertise to empower the sector.	EA (Kenya, Uganda & Rwanda)	2 MN EUR
7	2022-2027	Norad	Developing sustainable aquatic feeds for resilient aquatic food systems in Sub-Saharan Africa | WorldFish	Alternative feed ingredients for fish farming using local ingredients	Zambia, Nigeria, Kenya	8 MN USD
8	2012-2021	NL	FoodTechAfrica | Sustainable aquaculture projects for East Africa	See page 28 for more details	Kenya, Rwanda, Tanzania	8 MN EUR
9	2019-2024	NL & SHV	Gishanda Fish Farm	Introducing innovative state of the art tilapia RAS hatchery in East-Rwanda and focusing on sustainable land use, biodiversity conservation and improving community lives.	Rwanda	1.7 MN EUR
10	2021-2027	NL	FoodTechBangladesh | Boosting fish farmers in Bangladesh	Strengthening the aquaculture sector in Bangladesh	Bangladesh	6 MN EUR

Annex 4 - Ongoing projects and programs

Nr	Duration	Funding organization	Project/Program	Focus area	Geographic scope	Budget
11	2024-2026	NL government	MACIB Project	The MACIB project aims to professionalise and financially empower aquaculture cooperatives, making them self-sufficient, attractive to financial institutions, and more inclusive and sustainable.	Vietnam	1,1 MIL euro
12	2025 - 2026	Access2Innovation	Aquaculture and Advocacy for Green Fish Farming in Central Uganda	Innovation in aquaculture, rural entrepreneurship	Uganda	USD 3 million (est.)
13	2019 -2021	UN Women	Women in Bugiri champion domestic harmony and economic advancement through smart fish farming | UN Women – Africa	Gender empowerment, aquaculture, community development	Uganda; Bugiri District	USD 1.5 million (est.)
14	2019–2022	CultiAF, IDRC and the Australian Centre for International Agricultural Research	Harnessing dietary nutrients of underutilised fish and fish-based products in Uganda.	Improving nutrition and livelihoods through value addition of underutilized fish species, addressing micronutrient deficiencies.	Uganda	AUD 2.389.175
15	2023-2026	China & FAO	China and Uganda work together on $12M rice-fish culture project - Hatchery InternationalHatchery International	Enhancing agricultural productivity and sustainability by promoting an integrated rice-fish culture system, aiming to improve food security, income, and environmental protection for thousands of farmers across Uganda.	Uganda	USD 12.4 MN
16	2024-2028	Trademark Africa & Mastercard Foundation	Fisheries programme targeting African women and youth.	Enable over 240,000 work opportunities and boost trade in fish and fish products by about $100 million by 2028.	Kenya, Uganda, Tanzania, DRC, Zambia, Nigeria and selected Island states	Unknown
17	2023 – 2028	Mastercard Foundation	Empowering youth for sustainable aquaculture markets and job creation	Focuses on creating sustainable employment opportunities for youth by strengthening aquaculture value chains and promoting inclusive market systems in Africa.	Kenya	Unknown
18	2016–2021	African Development Bank and Zambian Government	AQUACULTURE ENTERPRISE DEVELOPMENT PROJECT	Promoting aquaculture as a business, enhancing production and productivity, and improving market linkages.	Zambia	$50 million
19	2018-2023	Worldfish	Feed the future Bangladshe aquaculture activity	Aimed at improving nutrition and increasing incomes by strengthening the aquaculture market system and promoting sustainable aquaculture practices.	Bangladesh	24.5 MIL euro
20	2018 - 2024	Aqua-Spark	Aqua-Spark Soon Launches Africa Fund to Ignite the Next Iteration of Sustainable Aquaculture in Sub-Saharan Africa	Investing in sustainable aquaculture enterprises to boost tilapia farming and improve food security.	Sub-Saharan Africa	Unknown

Annex 5 – Key principles

1. Ensure sustainability	2. Trust and consistency	3. Technical know-how is not enough
The economic sustainability of interventions is crucial to ensuring lasting impact beyond the project's duration. While some activities can transition to self-sufficiency with initial subsidies and financial support, others may collapse once external funding is withdrawn. To prevent this, it is essential to establish a strong business case for each intervention, ensuring that job creation and economic benefits endure over time. A proactive, market-driven approach is key to designing effective interventions. By embedding a solid business rationale, initiatives can foster sustainable market linkages, securing long-term productivity gains and improved conditions. Aligning interventions with market dynamics not only addresses immediate needs but also extends their impact beyond the project's timeline and budget constraints.	Build trust through long-term commitment, consistency, and sustainable implementation of interventions. Project design should prioritize strong coordination, active monitoring, and extended support throughout and beyond the project lifecycle. Engaging partners early on—particularly private sector actors who can continue activities after the project concludes—is key. This is especially important for private companies, both large and small, whose main concern is aligning project outcomes with their business objectives. A consistent and committed approach fosters trust among these partners, ensuring they remain engaged and invested. Ultimately, this level of collaboration and continuity is essential for securing lasting positive impacts and strengthening partnerships across the sector.	In the aquaculture sector, technical knowledge of fish farming is essential, but it is only one piece of the puzzle. Successfully running an aquaculture business requires much more than the ability to produce fish. Entrepreneurs must also develop business and financial management skills, such as bookkeeping, cash flow management, and understanding investment needs. Additionally, they need to navigate supply chains—knowing where to source quality inputs like feed and fingerlings—and identify reliable market channels to sell their fish at a fair price. Without these complementary skills, even technically proficient farmers may struggle to operate sustainably or scale their operations. Therefore, future interventions should adopt a holistic approach that integrates both technical aquaculture training and business development support to enhance the long-term viability and profitability of aquaculture enterprises.
4. Collaboration and communication	**5. Quality over quantity**	**6. 'Skin in the game'**
Ensuring alignment between donors and development agencies is crucial to minimizing duplication and maximizing resource efficiency. To achieve this, silos must be dismantled, and knowledge must be actively shared among stakeholders. Maintaining ongoing dialogue between donors, government entities, and implementing partners—initiated during this study—will facilitate the exchange of best practices and insights. Additionally, knowledge-sharing within the industry is essential, fostering collaboration among stakeholders at all levels, from small and large-scale producers to feed suppliers, exporters, processors, and researchers. Increased transparency will ultimately help create an enabling environment for the sustainable growth of the aquaculture sector.	It is essential to focus on specific challenges within targeted value chains, supported by clearly defined objectives. By concentrating efforts on a narrower set of priorities, projects can provide consistent, high-quality support that fosters meaningful success and facilitates replication. Rather than spreading resources thinly to achieve high numbers, a focused approach enables greater depth, effectiveness, and impact. This strategy acknowledges the reality of limited time and resources, highlighting the importance of pursuing fewer, well-targeted objectives to maximize long-term outcomes and create scalable models for future interventions.	When aiming to develop the private sector, initiatives must prioritize economic sustainability to avoid fostering dependency on aid. Insights from interviewed stakeholders suggest that projects should refrain from providing free inputs, such as feed or fingerlings, as beneficiaries may not fully appreciate their value compared to those obtained through market transactions, hampering adoption after the provision of free-inputs stops. Instead, fostering self-reliance within the target group is essential, ensuring that access to inputs is not conditional on external support. This can be achieved by implementing cost-sharing models, such as offering inputs at a slightly discounted rate until the business case is clearly observable or requiring in-kind (time, logistics) contributions for training, rather than simply providing financial incentives to beneficiaries for their participation.