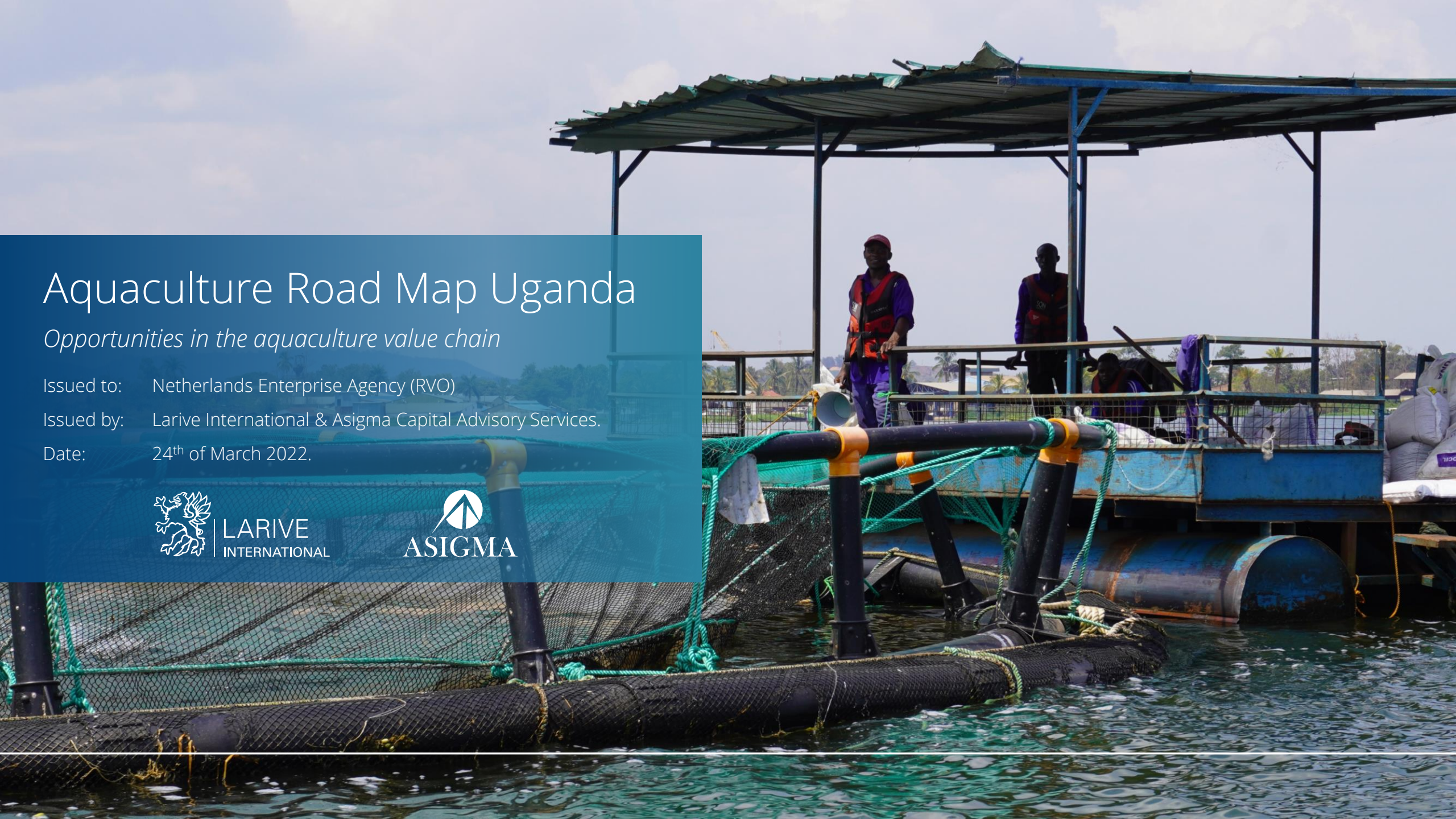

Aquaculture Road Map Uganda

Opportunities in the aquaculture value chain

Issued to: Netherlands Enterprise Agency (RVO)

Issued by: Larive International & Asigma Capital Advisory Services.

Date: 24th of March 2022.

LARIVE INTERNATIONAL

ASIGMA

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Source of the Nile fish farm (2013)

Abbreviations and definitions

A = Actual

aBi = Agricultural Business Initiative

ACF = Agricultural Credit Facility

BCN = Billion Cubic Meters

BN = Billion

B2B = Business-to-business

B2C = Business-to-consumer

CAGR = Compounded Annual Growth Rate

CY = Calendar Year

DFO = District Fisheries Officer

DRC = Democratic Republic of Congo

F = Forecast

FCR = Feed Conversion Ratio

FY = Fiscal Year

GDP = Gross Domestic Product

GM = General Manager

HSE = Health Safety and Environmental

KMT = Kilo Metric Tonnes

Large-scale cage farmer = Large-scale cage farmers are defined as having a minimum production capacity of 10 MT p.a. These are mostly members of the Uganda Commercial Fish Farmers Association (UCFFA), some of whom have capacity to directly import their own fish feed.

Larive = Larive International B.V.

LHK = Lake Harvest Kenya

MAAIF = Ministry of Agriculture, Animal Industry and Fisheries

M&A = Merger & Acquisition

MD = Managing Director

MN = Million

MT = Metric Tonnes

NGO = Non-Governmental Organization

NEA = Netherlands Enterprise Agency (RVO)

OWC = Operation Wealth Creation

p.a. = Per Annum

PE = Private Equity

SON = Source of the Nile

TiLV: Tilapia Lake Virus disease

UCFFA = Uganda Commercial Fish Farmers Association

UGX = Ugandan Shilling

USD = United States Dollar

Source of the Nile fish farm (2021)

Executive summary

Executive summary

The aquaculture sector in Uganda

The aquaculture sector in Uganda is one of the fastest growing sectors in the country. The advent of cage farming on Lake Victoria and the entry of major international fish farmers have been drivers of the fast growth. As a fast growing sector, directly linked to food security, it provides interesting opportunities for the Dutch Ministry of Foreign Affairs to promote private sector development. The Dutch private sector is also showing a high interest in the sector and its future development.

Fish is a popular product for consumers, but prices are high. With catches from wild catch not able to meet demand, there is a clear need to increase production. However, overall, most farmed fish is still exported. The development of a strong home market would significantly contribute to a more resilient value chain.

Challenges for private sector development

- Despite the rapid growth, overall sector size is only estimated at approximately 35,000 MT in 2020, considerably smaller the official estimate of 107,000 MT. Farmed fish is nearly exclusively produced in cages.
- Within the aquaculture sector, there is a clear divergence between the large farmers funded with foreign soft loans or capital, and the smaller farmers with limited access to capital. Whereas the former exhibit rapid growth in recent years, the latter, being especially pond farmers, facing structural challenges impeding further growth. To support sustainable long-term growth and equitable sharing of the benefits of the development of this sector, it is vital that the support system for smaller players is developed as well. This study provides recommendations specific for this group of farmers.
- Critical to the development of the segment of small to mid-size farmers is an investment in domestic feed production. Whereas larger players are able to import quality fish feed in bulk and enjoy import tax exemptions, smaller farmers have limited access to quality affordable fish feeds. This should be coupled with improved access to quality fingerlings as well as an overall improvement of technical capacity in the value chain.
- Support to the small-to-medium farming segment should be private sector driven, given that government-led initiatives such as OWC has had limited success in driving the sector forward. Overall, it is important that the position of farmers in the value chain is improved, potentially through the formation of farmers associations, as market power is primarily held by traders.
- The sector is completely dependent upon imported feeds. The high cost and poor quality of domestically produced feeds can partly be attributed to the poor quality of raw materials, especially proteins, in-country, leading to feed producers having to import these raw materials. Addressing concerns in the raw material value chains in Uganda would greatly lower costs, increase quality and will have spill-over effects in other livestock value chains such as poultry.
- Lastly, most of the farmed fish is currently being exported to regional markets. Other livestock value chains have shown the vulnerability of such a model, exemplified by the impact of the recent ban on imports of Ugandan eggs by Kenya. Developing the domestic consumer market is critical to long-term sector sustainability.

Interventions and opportunities

- In response to these challenges eight comprehensive interventions have been identified. These present opportunities for Dutch expertise to contribute to sector development and the development of small and medium size fish farmers. A number of these interventions span the entire value chain and require a level of financial support not solely available using instruments from NEA. However, these have been included to allow for other interested parties to potentially implement the proposed interventions. In this way, other actors are invited to develop the aquaculture value chain, leading to higher productivity, income, and sustainable growth.

1. Investment in domestic feed production;
2. Supporting the entire value chain through investments in raw materials;
3. Improving access to quality fingerlings;
4. Improving technical capacity along the value chain;
5. Development of the domestic consumer market.
6. Improve financing options for small to medium farmers;
7. Formation of farmers' associations and other unifying bodies;
8. Ensuring regulation is properly implemented;

Executive summary

Market roadmap for the sustainable development of small & midsize aquaculture farmers in Uganda

Challenges	Lack of affordable, quality feed	Lack of quality raw materials	Limited access to quality fingerlings	Limited technical expertise along the value chain
Opportunities For intervention	In-country production of high-quality feed The quality of fish feed plays a major role in helping the fish grow. Feed quality is therefore a high priority for farmers so they would be willing to purchase it regardless of the price. However high-quality feed is currently not produced domestically. This is especially true for smaller fish farmers, as they cannot import quality fish feed directly. This is an opportunity for investment in local feed production. A local feed manufacturer is critical to further democratic sector development, allowing smaller farmers to access affordable feeds and prosper. This also requires the supply of quality feed manufacturing equipment.	Supporting the entire value chain through investments in raw materials Although Uganda is one of the key producers in East-Africa of raw materials such as maize and soy used in fish feeds, quality and consistency are a major issue. Current domestic fish feed producers import their raw protein ingredients from abroad due to a lack of quality inputs domestically. Investing in the maize and protein supply chains to improve quality and consistency is critical to the success of local feed production and bringing overall cost of production down, while providing job creation. Production increase of raw materials would also support the development of other livestock value chains.	Making fingerlings easily accessible There are currently only a few larger hatcheries, primarily producing for internal needs of large farmers. These are also mainly located in the central region of the country. Smaller farmers have very limited access to quality fingerlings. Small farmers from Western Uganda need to source as far as Rock Springs in Tororo. Improving production at existing hatcheries and starting new hatcheries is critical to support sector growth. Increasing the number of hatcheries in remote regions would reduce the distance to source fingerlings.	Training programs for farmers and teachers Current technical capacity levels are low across the value chain. In order to improve overall technical capacity, it is recommended that practical training programs are implemented. These should be hosted at practical training centers, are advised to leverage digital tools, and incorporate business acumen skills. Collaboration between Dutch and Ugandan education institutes should also be encouraged, to improve the overall curriculum. Incorporating the needs from the private sector in this collaboration would be highly beneficial to ensure the education meets the rapidly developing job market requirements.
Impact	Fish feed prices are the main cost item in fish farming production. In Zambia, investment in local feed production allowed for the doubling of production from 2014 to 2017 and dramatically reduced feed prices.	The soya cake requirement of one large size fish feed plant can provide guaranteed offtake at a good price for 400,000 smallholder farmers.	Kamuthanga hatchery, a third-party fingerling supplier in Kenya set-up with support of the Dutch government, currently supplies 1 to 2 million fingerlings to small farmers, translating to 300,000 to 1,000,000 kg of fish.	Lack of technical expertise is reported to be one of the key critical challenges by farmers. Training programs in Kenya have shown that profitability of especially smaller farmers increases by 20%-50% with proper technical support

Executive summary

Market roadmap for the sustainable development of small & midsize aquaculture farmers in Uganda

Challenges	Market dependency on export	Lack of financing and insurance	Inefficient market dynamics	Regulatory reform needs to be properly implemented
Opportunities For intervention	Development of the domestic consumer market. At current, most of the aquaculture production from Uganda is regionally exported, with limited domestic sales. This is a risk to overall sector sustainability, as the frequent border closures in the region and other trade disputes could potentially negatively affect the industry. There is a real opportunity to develop the local market for quality, fresh fish. This fish commands a premium and such improves profitability of the sector. Moreover, this leads to better product quality and food safety for consumers.	Reduction in the cost of acquiring additional financing Given that most farmers are unable to borrow from commercial banks, capital constraints hinder further growth. Agricultural initiatives (like ACF) designed by the government can solve this problem by recalibration of their requirements to be more accommodative of smaller farmers. Other initiatives such as the aBi model can work to get farmers access to guaranteed lines of credit from commercial banks.	Formation of farmers' associations and other unifying bodies Due to the limited market power of farmers in the aquaculture sector, farmers are often taken advantage of by traders and other market players. Organization and unity of farmers through the formation of farmers' associations would significantly raise their power in the market, enabling them to bargain for higher prices for their fish.	Ensuring regulation is properly implemented. The aquaculture and the Fisheries and Aquaculture Bill looks to update the regulations within the sector that were last updated in the 60s. The bill is on floor in the Parliament and looks like to pass. The implications of the Aquaculture Bill 2020 on exports cannot be fully predicted. There is a perception from the government that the law allows any manner of value addition such as removing scales, intestines and packaging, among others. However, industry insiders express a worry that it might harm the sector and there is a need for the government to address these legitimate concerns from the industry.
Impact	Over 67% of Ugandan production is exported. As a healthy and high-quality protein, farmed fish can contribute greatly to food security in the country, especially given reducing catches from wild fisheries. A domestic market also provides better opportunities for smaller farmers, who are unable to export directly themselves	Agricultural loan interest rates in Uganda range from 12% to 42%, with business loans ranging from 21 to 41% per annum. Smaller fish farmers are unable to access the agricultural loans, representing a 9% difference in interest rates. This is if farmers can access commercial loans at all.	On average, pond farmers receive 15% less than cage farmers, primarily due to their lack of market power in the value chain. This lack of market power is primarily due to low harvest volumes, which can be tackled by the formation of farmer groups.	At current over 67% of all farmed fish is exported. Legislation that would impact the ability of Ugandan fish farms to export would thus be highly detrimental to the development and status of this burgeoning industry.

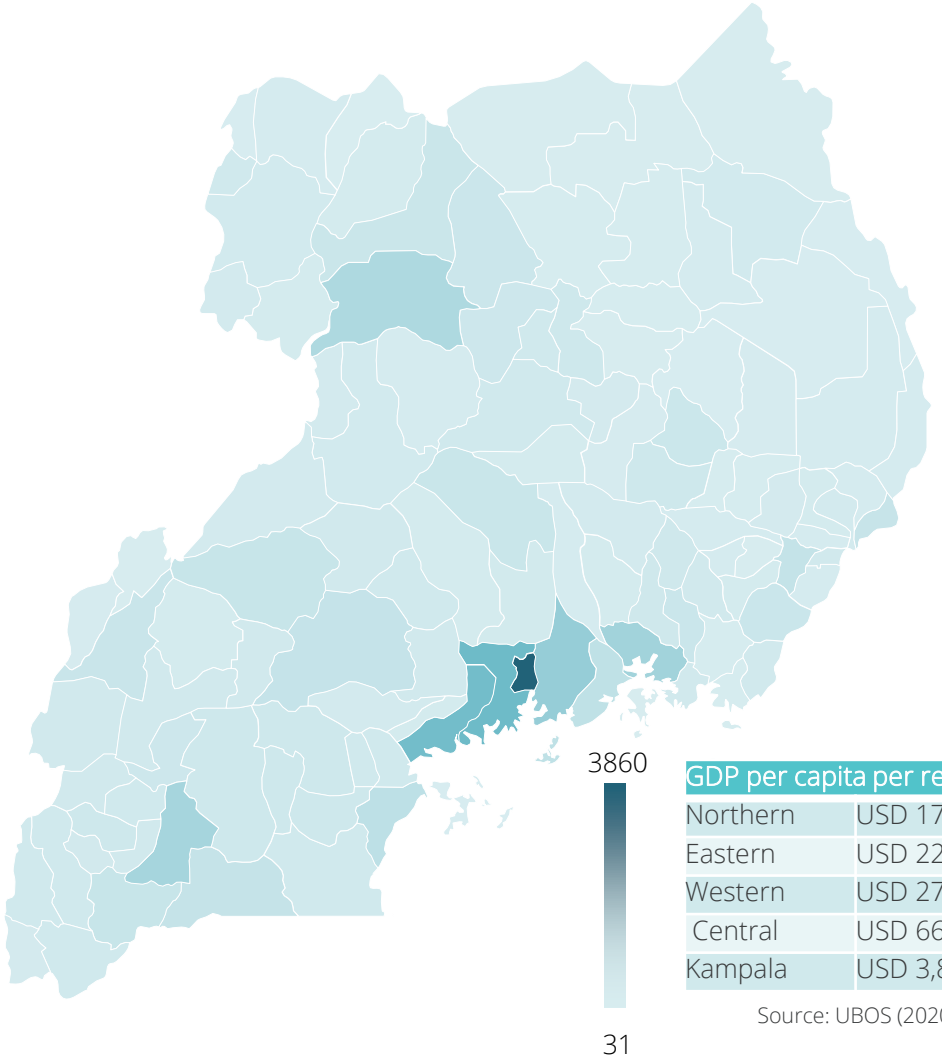
Overview

Uganda overview

A rapidly growing country with fisheries being a historically important sector

- The Ugandan population has been growing at a rate of around **3%** for the last decades. As a result, its population has increased from 24 million people in the year 2000 to **45.7 million people in 2021**. The population is expected to increase to a **100 million people in 2050**. This population growth is even more rapid in the cities, with **an annual urban growth rate of 5.2%**.
- The country is especially young. **48%** of the country is below the age of 15, with around 1 million people entering the job market each year.
- The GDP per capita in the country is 910 USD. Growth and economic activity are not equally divided across the country. As illustrated in figure 1, the Northern and Eastern regions are especially poor. The Ugandan economy grew by **2.8%** in 2019/20, a sharp decline from 6.8% in 2018/19. The decline can be attributed to the COVID-19 pandemic that led to a decline in economic activity in Uganda.
- Uganda is a predominantly agriculture-based economy, with agriculture, forestry and fishing contributing to **24% of the total GDP in 2020. The fisheries sector contributed 2.3% to Uganda's GDP in 2020.** The fisheries sector has a 5-year CAGR of 8%.
- Fish and fish products are the third highest value exports from Uganda after gold and coffee. In 2020, the total fish exports were worth USD 127.63 MN. However, this was a 28% decline from 2019 caused by reduced fish production and disruptions in transport from COVID-19 induced lockdown. The government has a target of USD 698 million worth of fish exports in 2024/25[2]. However, this income is primarily from wild-caught fisheries, not aquaculture.
- Local wild caught fish is an alternative to farmed fish, as are other forms of protein. For lower income groups, these are plant-based proteins, whereas poultry products are also increasingly becoming a popular alternative that is decreasing in price. In contrast, fish prices have been increasing in recent years. The competition from cheaper plant-based protein sources often intensifies during the harvest seasons of crops such as beans.

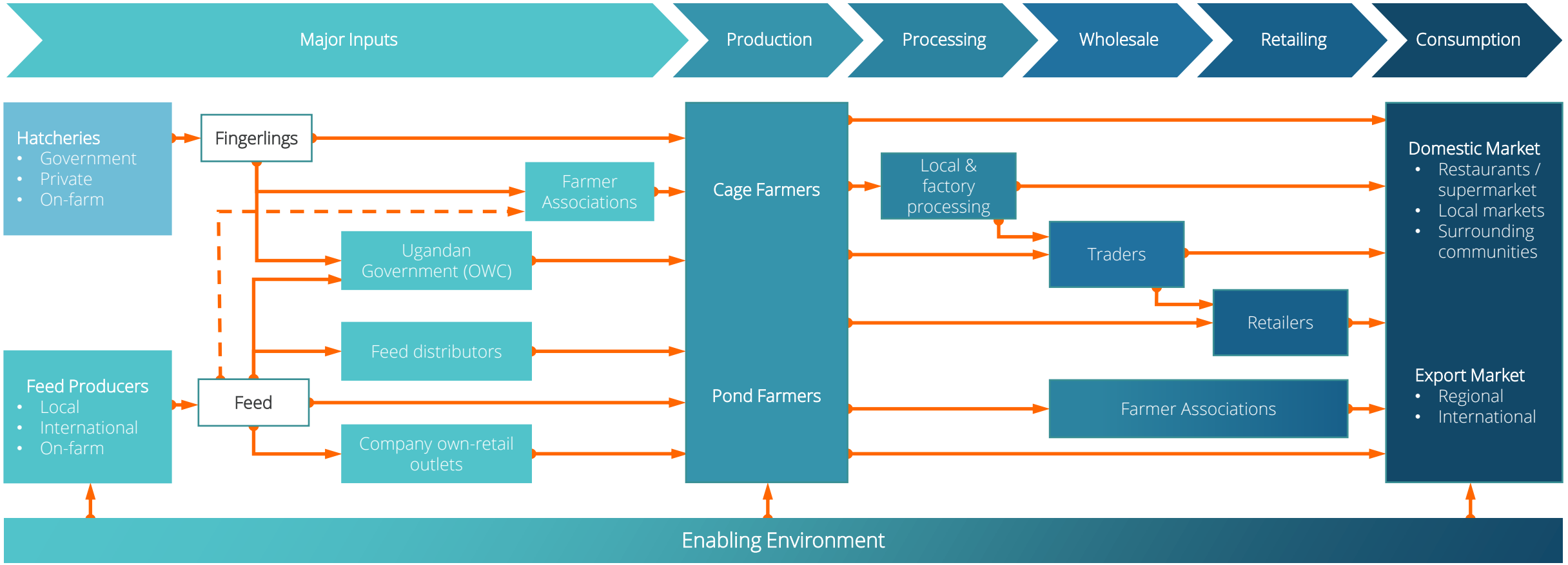
Uganda GDP per capita per district



GDP per capita per region	
Northern	USD 174
Eastern	USD 222
Western	USD 276
Central	USD 668
Kampala	USD 3,860

Source: UBOS (2020)

Aquaculture value chain structure overview



Overview of main players in the aquaculture value chain

Breeding[1]			Feed[2]			Farming		
Player name	Estimated annual production in fingerlings/year	Location of hatcheries (State/Province)	Player name	Est. Aqua feed sales (MT)/ market share in %	Locations of mills (State/Province)	Player name	Est. Production (MT.year) / market share in %	Locations of farms (State/Province)
Rocksprings Fish Farm Ltd	24 million fingerlings/year	Tororo, Eastern Uganda	Kaffiika Feeds	–	Distribution Centres are present in all regions the country	Yalelo	4,380 MT / 10%	Buikwe, Central Uganda
Kabeihura Hatchery	2.34 million fingerlings/year	Bushenyi, Western Uganda	Ugachick Ltd	3 MT/hr	Wakiso, Central Uganda	SON Fish Farm	2,200 MT / 5%	Jinja, Eastern Uganda
Bushenyi District Hatchery	0.1 million fingerlings/year	Bushenyi, Western Uganda	Afro Kai Ltd	1.8 MT/hr	Wakiso, Central Uganda	IG Invest (U) Ltd	1,095 MT / 2.5%	Jinja, Eastern Uganda
Matugga Fish Farm Ltd	9.6 million fingerlings/year	Wakiso, Central Uganda	Laguna	–	Namanve, Central Uganda	Agro Fish Farm	730 MT / 2%	Buikwe, Central Uganda
Interfish Ltd	0.12 million fingerlings/year	Wakiso, Central Uganda	Aqua Group	–	Kampala, Central Uganda	Nam fish farm	190 MT / <1%	Mukono, Central Uganda
Ssenya Fish Farms	6 million fingerlings/year	Masaka, Central Uganda				Asante fish farm	135 MT / <1%	Mukono, Central Uganda
Pearl Aquatics	3 million fingerlings/year	Wakiso, Central Uganda				Victoria treasures	100 MT / <1%	Wakiso, Central Uganda
Yalelo	N/A	Buikwe, Central Uganda				Rashid (L. Albert)	120 MT / <1%	Hoima, Western Uganda
SON Fish Farm	18-24 million fingerlings/year	Jinja, Eastern Uganda				King Fisher (L. Albert)	40 MT / <1%	Hoima, Western Uganda

[1] The indicated players in breeding all have one hatchery. As such, the stated amount is their estimated annual production. [2] Data on aqua feed sales was not readily available, but production capacity per hour for some of the key players is indicated. [3] Yalelo is still in a scaling period, increasing their volumes of fingerling production. As such, clear figures could not be established.

SWOT Analysis

Market roadmap for the sustainable development of the aquaculture sector

Strengths

- Ongoing projects by the EU and the UNDP to improve the aquaculture sector.
- Sector supported by the Ugandan government.
- Few permits & licenses involved in starting an enterprise.
- Large untapped market of feed, fingerlings and fish.
- Tax incentives for importing feed or any other inputs in the aquaculture sector.
- High margins, especially for large-scale cage farmers.
- Suitable climate and water bodies for further growth.
- Interest from the private sector in the industry, including from the Dutch private sector.

Weaknesses

- Limited technical knowledge.
- Low levels of income among most farmers which prevents them from using high-quality feed.
- Difficulty in accessing finance and insurance.
- Low levels of professionalism among most farmers.
- High dependency syndrome among subsistence farmers.
- Scarcity of quality feed ingredients locally.
- Low incomes of Ugandans which limit the consumption of fish.
- Preference for wild capture fish by consumers.
- Heavy government involvement in the value chain.

Opportunities

- Only a few large-scale hatcheries are producing quality tilapia and catfish fingerlings, offering opportunities to enable growth.
- Limited local feed producers and low quality of locally produced feed offer an opportunity to support growth with feed production investments.
- Growing local and international market for farmed fish.
- Farmers are exploring the possibilities of growing different species like mirror carp.
- Government of Uganda plans to support the aquaculture sector.
- Capacity building of farmers to improve their technical knowledge and understanding of the sector will lead to strong efficiency improvement.

Threats

- Competition from other cheaper sources of protein like plant proteins among locals.
- Competition from capture fisheries.
- Competition from cheaper sources of tilapia such as imported fish from China.
- Consolidation of market power in traders and brokers.
- Dependency on export market.
- Possible trade disputes and other political risks.
- Growing dominance of a few larger private sector players.

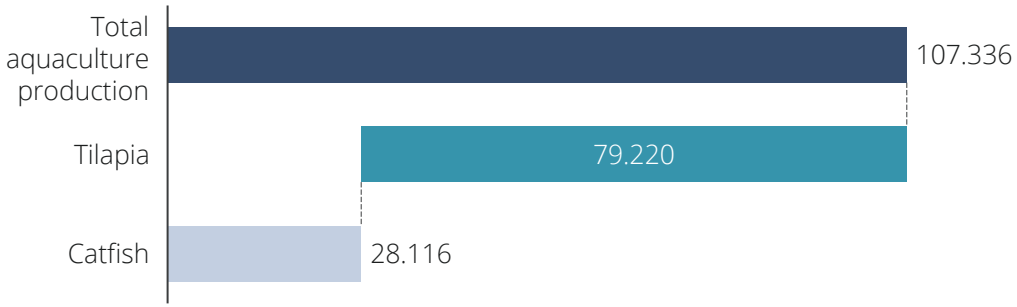
Sector status and growth

Market size overview

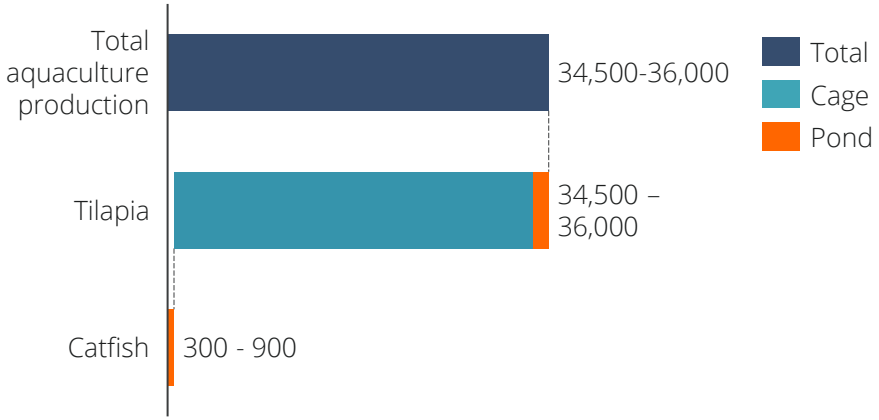
Total aqua production in Uganda in 2020 is estimated to be 34,500 to 36,000 MT. For 2021, the total production estimate is between 44,000 – 46,000 MT. Pond farming accounts for 2-6% of total production.

Total production of farmed fish, by source and species, in MT, in 2020

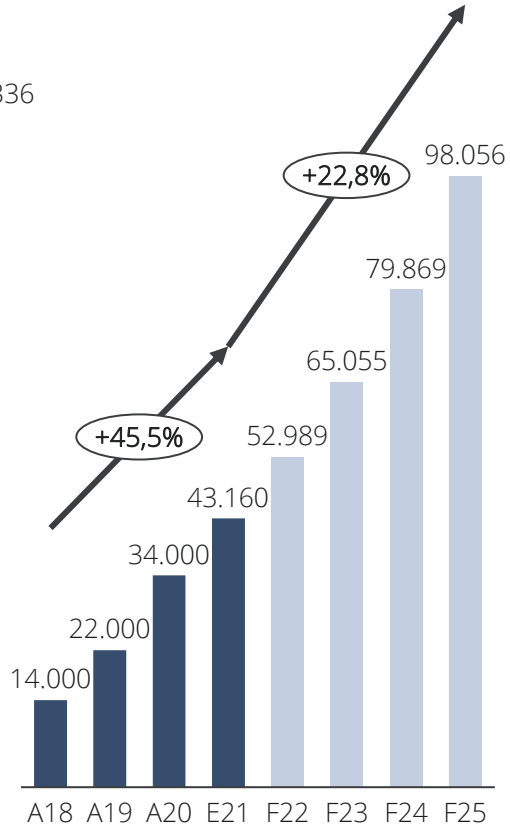
MAAIF estimates of aquaculture production in Uganda, in MT in (2020)[1]



Study estimates of aquaculture production in Uganda, in MT, in (2020)



Cage production development, historic and forecasted, in MT[2]



Remarks on species split per production system

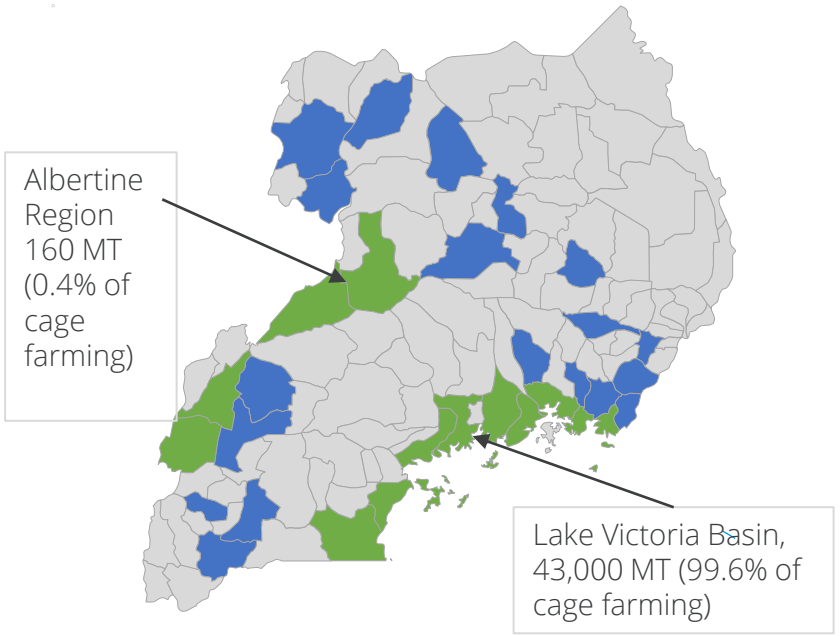
- Commercial cage production has been exponentially growing with a CAGR of 46% in the last three years, driven by the entry of international investors in the sector.
- Based on expansion plans of existing major players, notwithstanding political intervention, growth in cage farming for the coming years is expected to slow compared to previous years but nonetheless remain high overall. Given the capital intensive nature of cage farming, growth is likely only to originate from larger players, which also implies that small-scale farmers can only compete in ponds.
- Initial production projections by the industry organisation CCFA for 2021 have been 50,000 MT. These are reasonable given installed capacity. However, the increased costs of imported feed and limited availability due to COVID-19 have negatively affected production, leading to a production estimates for 2021 from cages of 43,161 MT.
- Pond farming has been highly promoted by the government through Operation Wealth Creation (OWC). Through this initiative, farmers are provided with fingerlings and starter feed for a period of 2-3 months. This has been one of the major drivers of new entrants into the market and currently drives growth. However, sustainable growth is constrained by the limited ability of the farmers to sustain feeding once the distributed starter feed runs out due to capital constraints.
- Due to structural challenges, pond farming is unlikely to substantially grow in the next years without fundamental long-term investment in capacity building and attitude-change of farmers. As a spin-off of the growth of the cage farming segment, pond farmers will likely benefit from better access to farming inputs.

Source: Research by Larive Group (2021). The figure of 2020 and 2021 is a best guess estimate, based on reporting by DFO's, CCFA and internal calculations. More information on market sizing methodology can be found in Annex 1. [1] *MAAIF Annual Performance Report 2019/20* [2] Data from CCFA and adjusted by Larive-Asigma.

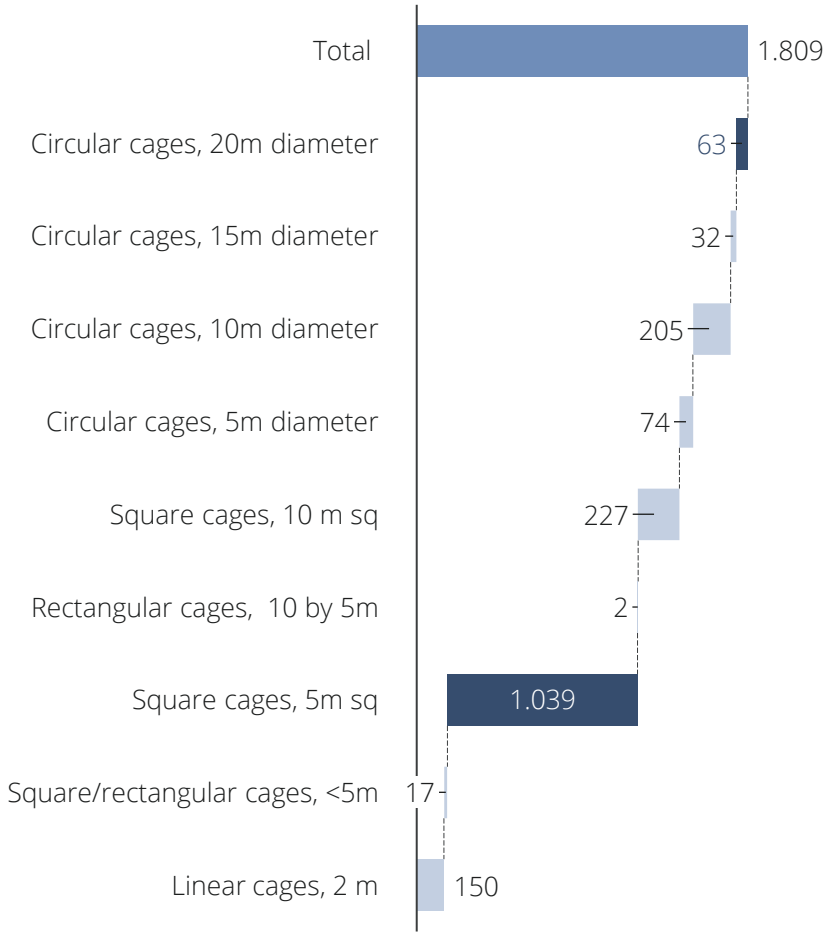
Aquaculture production

Fish farming is primarily concentrated around the Lake Victoria basin.

Regions where aquaculture is practiced, Total minimum number of confirmed cages on Lake Victoria, per cage size, in number of cages in 2021[1]



Total minimum number of confirmed cages on Lake Victoria, per cage size, in number of cages in 2021[1]



Remarks on cage farming

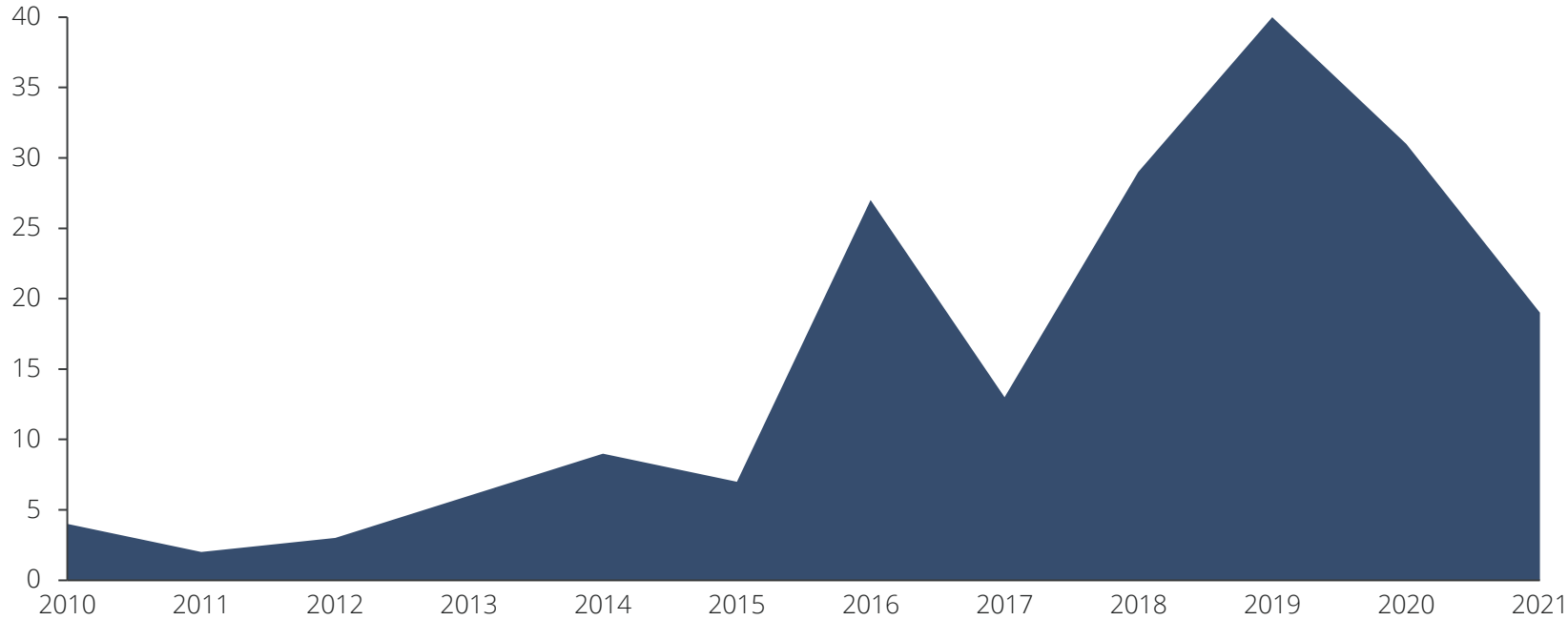
- Officially, 25,000 ponds and 5,000 cages are registered in the country. However, many of these are not in functional use. This is especially true for pond farms, which are often started under support programs but abandoned after this support ends
- In terms of production capacity, in one circular cage of 20 meter diameter, the same volume can be produced as in fifty 5 meter square cages.
- Many of the cage farming operations are aimed at the export market, where relatively higher prices for tilapia can be obtained and high volumes can be directed towards.
- Outside of Lake Albert and Lake Victoria, no notable fish farming is taking place. Other lakes, such as Lake Kyoga or Lake Bunyonyi are unsuited for fish farming due to their shallow nature or temperatures.
- Growth in cage farming in Uganda has been driven by a few large-scale commercial farms established especially around Lake Victoria. These have been investments from foreign investors who entered the market between 2018-2020.
- The 2019 flooding of the Lake Victoria Basin has led to many smaller cage farmers exiting the sector, and consolidation of the industry.

Note:[1]Research by Larive Group (2021), based on available satellite imagery. Please note that the above number of cages are likely underreported, as at the linear cage level, the satellite model was able to discertain individual cages accurately. With industry experts state more cages are likely to in terms of linear cages and square cages segment.

Sector development – cage farming

The aquaculture sector in Uganda has seen many entrants in the last decade

Total number of new cage farmers started per year in Uganda[1]



	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Uganda	4	2	3	6	9	7	27	13	29	40	31	19

Observations, Business operators

- The aquaculture sector in the Lake Victoria basin is relatively new. Only substantial activity of new entry has taken place in the last decade after adoption of cage farming.
- Around 89% of the operators started their business since 2015.
- There are a few fish farmers, such as Source of the Nile, who have started prior to 2010. However, these only have scaled in recent years as well.
- In general, industry insiders describe the business cycle of aquaculture operators as a boom and bust cycle of around five years.
- Growth of new entrants has stabilized in recent years, most likely due to the pandemic. However, some of the existing fish farmers operators are expanding significant, potentially signalling a maturing sector.

[1]Information based on census data prepared for the FAO by Lattice Aqua (2021). Total number of farmers is likely to be underreported as not all farmers were interviewed in Uganda.

Future outlook for pond and cage farming

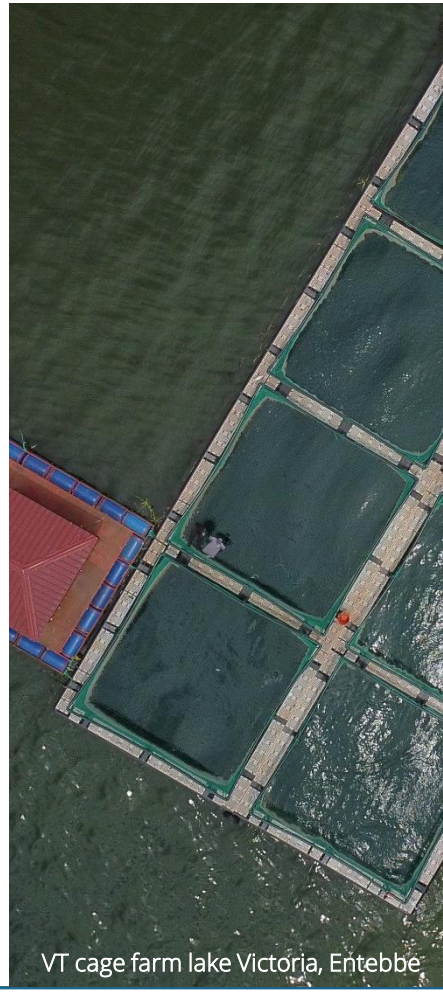
Growth in cage farming has been driven by large scale commercial farmers whereas growth in pond farming is driven by government initiatives

Pond

- Pond farmers struggle to obtain a good price for their fish because of stiff competition from cage farming and wild capture. Farmers reported knowing at least two farmers who have closed their pond farms in the last two years.
- There is a considerable number of pond farmers exiting the sector after one first harvest cycle, mainly due to poor technical performance and high feed costs, a trend that can be observed throughout the country. Many people consider fish farming as an additional activity to supplement their food and income sources, in which they limitedly invest and combine with other farming to supplement income.
- The current utilization level of ponds is poor, with limited production per pond. Increased production intensity from ponds could be achieved by the adoption of commercial feeds, but high costs of feeds are deterring farmers. In general, pond farmers report very high feed prices to be the main constraint to growth.
- Professionalism is highly lacking in the sector, with low skills levels, low commercialization levels and a high dependency on donors for free inputs.

Cage

- There is a growing movement of environmentalist and fishermen towards cage farming, which have contributed to security problems and vandalism of cages. If such movements gain traction, government intervention could see restrictions to cage farming.
- Government intervention is a risk to sector development. The new Fisheries and Aquaculture Bill requires all exports of fish to have undergone some form of processing, which includes only gutting or scaling. Industry stakeholders have expressed their concern, as a considerable proportion of production is exported, and regional preference is for fresh fish. Moreover, border closures and other unexpected political measures negatively impacting trade pose a significant risk to sector development, as also exemplified in other value chains.
- Cage farming is currently completely dependent upon imported feed, making it susceptible to supply shocks and highly influenced by the increased prices of transport due to COVID-19. Domestic production of fish feed could be a major stimulus to development, if these feeds can be competitive given the high costs of inputs.
- The capital-intensive nature of current international players in cage farming also implies that small-scale farmers can only compete in ponds. Growth is thus only likely to come from larger investors, which can be both foreign as well as wealthy Ugandans.



VT cage farm lake Victoria, Entebbe

Future outlook – Considerations for sustainable growth

Long-term sustainable development of the sector requires mitigation of possible risks

Avoiding resource conflicts

- Lake Victoria is a shared public resource, used for different economic means. It is also of critical importance to fishermen, tourism and for other livelihood generating activities. Unregulated growth and limited community participation can lead to conflicts.
- Such conflict has been observed in Kenya, where cage farmers do not need to consult local communities prior to starting operation.[1]
- Adequate regulation that ensures community participation and consultation is thus crucial for long-term sustainable growth. Zoning, the designation of specific areas of the lake to specific economic activities, is an important tool to guide growth in the future. Zoning of Lake Victoria is executed as part of the EU-EAC True Fish Farming Story in Lake Victoria Basin (EU-TRUEFISH) project.

Equitable growth and development of small and mid-size businesses

- Recent growth has been primarily driven by foreign, large-scale investments. These major companies are able to integrate and overcome crucial value chain constraints such as a lack of quality feed and fingerlings in-house.
- However, for equitable growth of the sector to develop, it is essential that crucial support services are also available for smaller farmers. Suggestions how have been provided in this document from page 65.
- In Zambia, a divergence occurred, where only large fish farms have been able to develop and sustain. Egypt did manage to involve smaller to medium size businesses. This was achieved by providing essential support services at aqua parks.
- With decreased wild population and increased competition from farmed fish, fishermen are also at risk of losing their livehoods. These form a key group to target for involvement in the aquaculture value chain to ensure local communities benefit from sector growth.

Impact of aquaculture development on domestic raw materials availability and demand

- The growth of the aquaculture sector will increase the need for animal feed and associated raw materials. Fish is the most efficient form of animal protein production, but nonetheless requires feed and feed inputs. At current, there is already high competition for raw materials such as maize and fish meal in Uganda.
- Increased demand for raw materials due to increased fish production can lead to competition with human consumption, for example when using mukune as an ingredient for fish meal and fish feed production.
- It is thus critical to increase the overall production of raw materials in Uganda, as well as ensure that the feed ingredients used are not in direct competition with human consumption. This can be achieved by including alternative feed ingredients from current waste streams such as brewers yeast in feed formulation or using soy cake.

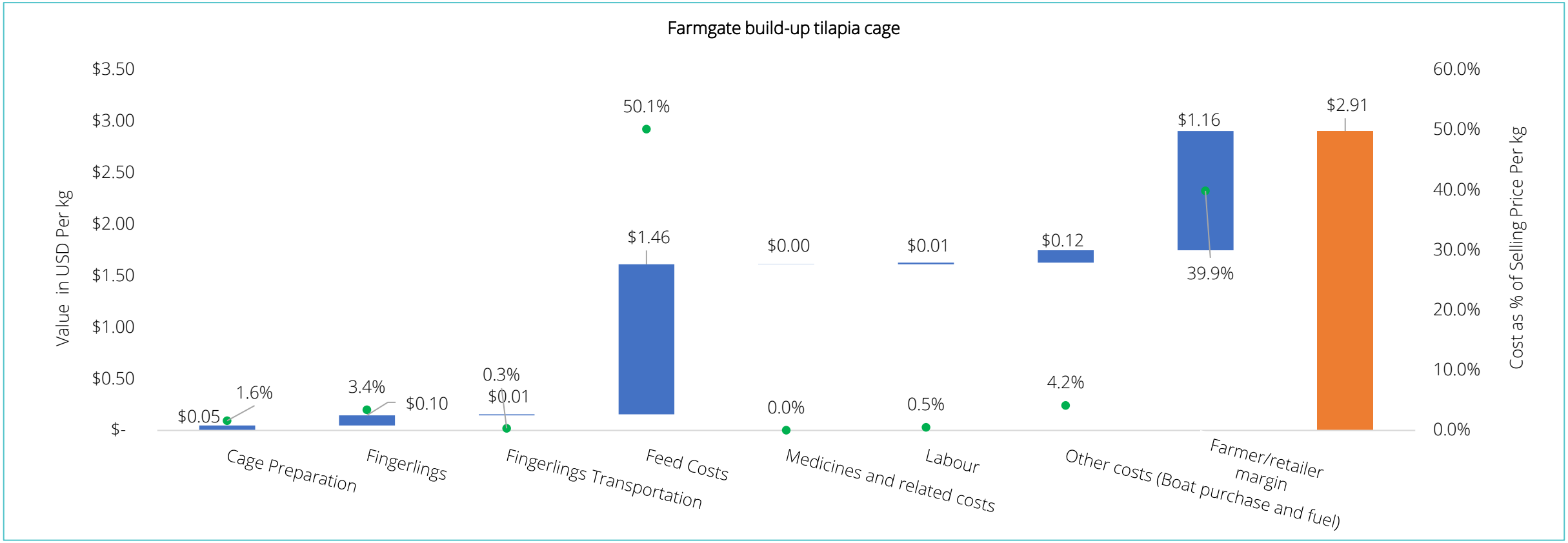
Environmental impacts

- Fish farming can lead to negative environmental impacts, if it is not well-managed and poor farming practices are applied. Key risks associated with cage fish farming are eutrophication, escapees of invasive species and disease transmission.
- To avoid eutrophication, it is important that cages are only placed in suitable locations with sufficient depth and water flow as well restrictions on the overall number of cages installed based on the carrying capacity of the water body. Zoning is critical to manage this risk and is already being addressed by the EU-TRUEFISH project.
- Regional monitoring systems of diseases such as TiLV is also crucial to long-term sector health.

[1] https://www.standardmedia.co.ke/business/financial-standard/article/2001418101/cage-fish-farming-roils-the-waters-of-regional-lake. [2] Kaminski et al. (2018). Commercialization and upgrading in the aquaculture value chain in Zambia. https://wwwnce/article/pii/S0044848616311607 [3]Obwanga et al. (2018). A Comparative study of aquaculture sector development in Egypt, Ghana and Nigeria: Insight and Lessons for Kenya. 3R Research Report 006.

Value chain cost analysis – cage farming

Cage farming is more profitable than pond farming with farmers making 39.9% profit margins.

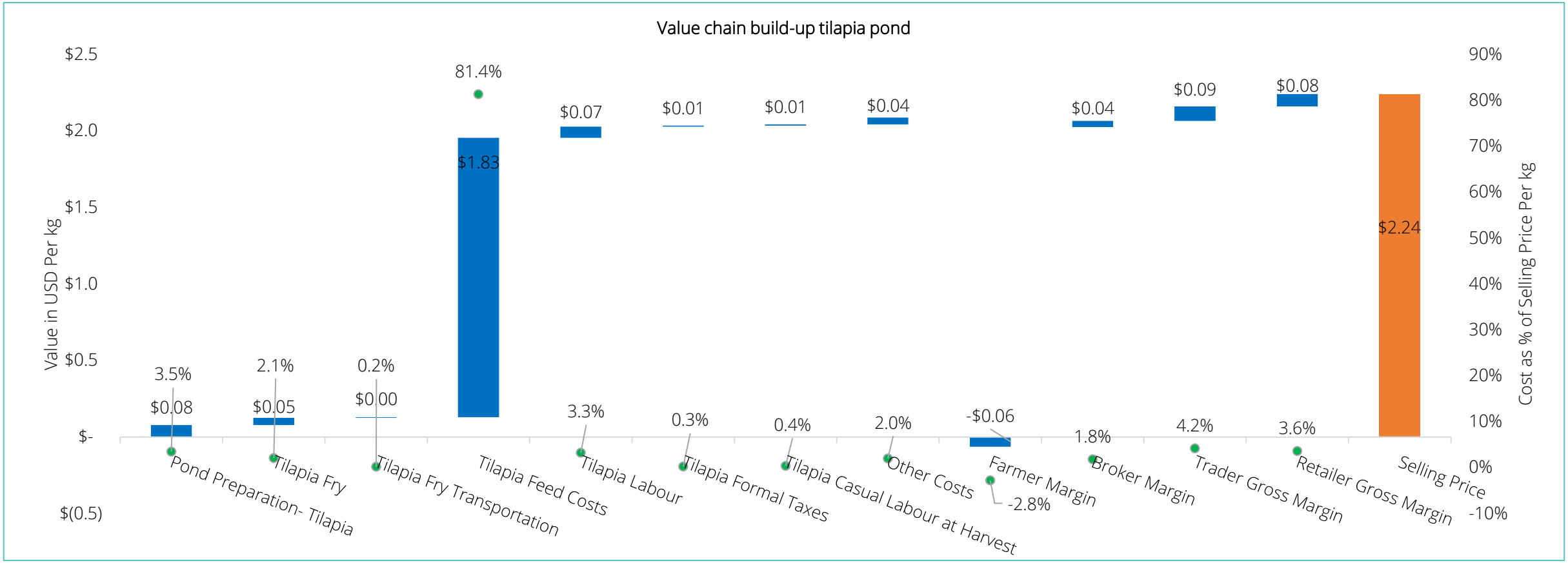


- Large scale cage farmers such as Yalelo and SON fish farm directly import their own feed at a blended price of USD 0.91 per kg of feed. At an FCR of 1.6, this translates to a cost of USD 1.46 of feed needed to produce one kilogram of Tilapia in a harvest season. The large-scale cage farmers have their own integrated retail outlets where they sell at premium retail prices at higher margins. Prices used are average retail prices of main integrators.

Note: Assumptions for the value chain analysis modelling can be found in the Annex. Cost of fingerlings was determined by data from interviews. First, regarding the total costs incurred on fingerlings in a harvest season was established. Total costs for fingerlings per harvest was divided by total harvest weight to assess pricing. Additionally, dominant hatcheries like Rocksprings were interviewed who shared their fingerling prices, which were used as reference.

Value chain cost analysis – pond farming

Large scale pond farmers are making margins of -2.8% of the final selling price

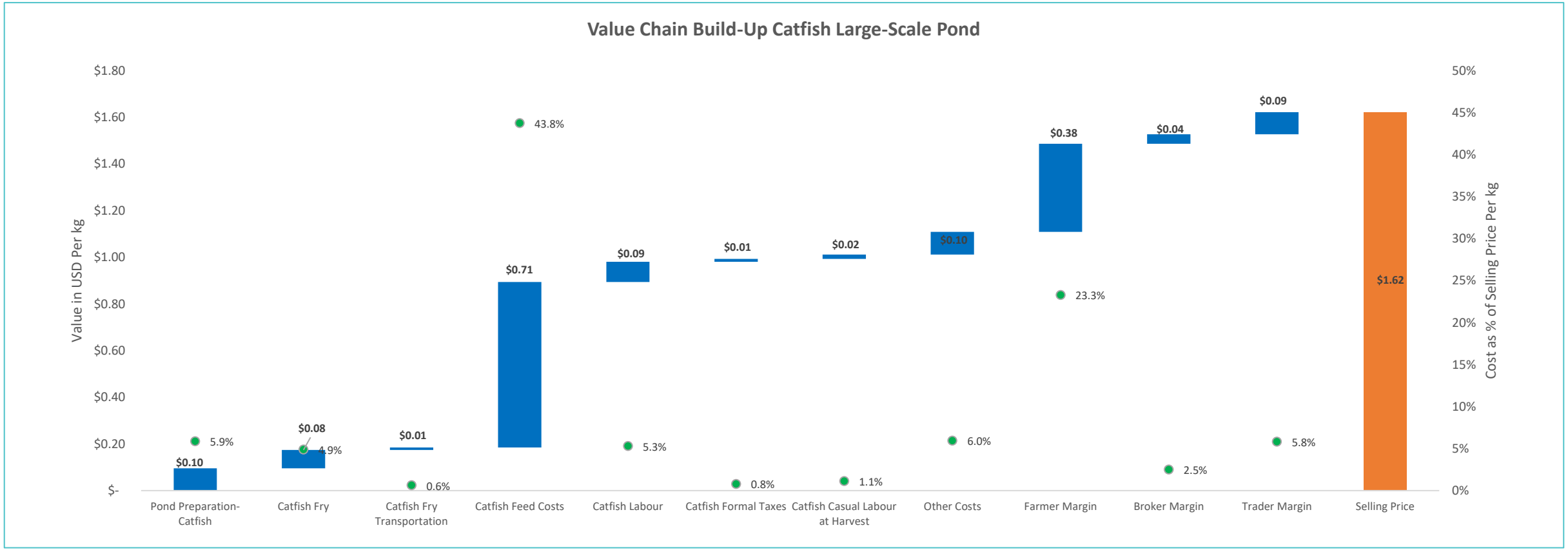


- Large scale pond farmers rely on imported commercial floating feed from suppliers such as Koudijs and Laguna bought from local distribution centres and retailers. The blended average price per kg for feed from these suppliers is USD 1.21. Based on an average FCR of 1.51, a farmer spends at least USD 1.83 on feed per kg of biomass produced in a harvest season. Commercial pond farming is generally seen as not profitable in the country due to high feed prices and poor farming practices.

Note: Assumptions for the value chain analysis modelling can be found in the Annex.

Value chain cost analysis – Small-scale catfish farming

Catfish farming in ponds obtain solid profit margins of about 23.3% % for the farmers mainly because they utilise alternative feed sources such as blood meal. However, total production from such ponds is limited due to low production intensity.

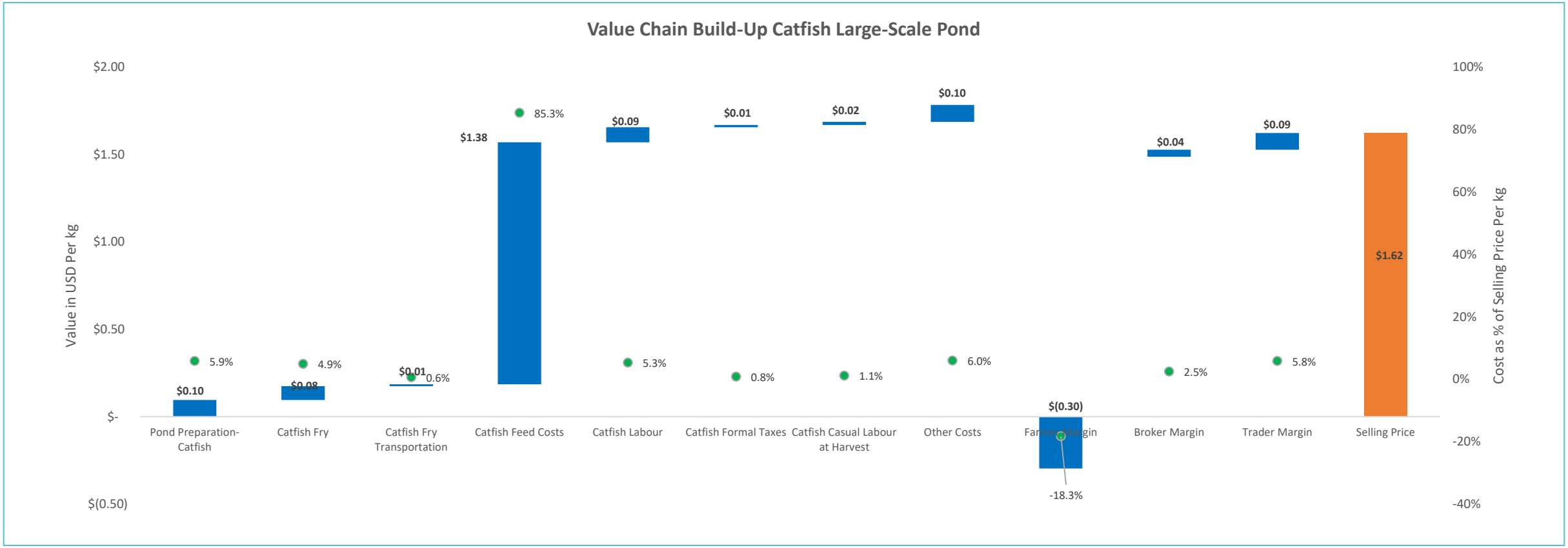


- Typically, catfish farmers only use commercial feed for three out of the ten months of the harvest cycle. For the remainder of the cycle, farmers rearing Catfish in a monoculture setting rely on alternative feeding means such as blood meal and chicken intestines. Farmers that practice polyculture only feed the Tilapia in the pond and leave Catfish to also feed on Tilapia fingerlings.

Note: Assumptions for the value chain analysis modelling can be found in the Annex.

Value chain cost analysis – Catfish – Scenario if only fed commercial feed

Commercial catfish farming, requiring higher production intensity, requires commercial feeds. Catfish farmers make margins of -18.3% of the final selling price if they would only rely on commercial feeds, demonstrating current need for mixed feeding strategies



- In a scenario where a catfish farmer uses commercial feed for the entire duration of the harvest cycle, they incur losses of 18.3%. Farmers however only use commercial feed for the initial three (3) months and rely on alternative feeding means for the remainder of the cycle.

Note: Assumptions for the value chain analysis modelling can be found in the Annex.

Impact of COVID-19

COVID-19 reduced the margins earned by fish farmers in Uganda

Feed

- COVID-19 has led to a general increase in feed prices.
- Commercial cage farmers used to import 1 MT of feed at USD 710-715 before the COVID-19 pandemic but this has now risen to USD 910 per MT of feed.
- During the lockdown, there was scarcity of imported feed on the Ugandan market resulting from the disruption in transport.

Fish production

- Most farmers delayed their harvests due to a fall in fish prices.
- Farmers reduced their investment in aquaculture due to a reduction in overall incomes resulting from the reduced economic activity during the lockdown.

Fish prices

- The average price of tilapia was UGX 8,000 (USD 2.16) per kg before the COVID-19 pandemic. This fell to approximately UGX 7,500 (USD 2.03) per kg during the lockdown which reduced farmer margins. Fish prices have now stabilized and risen back to an average price of UGX 8,000 (USD 2.16) per kg for tilapia.
- The demand for fish reduced due to a fall in incomes earned by consumers. Demand was also affected by the reduction in exports to world markets1.

Export market

- Before the COVID-19 pandemic, fish at the Busia market was exported to Kenya by bicycles. The bicycles would take the fish to Kenya where it would then be loaded onto buses and trucks and then delivered to the different buyers.
- When the borders were closed during the lockdown, Kenyan exporters started using a truck that would be loaded at the Busia market and deliver the fish directly to the Kenyan buyers. The truck can carry between 2 and 5 MT of fish in each trip.

Local market

- Uganda has had two nationwide lockdowns since the outbreak of COVID 19. The cumulative economic effects of the ensuing lockdowns have trickled down to consumers who have had their disposable income reduced. Fish which is considered by most as a luxury item has had to take second place to other food sources such as beans.
- Local markets that usually sell fish had to close to ensure safe social distancing measures are adhered to. This meant that fewer traders are sourcing fish from farms and fewer buyers are coming to the market.

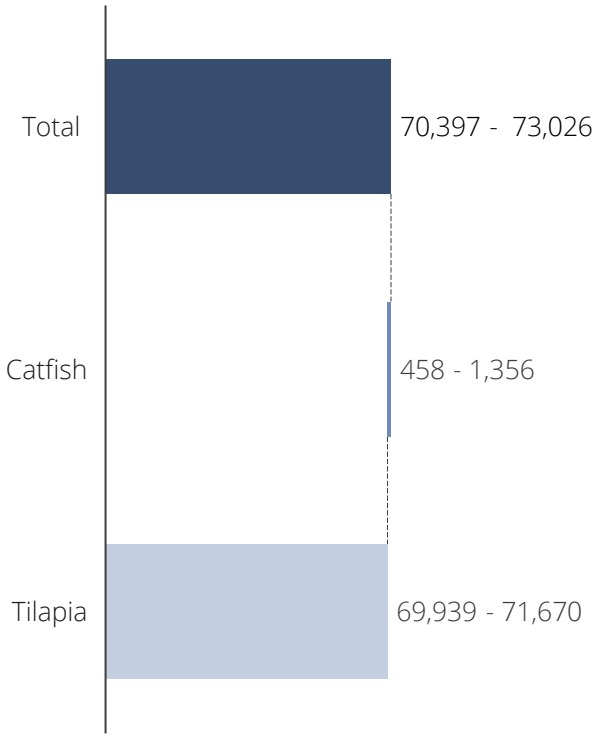
[1]*Chris Mukiza. 2020. Impact of COVID-19 on Key Economic Activities in Uganda and Suggested Policy. -* Impact-of-COVID-2019-On-the-Ugandan-Economy692020.pdf (ubos.org)

Feed

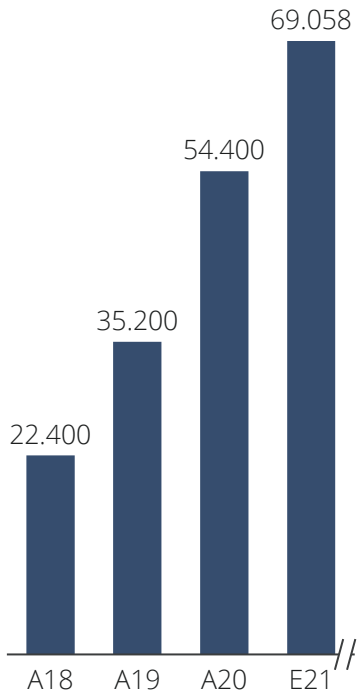
Aqua feed market – volumes and growth

Cage farming is driving growth in feed consumption in the sector, but is completely reliant on imported feeds

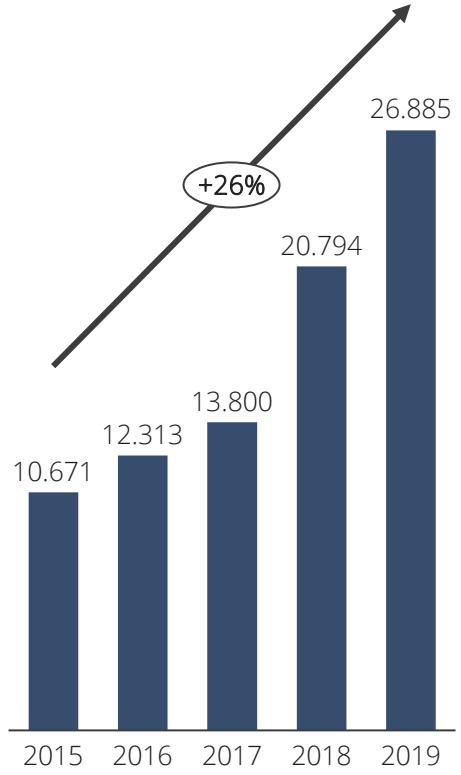
Commercial feed market, per species, in MT, based on reported FCR.



Growth in commercial feed usage in cage farming, historic and estimated, in MT, based on reported FCR[1].



Total official imports of fish feeds, in MT, from 2015 to 2019



Remarks on feed market

- Cage farming is driving the total growth in uptake of commercial feeds in Uganda. Cage farmers exclusively use floating fish feeds, combined with some supplementary feeding by some actors.
- Uganda is an importer of fish feed. The official quantity of imported fish feed into Uganda has consistently risen by a CAGR of 26% between 2015 – 2019.
- The high year-on-year change in feed imports recorded in 2018 corresponds with the influx of international investors into commercial cage production in the same year. These import feed directly. With no notable domestic fish feed producers (yet) and increased demand, feed imports are expected to continue to grow.
- Domestic fish feed producers such as Ugachick are reported to be considering to exit the industry. They have failed to compete in terms of quality and farmers have switched to imported feeds. On the other hand, Afro Kai is another local feed supplier that won the bid to provide starter feed under the Operation Wealth Creation (OWC) program. Farmers report the feed made by Afro Kai to be of fairly good quality.
- Other small-scale feed producers such as Nsava Feeds have scaled down their fish feed production citing low quality ingredients. Ugachick reported to import all off its main feed ingredients due to a lack of domestic quality ingredients.
- Local feed manufacturers tend to use lower quality feed lines imported from China. These do not produce fish feed to the quality demanded on the local market, and pose an opportunity for the Netherlands to engage in.

Source: Research by Larive Group (2021). Data for imports of 2020 were not available at Ugandan Customs reportedly due to internal reorganizing of the reporting systems. Note[1]: Used FCR for conversion is 1.6, based on assessment of industry experts with detailed insight in the practices of cage farmers on Lake Victoria. Reported FCR by interviewed farmers themselves state an FCR of 1.5. 1.6 has been used as it was deemed to be a more reliable metric.

Feed market landscape

Local feed production is constrained by high prices, quality inputs and unreliable production.

- **Few domestic producers:** Uganda has few domestic fish feed producers. The two prominent fish feed producers are Ugachick and Afro Kai Ltd, with smaller feed producers like Nsava Feeds and Sante fish feeds. However, Ugachick has been scaling down its fish feed production after numerous complaints about its quality and stiff competition from imported commercial feed. **Investment in quality domestic feed production is critical to support sustainable sector growth.**
- **Quality:** Majority of the farmers associate domestically produced feed with low quality. Farmers also quote inability to verify the protein content of domestic feed. From the field, farmers exhibited an increased sensitivity to the quality of fish feed, domestic players have failed to maintain consistent quality due to the high costs of sourcing protein sources and have in turn ended up compromising on quality. For some of the domestically-supplied feed, the ingredients such as silver fish ("mukene") are highly adulterated i.e. it is frequently mixed with sand to increase their weight.
- **Production capacity:** Availability of quality feed was cited as the biggest challenge among fish farmers. Currently, more than 70% of the fish feed used is imported which points to inadequacy in domestic feed production. Some of the domestic feed producers reported that they currently lack the capacity to produce enough quality feed to meet local demand.
- **Quality ingredients:** Domestic feed millers indicated that they have difficulties of sourcing quality protein sources domestically and have resorted to import them entirely. Alternative high protein feed sources such as black soldier fly larvae are being piloted but are also constrained by the high price attached to them.
- **Community-based production:** Most people who start community-based feed production businesses reportedly end up exiting due to failure to sustain production. The drop off is mostly because the cost of production is very high, with over 60% of the total production cost of a MT of feed spent on sourcing plant and animal protein. To off-set the high production costs, feed producers tend to compromise on feed quality which diminishes the demand of their feed among farmers.
- **On-farm feed production:** Small-scale farmers resort to mixing their own feed on the farm. Some that have feed mills produce for own-farm consumption. Own farm production is supplemented with imported feed products due to inconsistences in local production. Farmers resort to on-farm feed production because:
  - Commercial feed prices are high.
  - The quality of feed on the market is unreliable.
  - The supply of feed is unreliable.

Community feed mill at the biggest pond farm in Luwero, Central Uganda

Breeding

Fingerling market landscape

There is a severe lack of tilapia and catfish fingerling producers for third-parties.

- Most pond farmers source both tilapia and catfish fingerlings from private, third-party hatcheries. The average size of a tilapia fingerling is 2 grams. A 2-gram tilapia fingerling is sold at UGX 200 (USD 0.05). Catfish fingerlings are bought at UGX 300 (USD 0.08).
- Some farmers get their fingerlings from government hatcheries such the Kajjansi hatchery which is under the Aquaculture Research and Development Centre, (ARDC).
- Farmers who lack hatcheries mainly rely on fingerling suppliers in the surrounding communities. Large scale cage farms such as Yalelo and SON fish farm have their own private hatcheries where they produce fingerlings for their own consumption.
- Most on-farm fingerlings are of low quality because of limited technical knowledge in the establishment and operations of the hatcheries. Some farmers use rudimentary approaches such as digging shallow holes to do the on-farm breeding.
- Some farmers are unable to farm catfish because they are unable to access quality fingerlings.
- There are a limited number of hatcheries providing fingerlings for third-party, smaller farmers. Large-scale hatcheries include Rocksprings Fish Farm, SON Fish Farm, Matugga Fish Farm, Pearl fish farm and Ssenya fish farm. Among these, only Ssenya fish farm produces catfish fingerlings. However, these cannot meet demand and general quality is not high.

District hatchery in Bushenyi, Western Uganda

Leading hatchery operators in Uganda

Hatchery	Species	Third-party sales	Private	Size (grams)	Price (USD)	Estimated annual production (Millions)
Rocksprings fish farm	Tilapia	√		1	0.03	24
Kabeihura fish farm	Tilapia	√	√	0.5 - 1	0.04	0.96
	Catfish	√	√	3 - 5	0.08	1.38
Bushenyi district hatchery	Tilapia	√		1.1	0.03	0.1
Matugga fish farm	Tilapia	√		-	-	9.6
Inter fish farm	Tilapia	√		-	-	0.12
Ssenya fish farm	Catfish	√		-	-	6
SON fish farm	Tilapia		√	-	-	18 – 24
Yalelo	Tilapia		√	-	-	-
Pearl Aquatics	Tilapia		√	-	-	3

Profile of key hatcheries

Fingerlings are scarce as there are only a few hatcheries operating

Rocksprings Fish Farm Ltd

- Rocksprings is a privately owned tilapia hatchery in Tororo district, Eastern Uganda. It has been in existence since 2011 and is one of the largest hatcheries in Uganda.
- Rocksprings has been in existence for 10 years and currently boasts over 65 ponds, which include breeding, conditioning, treatment and grow-out ponds.
- Rocksprings has an annual production of over twenty four million fingerlings, which are sold to clients all over Uganda. Each 1g fingerling is sold at a price of UGX 110 (USD 0.031).
- The hatchery currently imports its own feed directly from Zambia.

Kabeihura hatchery

- Kabeihura hatchery has been in existence since 2000 and is run as part of an integrated Kabeihura Mixed Fish Farm in Bushenyi district. It is the largest hatchery in Western Uganda and serves the entire region. Farmers who don't get their fingerlings from Kabeihura travel as far as Tororo in Eastern Uganda or Matugga and Entebbe in Central Uganda to get high quality fingerlings.
- Kabeihura produces an estimated 960,000 tilapia and 1,380,000 catfish fingerlings annually. The tilapia and catfish fingerlings are sold at USD 0.04 and USD 0.08 respectively at average sizes of 0.5 – 1 gram for tilapia and 3 – 5 grams for catfish.

Other hatcheries

- Bushenyi district also boasts a district hatchery that produces 100,000 (1.1 gram) tilapia fingerlings annually that are sold at a subsidised price of USD 0.03 each.

Rocksprings Hatchery in Tororo, Eastern Uganda

Tanks for breeding Catfish in Western Uganda

NARO institute (2021)

Farming

Production system overview

Earthen ponds are the predominant production system in Uganda in nearly all districts but cages produce more volume.

	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 ssurrounding communities.	Surrounding communities, through local auctions and to traders.

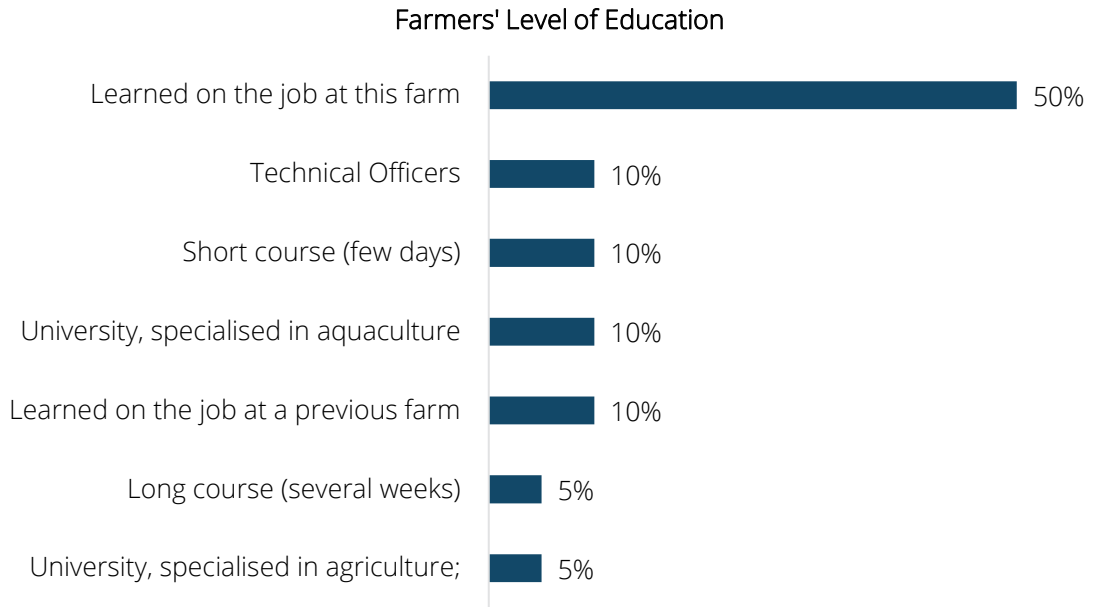
Small-scale fishponds in Lira, Northern Uganda

A large-scale pond farm in Bushenyi, Western Uganda

Professionalism of farmers

Low levels of professionalism among most Ugandan pond farmers

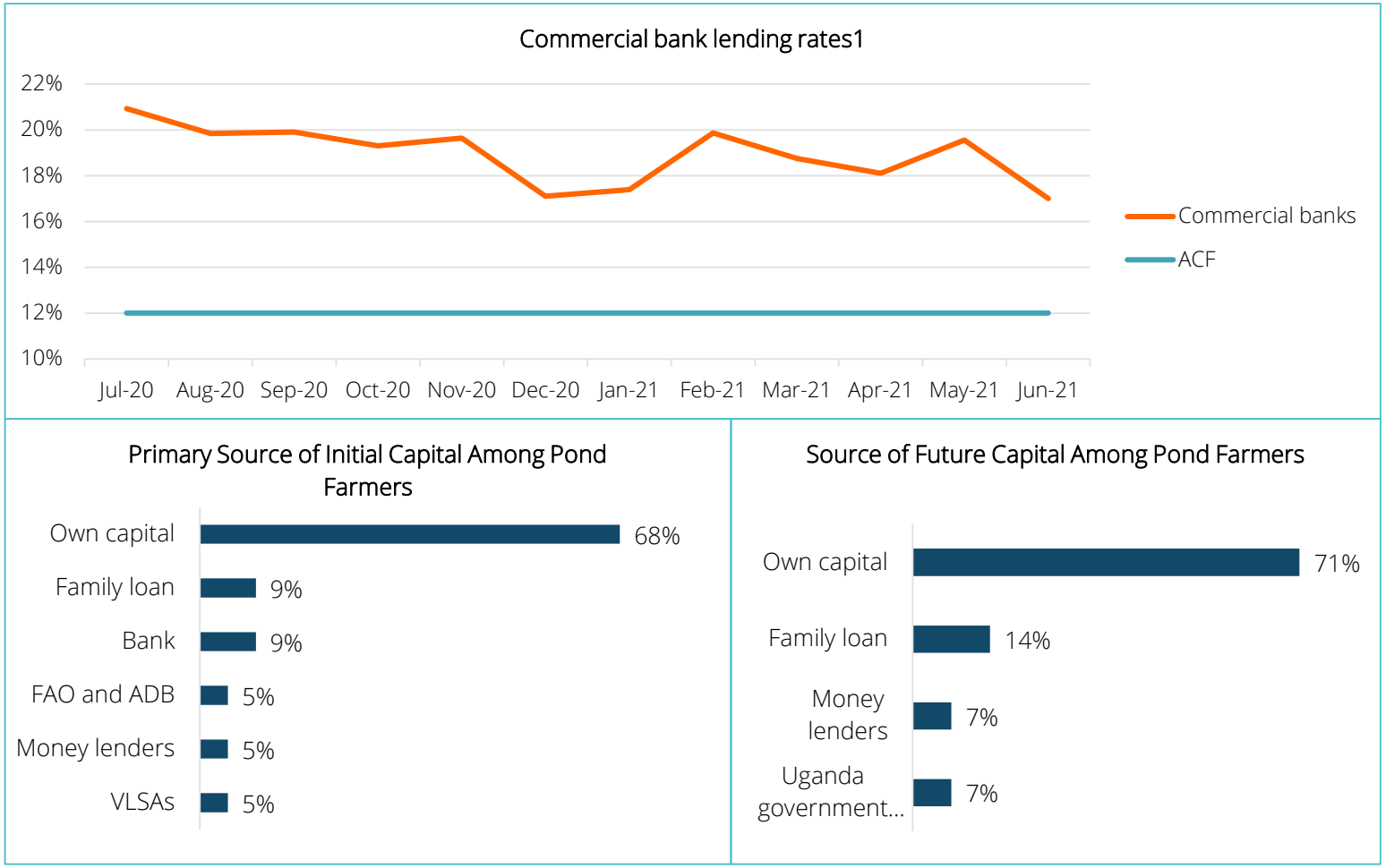
- Education can be used as a proxy of pond farmers' level of professionalism. Majority of the farmers interviewed have learned on the job with the aid of Technical Officers. A few commercial farms employ full-time technical personnel with training in aquaculture. These farms have thrived and have realised increased production.
- High levels of professionalism can be evidenced in the large-scale segment of both cage and pond farmers. This segment of farmers have shown adherence to commercial feed usage, hiring of technical staff and proper record keeping. Other qualifiers of professionalism such as water quality testing and biosecurity are still severely lacking. In most districts, water testing equipment is available at a district level though farmers are generally unaware of the parameters that are important to ensure increased production. Large scale pond farmers tend to be more professional with practices such as hiring qualified farm managers to run their farms. The small-scale category of farmers have shown overreliance on government initiative such as OWC for fingerlings and feed, a model that is unsustainable in the long run.
- Water quality testing and biosecurity measures are also important in determining the professionalism of a farmer. While 73% of farmers test their water quality, field data showed that only about 50% of them applied any biosecurity measures. Water quality testing is left to the Technical Officers in the districts that possess water quality testing equipment. As such, it is only done on occasion, indicating low level of professionalism. Some programs such as PESCA have helped through provision of testing equipment to model farmers in certain districts such as Masaka and Mbarara. Some of the visited districts did not have water testing equipment and as such, they did not conduct any water quality tests.
- The major bottlenecks in pond farming such as poor-quality feed usage, limited water quality testing and biosecurity measures are all an underlying result of limited technical knowledge. This poses a significant gap that must be bridged for pond farming to thrive. Efforts should be channelled towards capacity building to instil farmers with the basics of aquaculture, a move that will increase professionalism among farmers. This will result into increased aquaculture production and feed usage.



Source and cost of finance

Pond farmers mainly use their own capital in the operations of their farms

- 68% of pond farmers started their pond farms with their own capital. 71% of pond farmers aim to expand their operations using their own capital and returns from the current activities.
- Cage farmers are either financed through foreign investment and debt, use own capital or front other owned business to acquire loans to use for their fish farming enterprise.
- There is a general fear of debt financing especially from banks among pond farmers because of the high interest rates and subsistence nature of their farming activities. Only 9% of traders started their pond farms with loans from commercial banks.
- Banks are generally wary to lend money to fish farmers due to the perceived high risk.
- Uganda has the highest commercial bank lending rates (average of 18.95%) in East Africa. Kenya has an average lending rate of 12% and Tanzania's average lending rate is 16.74%. The Agricultural Credit Facility (ACF) was established by the Government of Uganda (GOU) to provide agricultural finance at a cheaper rate of 12% but most farmers are unaware of its activities.
- Most farmers avoid bank loans and seek debt capital from other avenues such as family (9%), money lenders (5%) and Village Lending and Saving Associations (VLSAs) (5%). This is because they have more favourable interest rates and require less bureaucratic procedures in getting loans. In general, aquaculture in East-Africa is financed through alternative channels than bank loans.
- 21% of farmers prefer borrowing from other sources such as relatives (14%) and money lenders (7%) for their future production activities.

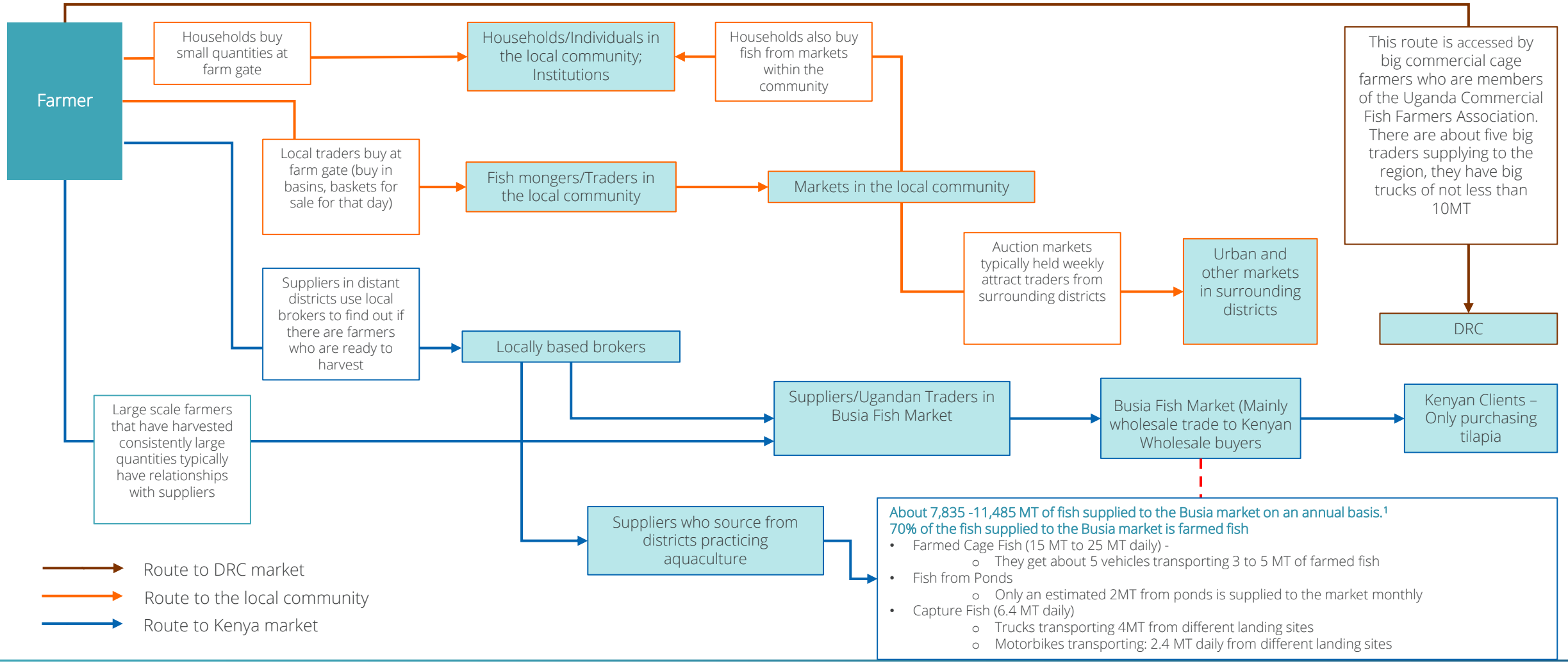


1. Bank of Uganda, 2021, Interest Rates

Route to market

Route to market - overview

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

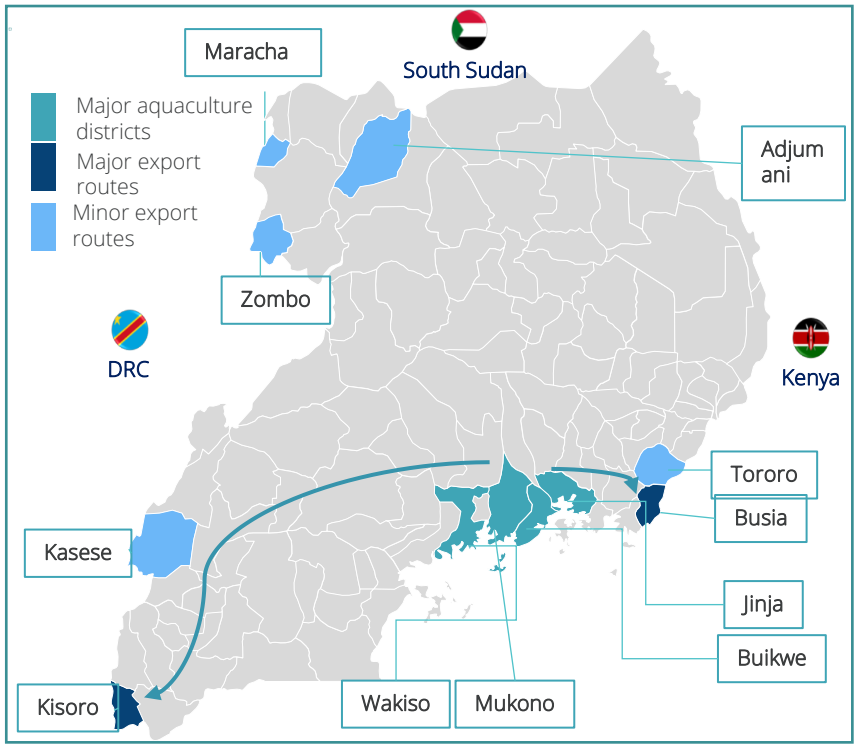


Note[1] : The 7k MT farmed cage fish exported mentioned on this slide is only the export going through Busia market place. There are other export channels as well, such as direct export by the main farmers.

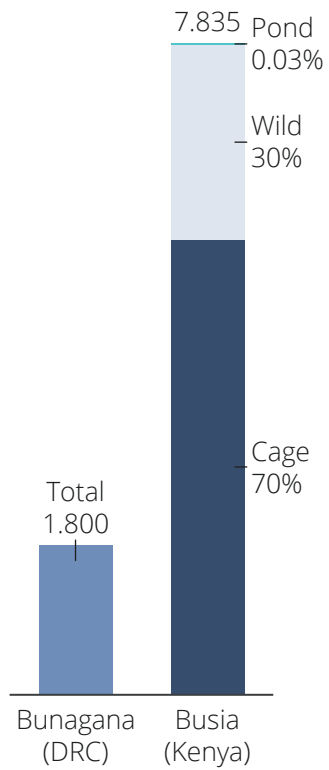
Route to market - Export

Main cage farmers currently export most of their product, making them susceptible to border closures and other export restrictions

Main export routes of Ugandan fish, per importance channel, in 2021



Sales through main export market hubs, in MT, in 2020



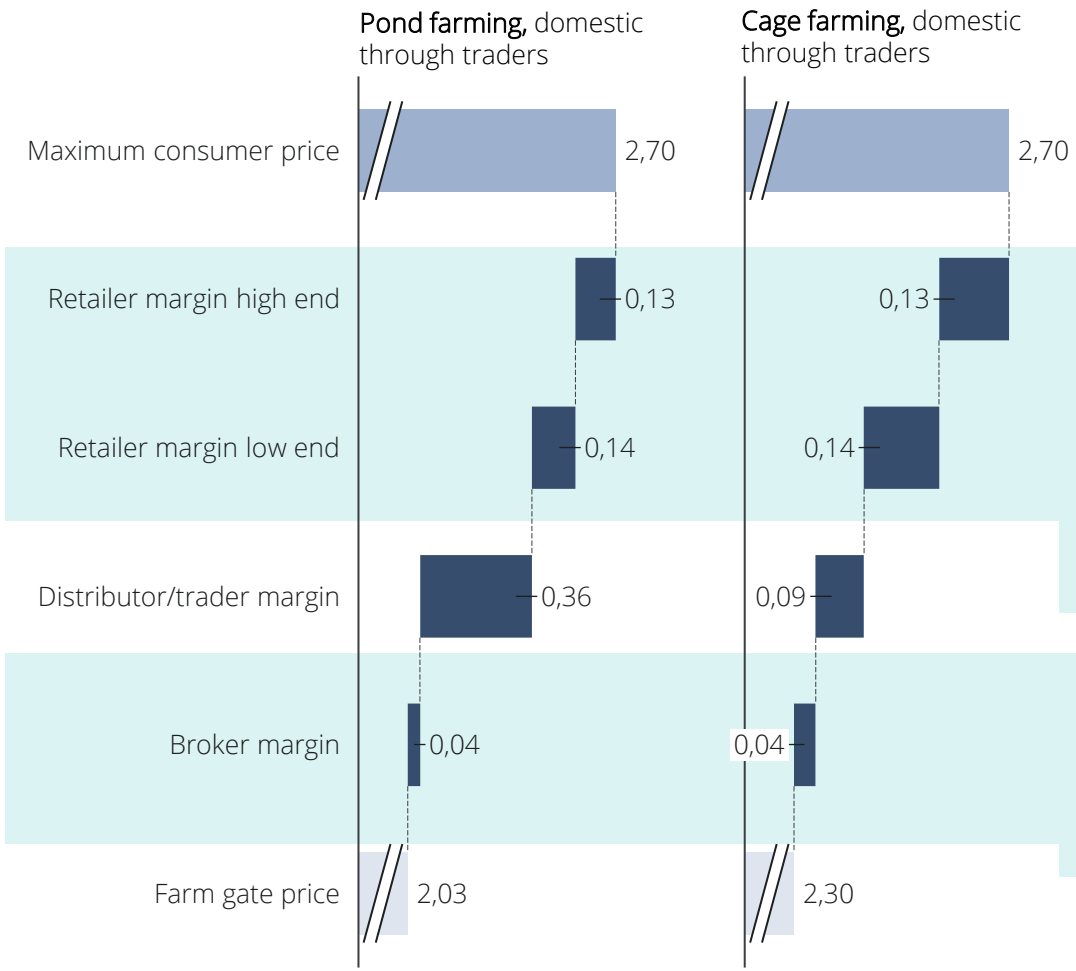
Remarks, export channels

- >67% of cage tilapia production is estimated to be sold in the large regional markets and export markets through traders. Of this, 17% is exported directly, whereas 50% is sold to traders who mainly sell in export markets such as Busia.
- Fish from Uganda is exported to DRC through the Bunagana border in Kisoro district. Only tilapia is exported through Bunagana. The Busia/Kenya export market has an average of 20 wholesale traders who supply farmed fish, especially tilapia. Supply of fish to DRC is dominated by five (5) big traders, who buy from cage farmers.
- While it is generally uncommon for farmers to directly export, a few large-scale cage farmers utilize their existing assets to carry out export activities by themselves. Through cutting out the middlemen, Yalelo enjoys larger margins on sales to customers in Kenya and DRC than most farmers that sell to exporters. SON also has retail outlets in Kenya and exports approximately 80% of their fish to Kenya.
- Fish is also exported to DRC through Kasese, Zombo and Maracha as well as to South Sudan mainly through the Elegu border in Adjumani district in Northern Uganda. Some fish also crosses to Kenya through Tororo in Eastern Uganda.
- The specific export market for farmers typically depends on the region in which the farm is located. Farms close to Busia in Eastern Uganda export to Kenya while those in Western Uganda close to the districts of Kisoro and Kasese export their fish to DRC.
- Reportedly, 70% of the fish sold at the Busia market is sourced from fish farms, especially cage farms in Buikwe, Wakiso and Jinja. Tilapia is the most sold fish species at the Busia market, mainly sold fresh without any value addition.
- Agents typically receive orders from the buyers, buy the fish from wholesalers in the Busia market and load it onto a truck for delivery in different Kenyan towns. They hardly meet with Kenyan clients and transactions are predominately done over mobile money. This is evidenced by the numerous mobile money operators of both Uganda and Kenya at the market entrance. Before the COVID-19 lockdown, fish was transported to Kenya by use of bicycles.
- Trade to major cities in the DRC such as Goma also used to take place through Rwanda. However, the border closure between Rwanda and Uganda meant that this trade had to redirected through Tanzania or Bunagana.

Pricing and market power along the value chain - domestic

Pricing is considerably lower for pond farmers due to lower market pricing

Pricing along the value chain, in US$/kg[1]



Local consumers buy fish at an average price of USD 2.57 to USD 2.7. Consumers prefer fish produced from cages because its bigger and is perceived as tastier. This is one of the reasons that traders buy fish from ponds at a significantly lower price than fish from cages.
In general, there has been an increase in local consumption of farmed fish in recent years.

Some distributors/traders access fish through brokers. Traders prefer dealing with brokers because they have more reliable information on farmer harvest volumes especially for pond farmers.

Additional remarks, domestic sales

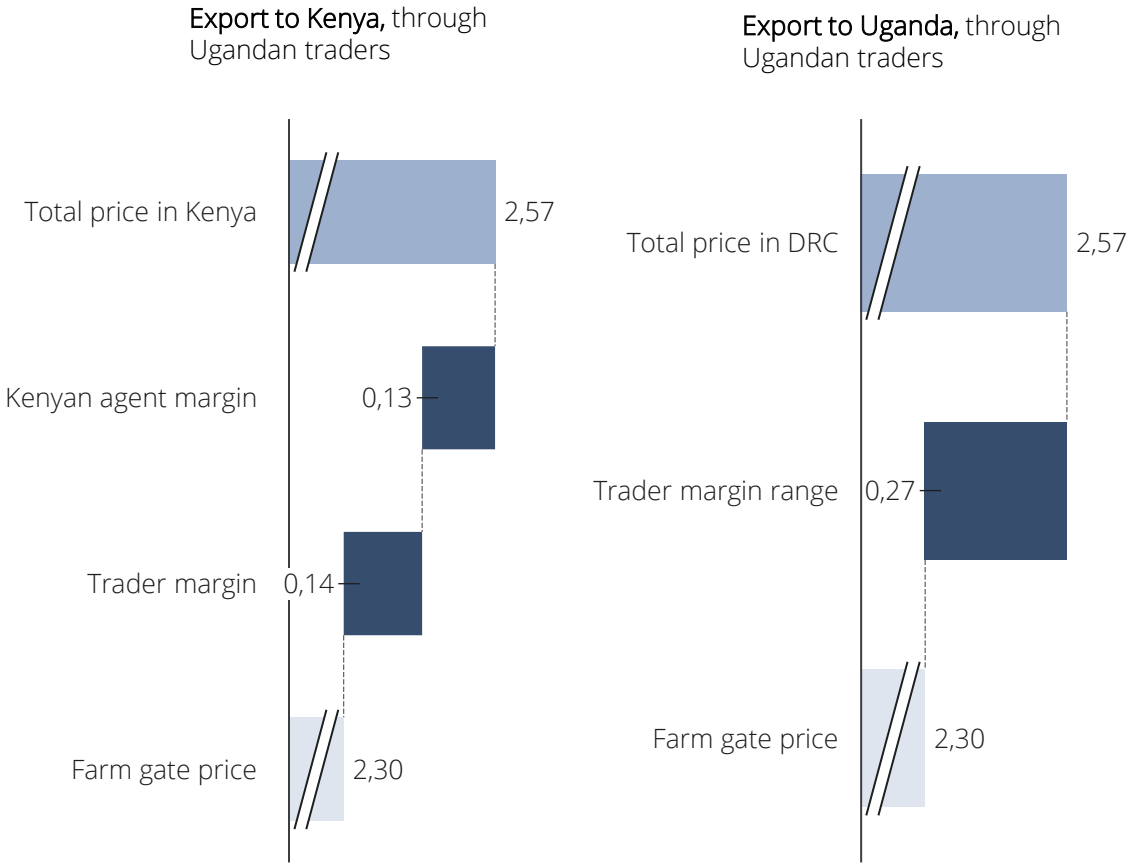
- Farm gate pricing of catfish is cheaper than tilapia due to its lower popularity. A kilogram of catfish at farm gate ranges between **USD 1.49 to USD 2.57.**
- Subsistence pond farmers sell their fish through auctions or markets at their farms. Some of these small-scale pond farmers (less than 2.5 MT) sell their fish at retail prices directly to the final consumers in their surrounding community, which is made possible by the low volumes sold.
- Due to the lower volumes, pond farmers have less bargaining power in the market. Traders plan their routes depending on the quantities of fish they expect to get. They incur costs such as hiring trucks, buying ice based on the estimated volume of harvest stated by the farmer. Pond farmers also often overestimate their production figures, which makes traders incur losses due to already sunk costs such as transportation. Cage farmers have more reliable production estimates as well as larger volumes. This biases traders to source most of their fish from cages over pond farmers.
- Large-scale farms like Yalelo and SON fish farm also sell their fish directly at their own integrated retail outlets. The fish is sold between **USD 2.7 and USD 3.24 per kg** in these retail stores and sold as premium fresh quality fish.

Note[1] :Pricing on this slide represents farmers selling to traders. The sales price on page 22 represents sales pricing of farmers with integrated sales outlets. Variation of pricing in integrated sales retail outlets is mainly due to special promotions of main integrators (https://twitter.com/yalelouganda)

Pricing and market power along the value chain - export

Export traders also prefer to deal with larger cage farmers, since they can obtain significant volumes.

Pricing along the value chain, in US$



Additional remarks, export sales

- A trader for export deals with an average of 5 large-scale commercial farms, especially SON fish farm, Pearl Aquatics, IG Invest fish farm and Yalelo.
- Traders supplying Kenya source the fish mainly from cage farms at an average price of USD 2.3 per kg and sell it in the market to wholesalers (agents of Kenyan customers) at an average price of USD 2.43 per kg. The Kenyan agents usually add USD 0.14 when selling to their customers in Kenya.
- Supply of fish to DRC is dominated by five (5) big traders, who buy from cage farmers and sell within the DRC. Traders buy the fish at an average price of US$ 2.3 per kg from cage farmers and sell it to Congolese wholesalers and retailers at an average price of US$ 2.57 per kg.
- The higher margin for traders serving the DRC covers costs incurred for the longer route. Farms such as Yalelo also export directly to the DRC and sell there for US$ 2.57 per kg to traders.
- The limited number of large export traders grants them more market power than pond farmers and small-scale cage farmers. Traders who export fish to DRC and Kenya prefer to source their fish from cage farms. The ability to by-pass traders puts larger cage farmers in a much stronger negotiation position than smaller farmers.
- A key consequence of these market dynamics is that small-scale farmers do not get high prices for their fish which they would be able to if they could access regional and export markets directly, like the larger farmers.
- The influx of large-scale cage farmers who run larger operations and thus enjoy awards that economies of scale give then the ability to sells at slightly lower prices as a strategy to increase their market share. This reduces the available market for smaller cage farmers since rational traders will always prefer to buy at lower prices.
- Fish from cages is larger and perceived as tastier among final consumers. The popularity of fish from cage farms, among traders and consumers, also reduces market power held by pond farmers.

Catfish – market dynamics

Catfish pond farmers are not competitive in the regional and export market due to limited demand and difficulties in production

- The Ugandan market is generally unfamiliar with the catfish which results in low demand for catfish. As such, farmers do not have sufficient avenues to sell their catfish. However, the Congolese market for catfish is a lot higher. Therefore, catfish sales to the export market account for about 25% of catfish farmers' sales.
- In the Northern and Eastern regions, farmers sell most of their catfish to the surrounding communities. These regions are known to be traditionally fish eating regions and there is a general shortage of fish in these areas.
- More than 60% of Catfish farmers sell their fish to the surrounding community at much lower prices per kilogram than tilapia. This is due to various reasons including:
  - The international market (DRC) prefers Catfish in smoked form, a practice most small-scale farmers shy away from due to the associated costs of value addition. Additionally, farmers don't produce enough volumes to justify export.
  - Catfish farmers are thus stuck with selling to surrounding communities who are unfamiliar with the species. People prefer tilapia. Because of this, the fish fetches a lower price.
  - For export, catfish must grow into a larger sizes of over 1kg which makes the prices/piece for catfish generally higher than those of tilapia. This has reduced the demand for catfish in the local market where small affordable fish sizes are more desirable. On the other hand, growing catfish to 1 kg leads to challenges for farmers.
  - With limited local market, catfish farmers rely on fish traders and mongers who sell to the major catfish markets such as DRC. As a result, returns are low for catfish farmers resulting from an added transport costs and trader markup.

A mature catfish harvested at one of the visited catfish farms

Central Kampala (2021) Image; Larive international

Netherlands

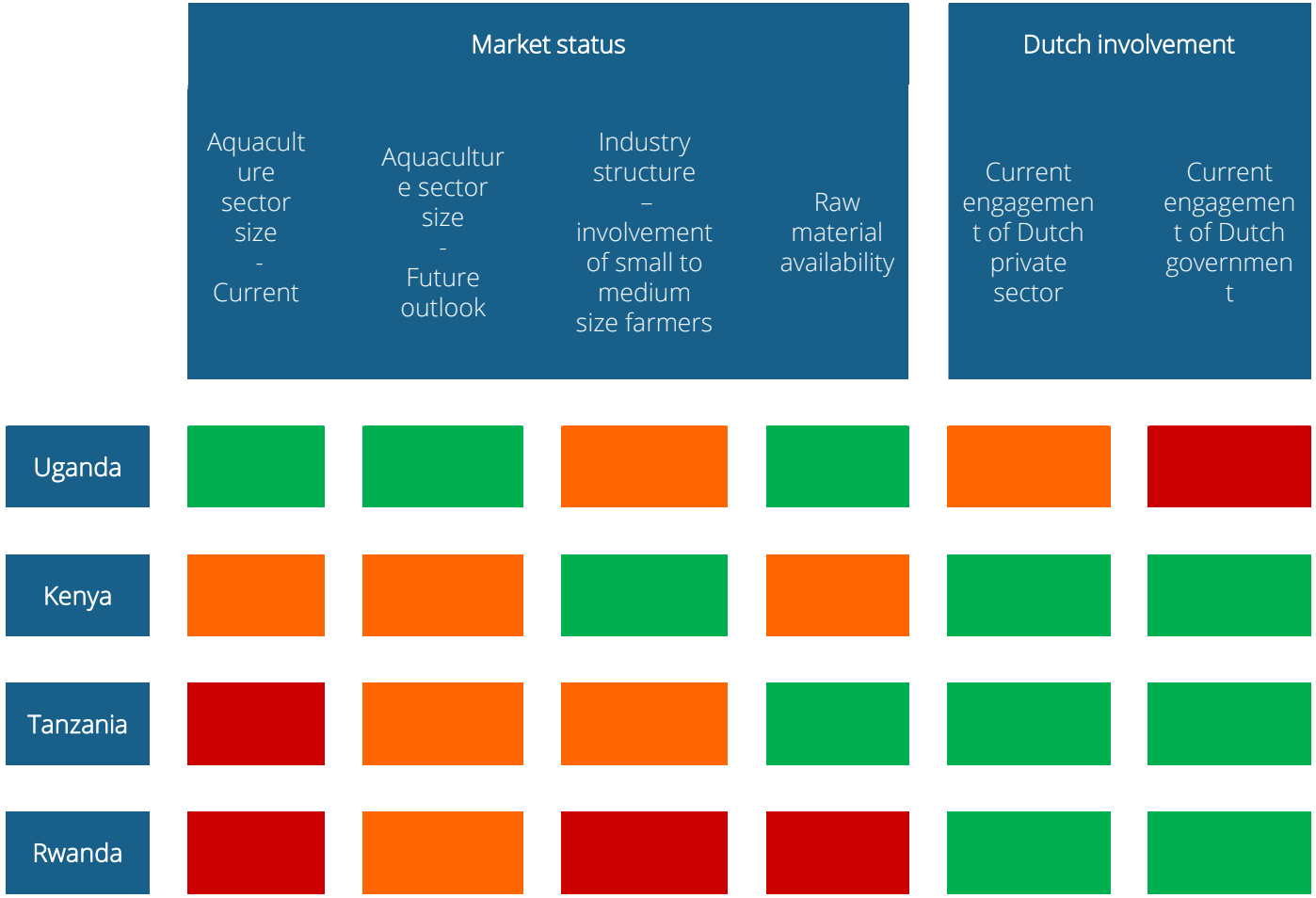
ASIGMA

LARIVE INTERNATIONAL

Regional aquaculture position of Uganda

Regional aquaculture production – comparing Uganda to its neighbours

Uganda boasting advantages on a regional market attractiveness and competitive landscape comparison



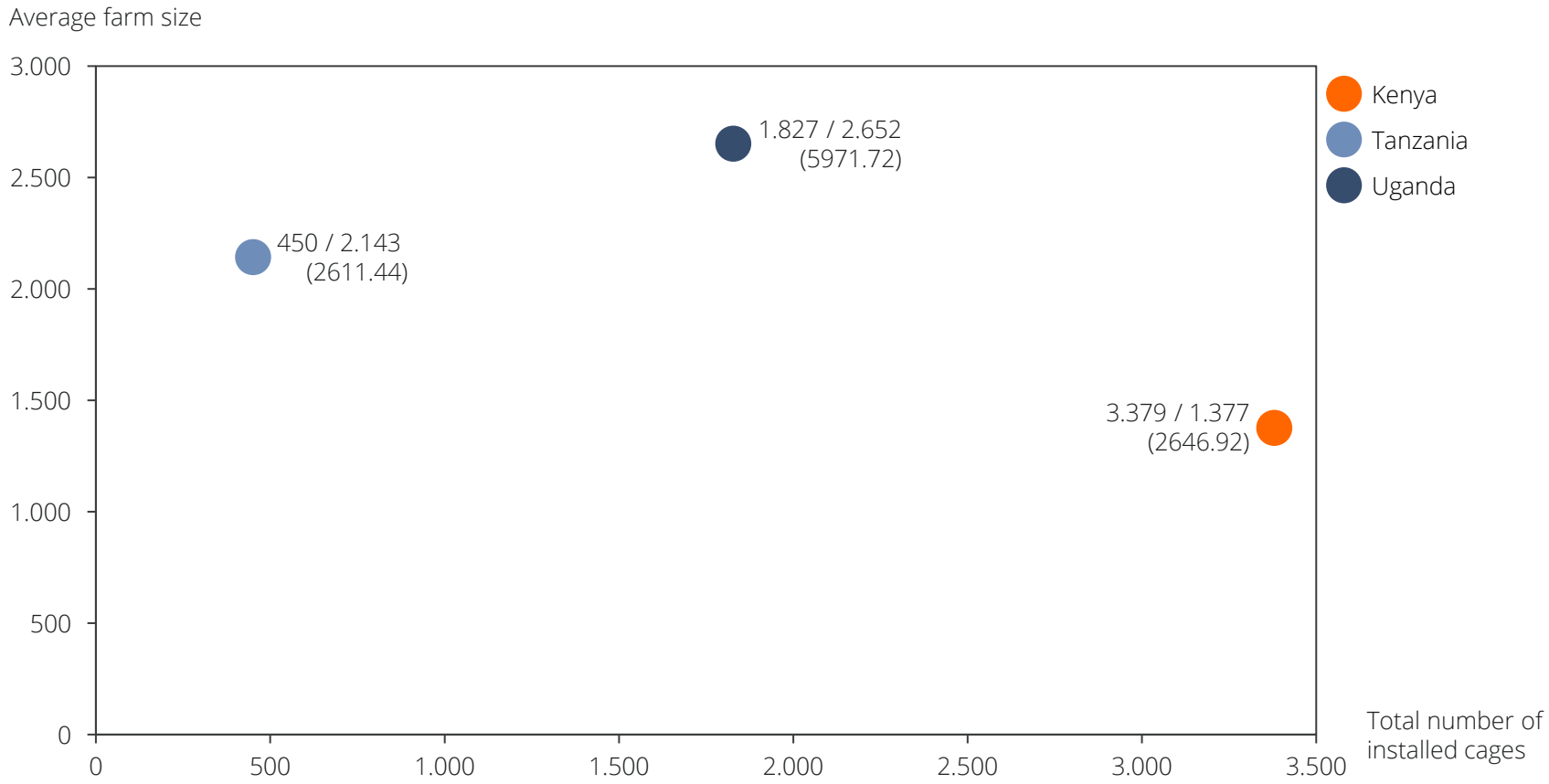
Remarks on regional position

- Compared to its regional peers, Kenya and Tanzania, Uganda has many more large cages installed, but fewer in total. This indicates concentration of farming within a number of capital-rich farmers, able to field the necessary working capital for such large diameters.
- In other words, compared to especially Kenya, Uganda has a number of larger farms, but fewer individual farmers. The supporting system for individual smaller business operators is also stronger in Kenya, with multiple hatcheries selling fingerlings to third parties as well as multiple feed producers.
- However, Uganda is currently leading aquaculture production in the region. It also has the largest proportion of Lake Victoria. Compared to Kenya, it also has a lot more growth potential, as suitable aquaculture sites are not yet a limiting factor in growth.
- Aquaculture in Tanzania and Rwanda is still in its infancy stage. In Tanzania, the business climate is the main barrier for growth, which is deemed to be considerably better in Uganda by industry insiders. In Rwanda, the main barrier is the lack of suitable water bodies with good water temperatures. However, several large farms are starting operation in Rwanda, primarily because of the good business climate.
- Regionally, aquaculture is a priority theme in the Dutch billateral engagement. Regional collaboration between respective Embassies would be highly encouraged, given the interlinkages of the aquaculture value chain in the region. FoodTechAfrica is a great example of successful Dutch engagement.

Regional comparison – size and number of farms

Average farms size in Uganda is largest, while the number of cages is greatest in Kenya

Average farm size in installed production capacity in m³ and total number of installed cages in # of cages, per country, total number of cages / average farm size (standard deviation of the mean).[1]



Observations, Size of farms

- Although Kenya, has the largest number of installed cages of all three riparian countries to Lake Victoria, these are primarily smaller in size.
- Uganda has several of the largest farmers on Lake Victoria, and as such the average farms size is also the highest among the three countries. However, it also holds the largest differential between small and large operators.
- After the floods of Lake Victoria shores in 2019, many operators left the industry in Uganda. This has likely been a driver of the consolidation in the Ugandan sector.
- Tanzania opened Lake Victoria for cage farming in the last few years, and as such the number of operators is relatively small. Insiders indicated that it is particularly difficult to obtain the required licenses in Tanzania. This forms a significant barrier to entry, for small business operators in particular.
- Farm sizes is determined on the basis of installed production capacity. However, many of the cages, especially in are either understocked or completely empty.

[1]Information based on satellite imagery and data prepared for the FAO census by Lattice Aqua (2021). Total number of installed cages likely to be an underreporting for Kenya.

Political economy analysis

Political Economy Analysis - methodology

The Political Economy Analysis shows the political feasibility and level of expectations for the development of any intervention in the Aquaculture sector

Definition:

- Political economic risk encompasses political decisions or changes that can affect conditions and profitability of actors along the market segments and the different stages of the value chain.
- Such political decisions include decisions on taxes, currency valuation, trade tariffs/barriers, investment, wage levels, labor laws, environmental regulations, and development priorities.
- Political risk assessment has been conducted based on market segments within the aquaculture value chain.
  - Surrounding community: This segment is supplied by small-scale pond farmers.
  - Local retail market: This segment is supplied by large-scale pond and small-scale cage farmers. This includes food markets in towns and cities.
  - Urban retail market: This covers large-scale cage farmers who own retail outlets. Urban retail market covers supermarkets as well as retail outlets owned by large-scale cage farms such as SON and Yalelo.
  - Regional export market: This is served by large–scale cage farmers and wild capture fisheries. The regional export market includes neighboring countries such as Kenya and DRC.

Methodology:

- The severity of political risk in the aquaculture value chain in Uganda has been defined based on four (4) key metrics:
  - Number of significant stakeholders.
  - Conflict resolution.
  - Ease of entry.
  - Market access.

Metric	Description	Risk Category	Score	Explanation
Number of and power of significant stakeholders	This looks at how many significant stakeholders are involved at each stage of the value chain, from supply of fingerlings and feed to fish markets.	High Risk	3	The government is the main actor at the value chain stages.
		Medium risk	2	The value chain stages are supplied by both the government and private entities.
		Low Risk	1	There are several private actors at the value chain stages.
Conflict resolution	This covers how long it takes to resolve conflicts at the value chain stages.	High Risk	3	Conflicts such as border and market closures take more than six months to resolve.
		Medium risk	2	Conflicts such as border and market closures take between 1 – 6 months to resolve.
		Low Risk	1	Conflicts such as border and market closure are resolved in less than one month.
Ease of entry	This assesses the ease with which actors along the value chain and market segments can get into operation.	High Risk	3	Required licenses are extremely difficult to obtain.
		Medium risk	2	Some licenses are required for actors looking to enter the value chain stage.
		Low Risk	1	There are few to no licenses required to operate.
Market access	Market access covers how easy it is for actors along the different market segments to access respective markets to sell their fish.	High Risk	3	Value chain actors are barred from gaining access to the market.
		Medium risk	2	Some restrictions in form of licenses are required to gain access to markets.
		Low Risk	1	There are no barriers to market access.

Note: Where the score for number of significant actors/conflict resolution score = 3, the segment is deemed high risk since these are terminal risks.

Political economic risks in the aquaculture sector

High political risk is experienced in the surrounding community market segment as the main producers of this segment (small-scale pond farmers) rely on the government for fingerlings and feed.

Key — Low Risk: | Medium Risk: | High Risk:

End market	Fingerlings	Feed	Production	Market
Regional Export market (large-scale cage farmers, wild capture fisheries)	➢ Number of significant actors score = 1 ➢ Conflict resolution score = 1 ➢ Ease of entry score = 1 Large scale cage farmers run their own private hatcheries for own consumption.	➢ Number of significant actors score = 1 ➢ Conflict resolution score = 1 ➢ Ease of entry score = 1 Large-scale cage farmers import their feed directly from country such as Brazil and Zambia.	➢ Number of significant actors score = 1 ➢ Conflict resolution score = 1 ➢ Ease of entry score = 1 Production is in large-scale cages set up around major water bodies such as Lake Victoria and Lake Albert.	➢ Number of significant actors score = 1 ➢ Conflict resolution score = 1 ➢ Ease of entry score = 1 ➢ Market access score = 1 Large-scale cage farmers such as Yalelo and SON export their fish directly to regional markets such as Kenya and DRC. In 2020, Kenya accounted for 93% of Uganda's fresh fish and 1% of fillet exports whereas DRC accounted for 7% of Ugandan fresh fish and 4% of fish fillet.[1]
Urban retail markets (large-scale cage farmers)	➢ Same as above	➢ Same as above	➢ Same as above	➢ Number of significant actors score = 1 ➢ Conflict resolution score = 1 ➢ Ease of entry score = 1 ➢ Market access score = 1 Large players such as SON and Yalelo sell fish in own retail outlets
Local retail markets (small-scale cage and large-scale pond farmers)	➢ Number of significant actors score = 1 ➢ Conflict resolution score = 1 ➢ Ease of entry score = 1 Fingerlings are supplied by private large-scale hatcheries.	➢ Number of significant actors score = 1 ➢ Conflict resolution score = 1 ➢ Ease of entry score = 1 Farmers buy commercial feed from distribution outlets countrywide.	➢ Number of significant actors score = 1 ➢ Conflict resolution score = 1 ➢ Ease of entry score = 1 Production is in large scale earthen ponds and small-scale cages.	➢ Number of significant actors score = 1 ➢ Conflict resolution score = 1 ➢ Ease of entry score = 2 ➢ Market access score = 2 Fish movement permits are required for all farmed fish being taken to local retail markets.
Surrounding community (small-scale pond farmers)	➢ Number of significant actors score = 3 ➢ Conflict resolution score = 1 ➢ Ease of entry score = 1 The government is the main supplier of fingerlings to small-scale farmers.	➢ Number of significant actors score = 3 ➢ Conflict resolution score = 1 ➢ Ease of entry score = 1 The government under Operation Wealth Creation (OWC) supplies starter feed to farmers for the initial 3 months.	➢ Number of significant actors score = 1 ➢ Conflict resolution score = 1 ➢ Ease of entry score = 1 Production is in unaerated earthen ponds.	➢ Number of significant actors score = 1 ➢ Conflict resolution score = 1 ➢ Ease of entry score = 1 ➢ Market access score = 1 Market is within the surrounding communities where anyone can sell fish.

Stage of the Value Chain

Note: Where the score for number of significant actors/conflict resolution score = 3, the segment is deemed high risk since these are terminal risks. [1]Number of small-scale cage farmers has not been established.

General risks in the aquaculture sector

The risks in the aquaculture sector are less significant in the urban retail and export market segments.

Key — Low Risk: — Medium Risk: — High Risk:

End market \ Stage of the Value Chain	Fingerlings	Feed	Production	Market
Regional Export market (large-scale cage farmers, wild capture fisheries)	Large-scale cage farmers run hatcheries for own production.	Direct feed imports to own warehouses. Large-scale cage farmers import feed at USD 910 per MT. The price has risen from USD 710 per MT due to the supply chain disruptions caused by the COVID-19 pandemic. Farmers buy in bulk and face the risks of shipping container shortage and delays in freight times. Global shortages in freight imply that farmers get their feed after a significant time of about 4 months after making full payment for the feed.	Production is conducted in cages. Production licenses are required. Government policy might change necessitating the need to limit coverage on lake space as well as mandatory environmental impact assessments. Recent government focus on curbing wild capture has capability to have spill-over effects since wild catch and cage farming share the same lakes.	Uganda reaps the benefits of EAC's common market protocol as the second regional integration milestone. This covers free movement of goods, persons, services, capital and labor across member states. This paves way to set up production in Uganda and target regional markets. Underlying politics within different member states means that free movement of goods is sometimes impeded. This has however not been experienced in fish exports.
Urban retail markets (large-scale cage farmers)	As illustrated above	As illustrated above	As illustrated above	Large players such as SON and Yalelo sell fish in own retail outlets. These are free of any political risk.
Local retail markets (small-scale cage and large-scale pond farmers)	Quality fingerlings are bought from large hatcheries such as Rocksprings fish farm. This presents a risk of increased costs such as transportation and inconsistency in supply.	Commercial feed purchased from retail outlets is used. Farmers reported limited availability of feed in retail outlets during certain periods.	Fish sold in local markets is mainly sourced from large-scale pond farms as well as small-scale cage farms. Their production volumes are not always consistent.	Only a few large-scale pond farmers can produce enough quantities to attract traders that can buy in bulk and take to local markets. They also mainly deal with traders who often offer less prices for the fish.
Surrounding community (small-scale pond farmers)	Small-scale farmers rely on government initiatives for supply of fingerlings and feed. This model by government has created a dependency syndrome and is unsustainable in the long-run incase government changes policy.	When the free government feed is used up, small-scale farmers use alternative feed means such as direct application of feed ingredients like maize bran to the ponds and fertilizing the ponds with chicken droppings.	Production is predominantly done by small-scale pond farmers using non-aerated earthen ponds. This points to low farmer professionalism and results in low productivity.	Limited risk since most people are gradually increasing their fish consumption.

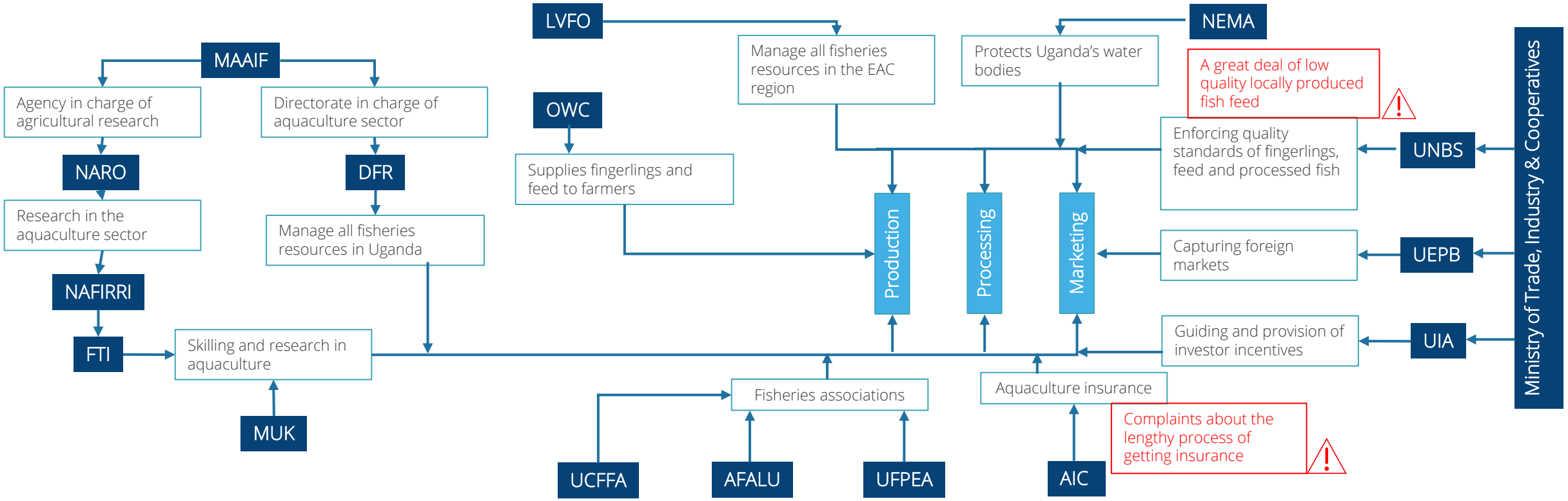
Note: [1]Number of small-scale cage farmers has not been established.

Central Kamapala (2021) Image: Larive international

Enabling Environment

Overview of key public stakeholders in the aquaculture value chain

Public stakeholders in the aquaculture value chain



AFALU: Association OF Fishers and Lake Users of Uganda
AIC: Agro Consortium
DFR: Directorate of Fisheries Resources
FTI: Fisheries Training Institute
LVFO: Lake Victoria Fisheries Organization

MAAIF: Ministry of Agriculture, Animal Industry and Fisheries
MUK: Makerere University Kampala
NAFIRRI: National Fisheries Resources Research Institute
NARO: National Agriculture Research Organization

NEMA: National Environment Management Authority
OWC: Operation Wealth Creation
UCFFA: Uganda Commercial Fish Farmers' Association
UEPB: Uganda Export Promotion Board

UFPEA: Uganda Fish Processors and Exporters Association
UNBS: Uganda National Bureau of Standards

Overview of laws and regulations governing the aquaculture sector

Laws governing the aquaculture sector

2005

National Agricultural Research Act, 2005

- Aquaculture research is regulated by the National Agricultural Research System Act of 2005, which disrupted the monopoly of public agriculture research by public institutions.
- This has opened research opportunities to other interested agencies and individuals **through competitive research grants.**

2010

Land (Amendment) Act, 2010

- The Land Act spells out the tenure systems for landownership and the legal rights of landowners. The act also defines the ownership of wetlands, swamps and other shallow waters.
- The process of acquiring land for aquaculture purposes is **simple with limited complexities.**

2010

Fish Act, 2010

- All fishing activities in Uganda are regulated by the Fish Act which replaced the Fish and Crocodiles Act. It provides the basic framework for the production, processing and marketing of fish in the country.
- It also has strict penalties against illegal fishing practices of **imprisonment of up to ten years or fine of up to UGX 200 Million.**

2019

National Environment Act, 2019

- The National Environment Act of 2019 states that **mandatory environmental and social impact assessments are required** before the establishment of aquaculture parks and construction of facilities for commercial aquaculture of 200,000 kilos per year or of an area of one hectare.
- NEMA, the enforcing body of the Act **restricts aquaculture to a distance of 200 m from the shoreline of a wetland** and the installation of any water obstruction system to supply the river-fed ponds.

2020

Fisheries and Aquaculture Bill, 2020

- **The Fisheries and Aquaculture Bill is still under review and proposes the need for value addition on fish exports.** Large commercial cage farmers have expressed concern that this could hamper the regional market in Kenya and DRC that remains the main destination of our farmed fish. The regional market has so far showed preference for fresh fish.

Laws governing the aquaculture sector

Fisheries and aquaculture Bill, 2020

- The aquaculture and the Fisheries and Aquaculture Bill looks to update the regulations within the sector that were last updated in the 60s. The bill is on floor in the Parliament and is looking to pass.
- The Bill focuses on value addition at different stages not just filleting. These include among others, gutting, removing scales which will increase the shelf life of the fish and packaging. Value addition is supposed to result into the increased shelf life of fish enabling it to reach more markets.

The Genetic Engineering Regulatory (GMO) Bill

- The GMO bill is facing some delays because the Government is taking a precautionary approach, that is to say, is seeking to first study the long-term impacts of such inventions. It was mentioned that current investors such as Yalelo have commended the quality of the indigenous Tilapia.
- The president has of recent expressed the need for the GMO bill to be passed. This will pave way for new and improved breeds of fish to be farmed within the country.[1]
- The GMO bill also paves way for improved varieties of plant protein sources such a soybean to be grown in the country. This will increase the availability of raw materials needed as inputs to prospective domestic fish feed producers.

Other government initiatives towards aquaculture

- The Ministry of Agriculture, Animal Industry and Fisheries (MAAIF): Directorate of Fisheries Resources is setting up a one-stop-center to assist investors looking to invest in all stages of the aquaculture value chain. This is envisioned to be operational within two years and will look to streamline the application process that investors take to setup.
- A digital marketing platform has also been designed that will help farmers sell their fish. This is currently under review and will be active in 2022. The marketing platform will enable fish farmers to access a wider market for their fish bridging the gap between farmers, traders and consumers. The need for the digital marketing platform has arisen out of the bottleneck of farmers reaching the market. Large and fairly new players such as Yalelo have managed to come in and in a short time capture a large share of the market, something local players have not taken advantage of.
- The government is working with PESCA on developing Aquaculture parks whose infrastructure construction will be completed in 2022. These will include land and water-based parks.
  - Water-based aqua park in Kalangala district
  - Land-based aqua park based in Apac districts which lies on the shores of river Nile.
- The aqua parks will have large scale and small ponds, a large fish aggregator to whom farmers can sell, a feed storage facility, a seed distribution center. The park will be surrounded by a network of out growers.
- The government is also running a Wetland restoration program by setting up five (5) ponds in wetlands of 24 districts. Farmers will be able to rent out the ponds for production under a Public-Private-Partnership (PPP).

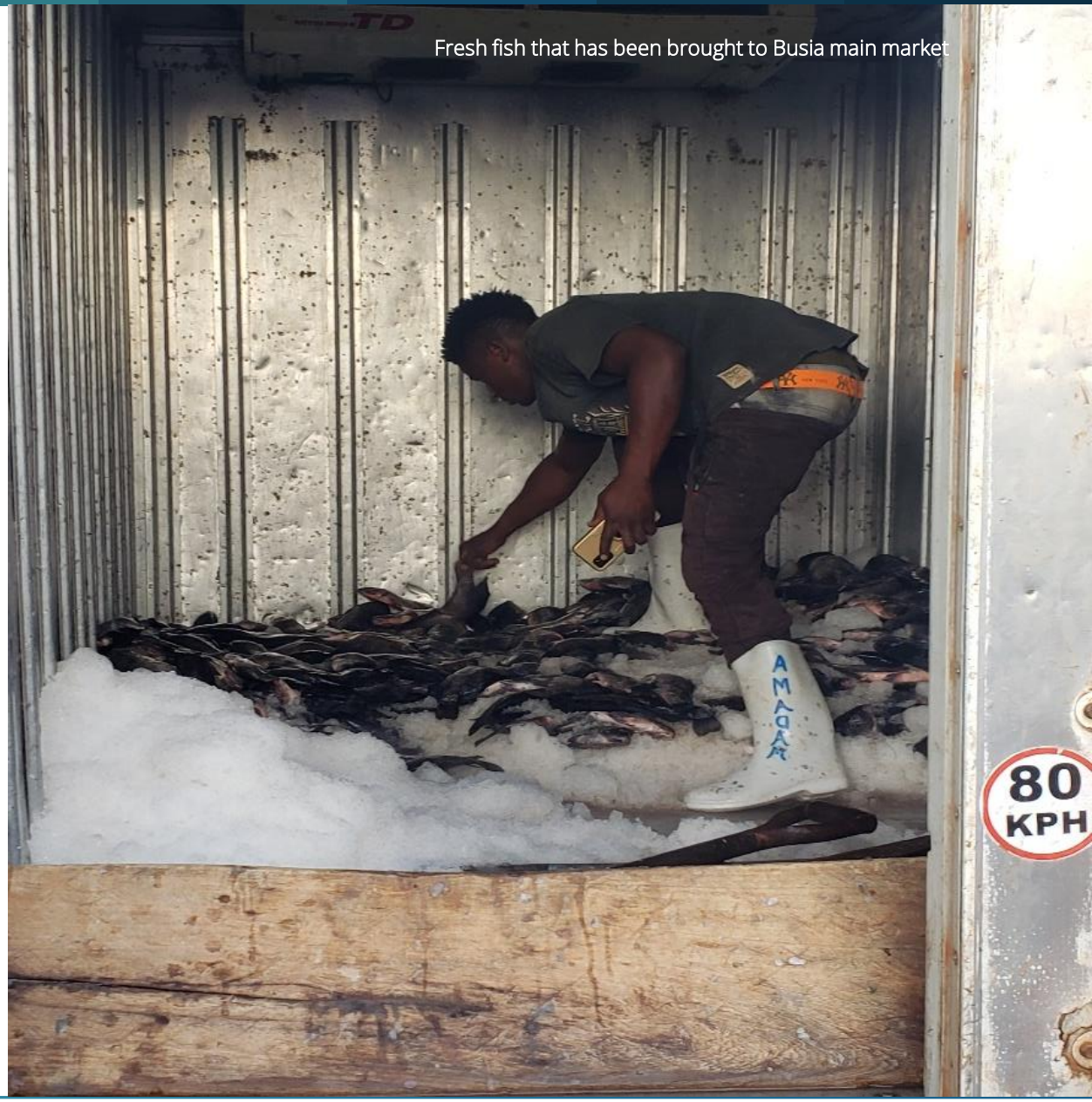
1) Bendana C,. Ugandan President wants GMO bill passed – accessed at https://allianceforscience.cornell.edu/blog/2020/03/ugandan-president-wants-gmo-bill-passed/

Impacts of policy on cage farming growth

Further growth of cage farming could be constrained by policy

The Fisheries and Aquaculture Bill 2020

- Among the main highlights of the bill is value addition of exported fish from Uganda. This is however likely to negatively impact the aquaculture sector.
  - Most (70% to 80%) of Ugandan fish is exported to regional markets (Majority of this lands in Kenya and DRC). This market prefers fresh fish. Value addition whether in the form of fish fillets or other products could potentially cause loss of key market for commercial farmers.
  - Value addition is costly. With value addition comes an increase in costs such as labor, packaging, among others. Commercial farmers believe their earnings wouldn't increase from processing fish into fillet and other products. If anything, it will just increase their operating costs and reduce their margins.
- The implications of the Aquaculture Bill 2020 on exports cannot be fully predicted. There is a perception from the government that the law allows any manner of value addition such as removing scales, intestines, packaging, among others.
- However, interviewed private sector players have expressed concern on the ramifications of the Bill on the sector especially the export market. While experts state that in case the bill passes, the implementation and ensuing effects would be immediate, present history in Uganda points to limited or delayed implementation of regulations, leading to lower impact.
- The differing requirements of value addition such as removal of intestines, removal of scales, packaging, etc implies that exporting farms and traders will initially face reductions in export volumes as they cope with the new regulations and value-addition expenses, but exports should recover after this period since regional demand is still high.



Fresh fish that has been brought to Busia main market

Overview of tariffs, VAT and import duties

Taxes, duties and subsidies

Taxes

All taxes in Uganda are collected by the Uganda Revenue Authority (URA) and they include:

- Income Tax. This is paid by individuals engaged in the aquaculture sector. It ranges from 10% to 30% depending on the income received.
- Non-Individual Income Tax (Corporation Tax). This is imposed on all corporate entities (Companies) engaging in commercial farming activities and is charged at a rate of 30% on the profits from the business.
- Value Added Tax (VAT). It is a tax on consumption charged on value-added to "taxable" goods and services, at different stages in the chain of distribution and is charged at a rate of 18%. A seller registered for VAT can claim their input tax when selling the product.
- Pay As You Earn (PAYE). Paid by all entities who have employees that are paid a monthly salary of UGX 235,000 and above. PAYE ranges from 10% to 30% of the total paid salary for both citizens and non-citizens.
- Customs duty. Is charged on all imported goods into the country. All foreign goods are charged a combined tax of 33% and an infrastructure tax of 1.5%.
- Local Excise duty. Is charged on all locally produced goods.
- Withholding Tax (WHT). This is a tax withheld at source at the point of making a payment to the supplier/service provider. Gazetted taxpayers under section 119 are required to withhold tax of 6% on any payments for supplies above UGX 1,000,0000 as well as 6% on the supply of raw materials.
- Rental Tax. In cases where a farmer has rental properties and earns rental income or they lease out their farms or equipment, this income is taxable under section 5 of the Income Tax Act.

Tax incentives

General incentives

- There are income tax and local excise duty exemptions for investors whose investment capital is at least USD 10 million for a foreign investor or USD 300,000 for a citizen or USD 150,000 for a citizen investing upcountry. 70% of the employees in these companies must be Ugandan citizens who are earning an aggregate wage of 70% of the total wage bill.
- Producers who export 80% and above of their products also enjoy income tax exemptions for ten years.
- Import duty is NIL for plant and machinery; Import VAT is deferred and WHT is 6% as long as the cost of plant and machinery is above USD 22,500.

Specific to the aquaculture sector

- Aquaculture inputs such as feed and fingerlings being imported directly by a farmer are exempt from all taxes. This exemption however is not extended to non-farmers for whom taxes are charged upon import. This has made imported fish feeds cheaper and more attractive than locally produced feeds for large scale farms and provides them with a distinct tax advantage over smaller farmers whom have to purchase from non-farmer feed importers.
- Uganda being a member of the East African Community (EAC) enjoys tax exemptions for fish crossing from/to EAC member states. Consequently, all fish (fresh, chilled or frozen) caught and landed by canoes or vessels registered and based in an EAC state is exempt from all taxes.

Ease of entry - Overview of licenses, permissions and approvals necessary to formally start fish farming

Most of the tariffs aren't implemented on-ground in order to encourage aquaculture

Table showing licenses required for aquaculture in Uganda

Type		License Fee (USD)	Pond farmer	Cage farmer	Processor
Trucks carrying fish by tonnage	Less than 5 MT	67.6			
	5-10 MT	135.1			
	Over 10MT	202.7			
Containerized vessels by tonnage	Less than 5 MT	67.6			
	5-10 MT	135.1			
	Over 10 MT	202.7			
By products and processed fish (dried/smoked) transporters		135.1			
Trading license per farm cycle (Pond farming)		99	√		
Market dues per farm cycle (Pond farming)		12	√		
Artisanal processors/fish mongers		13.5			√
Fish processing control fee for processing factories		810.8			√
Production license				√	
Boat builder/local gear makers/repairers		13.5		√	
Fish control permit (to allow access to fishing)		6.8	√	√	
Fish movement permit (per kg)		0.003	√	√	
Application fees		2.7	√	√	

- In the pond farming segment, most of the tariffs and licenses are not being implemented in a bid to promote aquaculture and reduce expenditure on pond farmers who are already experiencing reduced margins. The licenses include:
  - Production licenses.
  - Wetland permits.
- In cage farming, only large scale investors have been able to carry out environmental impact assessments. The government has however expressed the need to review policy especially as regards cage farming in order to ensure sustainability of the lake resources. Some of the highlighted adjustments include:
  - Limitations on how much lake space a given cage farmer should utilise given their licenses.
  - Conducting a general environmental impact assessment on all cage farming activities on the lake. EIA are currently being done by individual cage farmers.
  - Ensuring sustainable coexistence of other players on the lake such as local fishermen.
- To start cage farming, one needs to have a production license granting them permission to practice aquaculture on a given part of a water body such as a lake. The interviewed farmers stated that these licenses are fairly easy to get.
- In practice, the Department of aquaculture - MAAIF and the District Fisheries Officers (DFOs) have a final say on which licences and tariffs are implemented.
- From our interaction with MAAIF, even import waivers are issued on a case-by-case basis. A prospective investor applies for the waiver and the Ministry reviews and chooses whether to grant the waiver or not."

Investing in Uganda

The country is pushing an industrialisation strategy under NDP III

- Starting business in Uganda is a fairly straightforward affair with a one-stop business centre (OSC) set up by the Uganda Investment Authority (UIA) in this regard. The OSC provides among others the following services.
  - UIA Licensing Office: This office receives applications for an investment license as well as guidance on the different requirements regarding regulatory approvals.
  - Uganda Registration Services Bureau (URSB) Office: URSB oversees registration of both local and foreign companies, business names, and legal documents. It also provides advisory services on company registration.
  - Uganda Revenue Authority (URA) Office: Through the URA office, a business can obtain a Tax Identification Certificate (TIN). The office also provides guidance on the Ugandan tax structures, available tax incentives and tax advisory services.
  - Uganda Bureau of Standards (UNBS) Office: UNBS oversees formulating, promoting and enforcing national product standards on the market.
  - National Environmental Management Authority (NEMA) office: In Uganda, NEMA is in charge of regulating and coordinating environmental impact and mitigation compliance.
- UIA has introduced an online one-stop-centre (eBIZ) for business registration that enables investors from anywhere in the world access the same services offered by the physical OSC.
- The Ugandan government's recent push for industrialisation has seen the rise of industrial parks. In the Kampala region, there are three government-owned industrial parks, these include Kampala Industrial and Business Park (KIBP), Namanve, Luzira Industrial and Bweyogerere Industrial Parks. The industrial parks are run by the Uganda Investment Authority with the licensing office at the one-stop centre available to guide investors on how to acquire land within the industrial parks.

Namanve Industrial Park in Kampala and Jinja

Other development programs in aquaculture

Name	Description	Activities	Ability for collaboration.
Operation Wealth Creation	Aims to alleviate poverty by encouraging pond farming. Provides farmers with fingerlings and starter feed for a period of 2-3 months.	This has been one of the major drivers of new entrants into the pond sector. The initiative has, on the other hand, been held back by limited ability of the farmers to sustain feeding once the distributed starter feed runs out and is contributing to donor dependency in the sector.	Operation Wealth Creation could provide opportunities for Dutch businesses active in the country to supply high quality inputs. This is also true for any possible investments in hatcheries.
UNDP restauration - United Nations Development Program (UNDP), Green Climate Fund (GCF)	Aims to restore and sustainably manage wetlands and support target communities in wetland areas of Uganda to reduce the risks of climate change posed to agricultural-based livelihoods.	The Building Resilient Communities, Wetlands Ecosystems and Associated Catchments in Uganda project aims to support the Government of Uganda in the management of critical wetlands that are being affected by climate change. Some of the program's current activities include: ➢ Restoration of wetlands and their eco-system services, in an effort to reduce the increasing pressures on wetlands by encouraging alternative livelihoods, resilient agricultural practices and sustainable land management practices like reforestation. Some of these alternative livelihoods and resilient agricultural practices include pond farming. ➢ Enhancing the skills of people living in wetlands to diversify their livelihoods and become more resilient to climate shocks while reducing their exploitation of wetlands.	Dutch expertise, both in wetland restoration as well as pond aquaculture could be of great value to this program. Training programs could include farmers in wetland areas, to focus efforts and increase impact.
PESCA – The Nature Conservancy, European Development Fund	Aims to increase fish production and profitability through cage aquaculture with minimal impacts on the aquatic environment and other lake uses.	➢ PESCA is helping fish farmers across the country set up cooperatives. The goal is to organize farmers into groups which can easily lobby for financing and access to quality inputs. ➢ Establishment of two aquaculture parks in Uganda, with construction expected to be completed in 2022. 1) Mwena aquaculture park is a cage-based aquaculture park being established in Kalangala, with a projected annual capacity of 20,000 MT. 2) The land-based aquaculture park is being established in Apac district in Northern Uganda.	Dutch expertise can greatly contribute to setting up the aquaculture parks. These parks also offer opportunities for investors. Engagement of the Dutch Embassy could be in line with these aquaparks, for example with a technical support collaboration on setting up a good hatchery.
EU TRUE-FISH Program - European Development Fund, LVFO, WorldFish, FAO	Aims to contribute to the development of competitive, gender equitable and sustainable aquaculture, by addressing impediments to growth in aquaculture faced by investors.	➢ The LVFO will implement the first component and strengthen commercial networks for competitive aquaculture-related businesses. ➢ FAO will concentrate on improving skills through vocational training centers in the Uganda, Kenya and Tanzania. FAO will also foster sustainability of monitoring and surveillance of aquatic animal health conditions, and institute zoning, particularly for cage culture in Lake Victoria. ➢ WorldFish will implement the third component, improving the protection of biodiversity.	Dutch aquaculture expertise already plays a crucial role in this program, through the involvement of Dutch aquaculture experts as technical advisors. Given the expertise and practicality of the Netherlands in aquaculture vocational education, partnerships would be very beneficial to long-term curriculum and education development.

Note: Detailed profiles of development programs can be found in the Annex

Netherlands

ASIGMA

LARIVE INTERNATIONAL

Possible value chain interventions

Recommendations for development of the aquaculture value chain

Introduction

The aquaculture sector is rapidly growing and commercializing. Throughout this study, several key challenges, trends and opportunities have been identified. The following section will set out a key number of development opportunities, considering the strengths of the Dutch private sector and the priority themes of the EKN in Kampala.

Although the impact and effectiveness of these interventions is greatest when applied through an integrated approach, many can also be implemented independently. In the broadest sense, the proposed interventions contribute towards:

- Increased Food and Nutrition Security (FNS) through more resilient Food Systems.
- Increased Dutch-Ugandan investments and trade that is socially and environmentally responsible and contributing to inclusive growth.

To facilitate the implementation of these interventions, Dutch and Ugandan parties have been proposed. It also proposes RVO instruments where relevant for parties seeking support.

The following key development opportunities, in list of declining strategic priority, are proposed:

1. Investment in domestic feed production;
2. Supporting the entire value chain through investments in raw materials;
3. Improving access to quality fingerlings;
4. Improving technical capacity along the value chain;
5. Development of the domestic consumer market.
6. Improve financing options for small to medium farmers;
7. Formation of farmers' associations and other unifying bodies;
8. Ensuring regulation is properly implemented;

1. Investment in domestic feed production

Feed is currently the biggest bottleneck among farmers.

Potential implementing partners NL	De Heus, Trouw Nutrition, ForFarmers, AgriFirm.
Potential implementing partners UG	Ugandan private sector.
Suggested support tools	SDGP, FMO.

Challenge: Scarcity of quality, affordable feed

- Feed is the largest constraint limiting the growth and development of the aquaculture sector. Compared to other livestock sectors, fish feeds are relatively more difficult to produce and commercial fish feed production in especially cages is nearly not possible with complete feeds.
- **Farmers are sensitive to the quality of feed they give their fish**. However, farmers reported difficulty in accessing quality feed during their production cycles.
- The feed available on the market is expensive and is the largest contributor to both cage and pond farmers' costs. Feed contributes 36 – 79% of the total production costs in aquaculture. As a result, many farmers use on-farm produced feed or cheaper and lower quality locally produced feed.
- **Domestic feed producers quote the high expenses incurred in sourcing the feed ingredients such as plant protein, animal protein and non-protein inputs like maize as the key drivers of their costs.** Local feed producers end up charging high prices for their feed or compromising on the quality of feed in order to charge more competitive prices.
- The other challenge is the high adulteration of feed ingredients such as silver fish (mukene) which is mixed with sand to increase its weight. Most Ugandan feed input producers such as soybean producers also can't guarantee stable, consistent supply throughout the year. This leads to price fluctuations especially in times of scarcity.
- Despite the high prices, the general market is skewed towards internationally produced feed, whose quality is more guaranteed than locally produced feed.

Opportunities: Investment in feed production

- There is a clear opportunity for the start of aquafeed production in Uganda. The market is growing, and predominantly geared towards floating fish feeds. Any entrant would now benefit from first mover advantages.
- A local feed manufacturer is critical to further democratic sector development, allowing also smaller farmers to access affordable feeds and prosper.
- As Uganda has a high domestic production of maize and thus relatively low maize prices, it is well-positioned to become a regional leader in feed production and the investor could capitalize on further regional growth.
- To lower risk, a multi-species feed plant can be considered, including for example poultry feeds. This is another fast-growing livestock sector in Uganda.
- To increase the likelihood of an investor establishing production in Uganda and being successful, the EKN should consider engaging in three other opportunities mentioned in this Road Map:
    1. Invest in the development of the supply chain, to lower costs of raw materials and improve their quality;
    2. Invest in skills of farmers and technical support to grow the customer base;
    3. Support local fingerling production, possibly through promoting a partnership between feed manufacturer and existing hatcheries.

2. Invest in domestic raw material value chain

Lack of consistent quality feed inputs increases production costs.

Potential implementing partners NL	RijkZwaan, Delphy, East West Seeds, Heineken, De Heus, Trouw Nutrition, ForFarmers, AgriFirm.
Potential implementing partners UG	Ugandan financial sector, ACF & aBi, Proteen
Suggested support tools	SDGP, Impact Cluster, EKN delegated funds

Challenge: Lack of available quality raw materials

- **Domestic feed producers quote the high expenses incurred in sourcing the feed ingredients such as plant protein, animal protein and non-protein inputs like maize as the key drivers of their costs.** Local feed producers end up charging high prices for their feed or compromising on the quality of feed in order to charge more competitive prices.
- The biggest challenge with producing feed is sourcing high quality ingredients at competitive prices. Due to a lack of locally available quality ingredients, some local feed producers import their ingredients such as their protein.
- The other challenge is the high adulteration of feed ingredients such as silver fish (mukene) which is mixed with sand to increase its weight. Most Ugandan feed input producers such as soybean producers also can't guarantee stable, consistent supply throughout the year. This leads to price fluctuations especially in times of scarcity.

Opportunities: Investments in raw material production

- **For a feed producer to be successful, there is a need for quality raw materials available on the Ugandan market. This will also significantly reduce cost of feed and thus cost of production, as key ingredients no longer need to be imported.**
- **Feed producers can consider supply chain investments and linkage to secure supply of the feed inputs.** This can be through relationships where the producers of plant or alternative proteins can be supported. Such a relationship will also allow for guaranteed offtake of quality products for producers of raw feed materials.
- Given the high risk and size of this investment, this would be a great opportunity for project-based support from development partners, given the high impact on Ugandan food security and private sector development. This would incentivize international fish feed producers to start production in Uganda, while improving livelihoods of many farmers of soy or alternative protein ingredients.
- The Netherlands has great expertise in improving agricultural production, and similar collaborations supported by the Dutch government have been highly successful in other countries such as Myanmar.

3. Improve quality of and access to fingerlings

There is need for more commercial hatcheries across all the regions in Uganda

Potential implementing partners NL	Main Dutch aquaculture stakeholders already active in Uganda, such as Trouw Nutrition or Koudijs
Potential implementing partners UG	Ugandan Private Sector
Suggested support tools	Impact Cluster, SDGP, EKN dedicated funds

Challenge: Scarcity of quality fingerlings

- There are a few large-scale commercial hatcheries in Uganda. Many of the large-scale hatcheries produce fingerlings for their own consumption at their farms such as SON fish farm and Yalelo.
- Farmers complain about having no access to quality tilapia and catfish fingerlings. Some hatcheries do not disclose the true type of fingerlings they provide. Technical results are better in fish farming when working with monosex fingerlings. However, many farmers reported obtaining fingerlings which were labelled as monosex but later started reproducing in the fish ponds.
- There are very few catfish hatcheries in Uganda. Catfish farmers incur high costs in accessing fingerlings. As a result, many catfish farmers try to produce their own fingerlings The fingerling quality and production is poor by the limited technical knowledge of the farmers.
- Rocksprings fish farm is one of the largest tilapia hatcheries and is located in Tororo, Eastern Uganda. Farmers travel from as far as Mbarara and Bushenyi (more than 500 km away) to access fingerlings from Rocksprings.
- As a result, subsistence farmers depend on their Fisheries Officers and Government programs like Operation Wealth Creation (OWC) to get access to fingerlings. Some of these dispatched fingerlings never arrive as promised. For example, in Luweero, 6,000 fingerlings were sent by the Operation Wealth Creation but the consignment that arrived only had 900 fingerlings.

Opportunities: Improving access to quality fingerlings

- **Establishing large-scale hatcheries in the different regions to serve farmers.** This would save farmers transport and logistic costs incurred in getting fingerlings from more distant districts. These hatcheries can be government-run, or preferably, through private sector investment. Feed producers can also partner with hatcheries to provide a package deal to farmers.
- **Establishing hatcheries that produce fingerlings of other species such as catfish.** Uganda has many tilapia hatcheries and very few hatcheries that produce fingerlings of other species.
- **Partner with established farms to operationalize existing infrastructure or set-up (new) infrastructure.** Multiple major fish farms either have existing hatchery infrastructure not currently in use, as well as ambitions to supply third-parties with their newly to be constructed hatcheries.
- **Offer capacity building**. Hatcheries need to be trained on the processes involved in the breeding of fingerlings and farmers on the care of fingerlings upon arrival. This will lead to high quality fingerlings being more available to most farmers and their surrounding communities. It will also lead to better success rates in the production of monosex fingerlings,

4. Improving technical knowledge

Limited technical know-how is deep rooted across the aquaculture value chain

Potential implementing partners NL	WUR, Van Hall Larenstein, Zone.College, DAE, main Dutch aquaculture stakeholders already active in-country
Potential implementing partners UG	NARO, NAFIRRI, Fisheries Training Institute
Suggested support tools	Orange Knowledge Programme, Impact Cluster, YEP, EKN delegated funds, K2K programs.

Challenge: Limited technical knowledge

- There are technical knowledge gaps across the entire aquaculture value chain mainly affecting hatchery operators, feed producers and farmers.
- Most farmers reported learning about fishing either from a previous farm or learning during their activities on the farm. **Few farmers underwent any formal training related to agriculture or specifically aquaculture.**
- Farmers lack the knowledge and skills required in preparing ponds, managing ponds and cages, how often to feed their fish, among others.
- The low levels of professionalism among most farmers can also be attributed to limited technical knowledge. Some farmers lack practices such as record keeping, biosecurity and water quality testing because they don't understand the implications these activities can have on their production.
- **Farmers heavily rely on technical assistance from Local Government fisheries officers and extension workers.** The challenge with this is the limited number of extension workers who can't effectively serve all farmers.
- Some farmers try and mix their own farm feed or take ingredients and a formula to local feed millers to mix feed for them. However, they are uncertain of what quantities of ingredients to add to their locally mixed feed. Some may add more ingredients such as silver fish (mukene) in order to increase the protein content, but this can have adverse effects on the water quality of their ponds and affect the fish.
- The technical knowledge gap also extends to hatcheries and farmers who try to produce fingerlings on their farms.

Opportunities: Training programs for farmers and teachers

- There is a clear need to increase the technical capacity of the entire value chain, from feed producers, hatchery operators, traders to the farmers. This will significantly improve their production efficiency, profitability and sustainability.
- This training needs be practical in nature, and shown in a real world setting. This can be achieved at demonstration fish farms, serving as practical locations, or at practical training locations such as the Aquaculture Academy (Kenya).
- With a rapidly digitizing country, leveraging digital tools can increase the reach and spread of information throughout the country. Initiatives for such a digital learning environment have been started by FoodTechAfrica, but this can be expanded and promoted broadly.
- Smaller farmers can be organized into associations and cooperatives for easier training and capacity building. Through these groups, farmers should be educated on the importance of record keeping, biosecurity, water quality testing, among others. Additionally, equipment like water quality testing equipment can be shared among cooperative members since it could be costly for each farmer to own one independently.
- Moreover, collaboration could be set-up between Ugandan and Dutch education institutes (K2K) to improve fish farming education in the country. This should be geared towards practical skills and competence-based learning. A similar collaboration between vocational education institutions in Tanzania, being the Dutch MBO Zone.College and Tanzanian FETA, has been very successful. This can be complemented by training of Dutch experts from the field, with great practical expertise. The Dutch Aquaculture Experts (DAE) have many such experts as members.

5. Provide suitable financing and insurance

Financial institutions continue to shy away from lending to aquaculture sector

Potential implementing partners NL	Rabobank, AgriWallet, Lendahand, training providers.
Potential implementing partners UG	Ugandan financial sector, ACF & aBi
Suggested support tools	DGGF, FMO, other IFIs such as IFC, WB, InvestNL

Challenge: Lack of financing and insurance options

- Across the aquaculture sector, lack of funding for working capital requirements and expansion activities diminishes farmers' capacity to produce larger quantities and better quality. Interest rates from commercial loans are high, resulting in only people with access to capital from other businesses or family able to start fish farming. In other sectors and aquaculture industries worldwide, much of the growth has been financed by other actors along the value chain.
- Various programs have been developed by the Government of Uganda with the aim of getting financing closer to various players in the agricultural sector. These initiatives include the Agricultural Credit Facility (ACF) which offers a lower interest rate of 12%, and the Agricultural Business Initiative (aBi) which provides lines of credit and guarantees to businesses in the sector.
- However, securing funding from ACF and aBi is increasingly difficult because farmers that are most in need of funding do not qualify under the requirements of the programs. As such, the industry is still faced with limited financing options despite the existence of government initiatives.
- Farmers also cite challenges in accessing credit arising out of lengthy bureaucratic procedures that cause delays in acquiring funding,
- There are presently no insurance options in Uganda's aquaculture sector despite the fact that a large proportion of farmers are faced with unexpectedly low harvests and security challenges among others,
- The limited financing options, coupled with the complete lack of insurance, leaves fish farmers unable to build capacity and vulnerable to unexpected shocks.

Opportunities: Improve financing options

- The ACF presently serves the large actors in the sector and is riddled with politics. Even seasoned businesses find it complex to obtain these funds from commercial banks. From the interviews, only 3-4 fish farms have been beneficiaries of the facility even though most of the members are large scale, well-run farms.
- Typically, small-scale farmers in Uganda generally exhibit low levels of professionalism; their enterprises are often unregistered, limited levels of education, no record keeping, no business plans, little-to-know credit scores, among others. These factors render them financially excluded from being considered recipients of loans from most financial institutions within the country, the ACF inclusive.
- Whereas larger farmers can attract international low-cost funding such as DGGF financing, smaller Ugandan players have limited financing options.
- As such, a recalibration of the ACF program requirements would create a more conducive environment for small-scale farmers to acquire funding.
- Furthermore, focusing on the aBi's guarantee scheme would ensure that commercial banks contribute to the aquaculture sector since the aBi absorbs most of the risk.
- To ensure efficiency and results however, it is essential to offer technical assistance to farmers, including on entrepreneurship. This would improve their farming practices and build their capacity to pay back loans.
- Dutch banks could provide a leading advisory role, having a strong ecosystem of agriculture financing. Dutch fintech solutions such as AgriWallet or Dutch crowdfunding tools such as Lendahand can also play a supporting role.

6. Developing the domestic consumer market

Increased sales to Ugandan consumers will reduce sectoral risks.

Potential implementing partners NL	Main Dutch aquaculture stakeholders already active in Uganda, such as Trouw Nutrition or Koudijs
Potential implementing partners UG	Yalelo, MAAIF, NARO, Ugandan marketing companies
Suggested support tools	PSD-Toolkit

Challenge: Market dependency on export

- At current, most of the aquaculture production from Uganda is regionally exported, with limited domestic sales. This is a risk to overall sector sustainability, as the frequent border closures in the region and other trade disputes could potentially negatively affect the industry.
- However, domestic demand is still limited, with fish consumption rates in Uganda significantly below recommended WHO levels.
- Outside of the Lake region, access to fish is also limited and most fish is also not consumed fresh.

Opportunities: Develop the domestic consumer market

- Instead of imposing export restrictions, which should be avoided at all cost when looking to support this value chain, interventions should be geared towards increasing domestic consumption of fish.
- There is a real opportunity to develop the local market for quality, fresh fish. This fish commands a premium and such improves profitability of the sector. Moreover, this high-quality fish leads to better product quality and food safety for consumers.
- Currently, Yalelo is leading the development of the domestic consumer market for fresh fish, by establishing well-branded outlets throughout Uganda. This is increasing the availability of fresh quality fish to consumers in the country, while
- There is an opportunity to leverage and support this initiative, through a general Eat More Fish campaign, promoting quality fish. A similar campaign has been successfully run in Kenya.
- Other fish farmers could also be supported with locations where they can sell fresh fish as well, overcoming the barrier of needing an integrated sales outlet..
- As there is a significant lack of affordable proteins in Uganda, increased domestic sales would also improve food security. Fish is a healthy protein, with many positive health benefits, Omega-3 fatty acids and vitamins such as D2 and B2. It is also a great source of minerals, and thus serves as a high nutritious food that can support food security.

7. Improve market dynamics

The aquaculture sector in Uganda is heavily uncoordinated and unstructured.

Potential implementing partners NL	AgriTerra, Solidaridad, Main Dutch aquaculture stakeholders already active in Uganda, like Trouw Nutrition or Koudijs
Potential implementing partners UG	Ugandan private sector, MAAIF
Suggested support tools	Impact Cluster, DGGF

Challenge: Inefficient market dynamics

- Relationships between input suppliers, farmers, traders and other market players are vital to the smooth functioning of the value chain.
- In Uganda's aquaculture sector, farmers have less power than traders. This was evident in the fact that at harvest, traders come to the fish farm and offer the farmers significantly low prices for their fish, rendering them unprofitable or unable to break even.
- Due to the limited number of traders per region, they have the power to provide very low prices to the farmers with no consequence to the trader.
- Furthermore, the Ugandan market currently prefers fish farmed in cages. This leaves pond farmers with low market demand and results in most of them selling their fish in the surrounding community.
- In addition, the low production capacity of farmers makes them unable to sell their fish to export markets and regional markets within the country where they could get better prices for their fish. However, this is not possible due to a lack of ice containers and frozen trucks. As such, small-scale farmers are limited to traders and consumers in their immediate surrounding community.
- Given the infancy of the country's aquaculture industry, large-scale producers like Yalelo have not yet sufficiently penetrated the market. Consequently, there are limited distribution centers across the country, leaving some regions and districts unserved.
- The relations between traders and farmers, the preference for cage farmed fish and the infancy of the aquaculture sector all speak to market inefficiencies that limit the sector's growth and development.

Opportunities: Formation of farmers' associations

- Organization of farmers under unifying bodies like associations and cooperatives would go a long way in alleviating several of the market-based challenges farmers and other sector actors face.
- Unity under an umbrella body would give farmers the ability to collectively bargain for higher prices and reduce their vulnerability to traders .
- Collective bodies also give farmers access to connections and links that can be vital to the improvement of their farms and farming practices. In addition, it is easier to communicate, train, and manage farmers under a group because most of them are located in rural areas which are characterized by long distances between farms.
- An improvement in the quality of pond farmed fish could make it more preferred in the market. This is an opportunity for input suppliers to contribute to the improvement of the sector as their inputs are vital to the growth of the fish. The improvement could be in form of higher quality fish feeds or better-quality fingerlings.
- Investments in cold chain and post-harvest cooling for small scale pond farmers, in a cooperative form, would also allow them to store fish until traders are able to reach the farm, improving their position in the market.

7. Support regulatory framework

Upcoming new regulations require support for proper implementation.

Potential implementing partners NL	EKN
Potential implementing partners UG	MAAIF, UG government
Suggested support tools	G2G

Challenge: Regulatory reform needs to be properly implemented

- There are several key regulatory changes upcoming that could greatly benefit the sector and could promote future Dutch private sector involvement. However, these also can negatively affect industry development.
- The aquaculture and the Fisheries and Aquaculture Bill looks to update the regulations within the sector that were last updated in the 60s. The bill is on floor in the Parliament and is looking to pass.
- The implications of the Aquaculture Bill 2020 on exports cannot be fully predicted. There is a perception from the government that the law allows any manner of value addition such as removing scales, intestines, packaging, among others. However, industry insiders express a worry that it might harm the sector and there is a need for the government to address these legitimate concerns from the industry.
- Moreover, under the EU-TRUEFISH project, zoning of the Lake is likely to be supported. This is critical, as sustainable development of the aquaculture sector requires suitable site selection to avoid environmental damages as well as resource conflicts with other users of the Lake such as fishermen.
- Finally, at current, import duties are waived when directly importing feeds for own use at fish farms. However, when these feeds imported with the purpose of being sold in-country to smaller farmers, duties apply. As such, larger farmers importing directly have a distinct tax advantage over smaller farmers regarding costs of feed, which is the main cost driver in aquaculture production.
- For all three, after the passing of legislation and the introduction of adequate regulatory framework, it is essential that is it is well-enforced and implemented.

Opportunities: Support regulatory framework

- The EKN can work with the MAAIF for a full regulatory review and assessment of the impact of the new Fisheries and Aquaculture Bill on Dutch private sector involvement.
- It can also work with respective Ugandan agencies to properly structure the implementation of the new legislation.
- Moreover, it could highlight the current discrepancy between the duties payable for importing feed directly by farmers vis-à-vis imports of feed for sale to farmers by non-farmer importers. This creates a distinct tax advantage for larger farmers over smaller farmers, and the Ugandan government should consider extending the duty waiver to non-farmer feed importers as well to promote broad growth of the sector.

Legislatory review and impact assessment and potential implementation support of the new Fisheries and Aquaculture Bill.

Overview of support instruments

Available RVO/Invest International instruments for Private Sector Development

Instruments	Description
PSD Toolkit	The PSD Toolkit is a set of instruments available to the Embassy and RVO to develop small projects such as sector studies, small training programmes or for the formation of Public-Private Partnerships.
SDGP facility	The SGDP facility supports Public Private Partnerships that contribute to achieving the SDGs through a grant subsidy. This partnership should have at least one Dutch partner. The instrument is currently closed for applications.
Impact Cluster	The Impact Cluster is a RVO tool available for the development of integrated value chain clusters. An Impact Cluster is mutually designed by an Embassy, a consortium of Dutch and local businesses and RVO.
DHI	The demonstration projects, feasibility studies and investment preparation studies (DHI) is a subsidy for SMEs with international ambitions in emerging markets. Dutch companies can apply for subsidy for demonstration projects, feasibility studies or investment preparation projects.
FVO	The Fund for Responsible Business supports Dutch partnerships that wish to address the underlying causes of Responsible Business Conduct risks and misconduct in their value chains and implement measures to address them.
PIB	Partners for International Business (PIB) is a programme that allows Dutch businesses to enter into a public-private partnership to realise their international ambitions. This is primarily focussed on matchmaking, networking and economic diplomacy.
DGGF	The Dutch Good Growth Fund (DGGF) is set up to help Dutch entrepreneurs realise their international ambitions in emerging markets and developing countries (DGGF countries). The fund supports investment, import, export and investment funds. Since October 2021, DGGF is managed by Invest International instead of RVO.
Develop2Build	Develop2Build (D2B) is a Government-to-Government programme offering governments in 37 developing countries and emerging markets direct assistance in setting up infrastructural projects. Since October 2021, DGGF is managed by Invest International instead of RVO.
DRIVE	DRIVE facilitates investments in infrastructural projects that contribute towards a good business climate and entrepreneurship in the priority sectors: water, climate, food security, and sexual and reproductive health and rights (SRHR). Public infrastructure projects that have a high development relevance in other sectors also can apply for DRIVE support. Since October 2021, DGGF is managed by Invest International instead of RVO.
SIB vouchers	SIB vouchers can be used by Dutch businesses, to hire a consultant for market studies, participate in a trade mission or to hire an international lawyer.

Overview of support instruments

Other Dutch organisations and tools

Other Dutch (funded) organizations or initiatives	
PUM	PUM is a volunteer organization of Dutch experts supporting businesses worldwide. 180 PUM representatives are spread over 35 countries across the globe, with 1700 experts being active in 45 sectors.
NUFFIC OKP (ends in 2021)	The Knowledge Programme offers scholarships, training and institutional partnerships between education institutions in Technical and Vocational Education and Training (TVET) and higher education, in fields related to the priority themes of the Dutch government: • Food and nutrition security • Water, energy and climate • Sexual and reproductive health and rights • Security and the rule of law This is implemented through a number of calls, published on the website of NUFFIC. As of now, it is still unclear whether OKP will continue to exist in a different form from 2022 onwards.
YEP Program	The Young Expert Programme allows young experts, both Dutch and local, in the Agro&Food sector to gain experience in an intercultural environment an work on a specific project related to either Water, Agrofood and/or Renewable Energy. Up to 50% of the salary of this young expert is subsidized by the Dutch Ministry of Foreign Affairs.
CBI	The CBI supports entrepreneurs to become successful exporters to the European market through export coaching projects.
Atradius Dutch State Business	Atradius Dutch State Business offers a wide range of insurance and guarantee products for Dutch exporters of capital goods, their financiers and/or investors. It also assist in finding other funding through the Dutch Good Growth Fund.
FMO	FMO is the Dutch entrepreneurial development bank. FMO manages funds for the Ministries of Foreign Affairs and Economic Affairs of the Dutch government to maximize the development impact of private sector investments.

Annex

Development programs in the aquaculture sector - profiles

Promoting Economically Sustainable Aquaculture (PESCA)

Partner organizations	The Nature Conservancy, European Development Fund
Focus	Cage farming, Pond farming
Area	Uganda
Objective	To increase fish production and profitability through cage aquaculture with minimal impacts on the aquatic environment and other lake uses.
Period	2017 – 2024
Current activities	➢ PESCA is helping fish farmers across the country set up cooperatives. The cooperatives are based on their sub-counties. The goal is to organize farmers into groups which can easily lobby for financing and access to quality inputs. ➢ PESCA is also establishing two aquaculture parks in Uganda. Mwena aquaculture park is a cage-based aquaculture park being established in Kalangala, with a projected annual capacity of 20,000 MT. The land-based aquaculture park is being established in Apac district in Northern Uganda. ➢ PESCA has also provided water quality testing equipment to two pond farmers in Masaka, Central Uganda.

A water testing equipment donated to a farmer in Masaka by PESCA

Development programs in the aquaculture sector - profiles

Building Resilient Communities, Wetlands Ecosystems and Associated Catchments in Uganda Project

Partner organizations	United Nations Development Program (UNDP), Green Climate Fund (GCF)
Focus	**Wetland Restoration Program**
Budget	USD 44.3 MN
Area	Eastern and Western Uganda
Objective	To restore and sustainably manage wetlands and support target communities in wetland areas of Uganda to reduce the risks of climate change posed to agricultural-based livelihoods.
Period	2016 – 2025
Current activities	The Building Resilient Communities, Wetlands Ecosystems and Associated Catchments in Uganda project aims to support the Government of Uganda in the management of critical wetlands that are being affected by climate change. Some of the program's current activities include: ➢ Restoration of wetlands and their eco-system services, in an effort to reduce the increasing pressures on wetlands by encouraging alternative livelihoods, resilient agricultural practices and sustainable land management practices like reforestation. ➢ Some of these alternative livelihoods and resilient agricultural practices include pond farming. ➢ Enhancing the skills of people living in wetlands to diversify their livelihoods and become more resilient to climate shocks while reducing their exploitation of wetlands.

Fish ponds in Bushenyi district constructed as part of the UNDP project

Development programs in the aquaculture sector - profiles

EU TRUE-FISH Program

Partner organizations	European Development Fund, Lake Victoria Fisheries Office (LVFO), WorldFish, Food and Agriculture Organization (FAO)
Focus	Pond & Cage Farming
Budget	EUR 10.15 MN
Area	EAC region
Objective	To contribute to the development of competitive, gender equitable and sustainable aquaculture.
Period	2019 – 2024
Current activities	The True-fish project aims to address impediments to growth in aquaculture faced by investors. It has three main components which will be implemented by different partner organizations as discussed below: ➢ The LVFO will implement the first component and strengthen commercial networks for competitive aquaculture-related businesses. ➢ FAO will concentrate on improving skills through vocational training centers in the Uganda, Kenya and Tanzania. FAO will also foster sustainability of monitoring and surveillance of aquatic animal health conditions, and instituting zoning, particularly for cage culture in Lake Victoria. ➢ WorldFish will implement the third component which consists of improving the protection of biodiversity.

Market sizing methodology

1. **Market Definition**
   - Examining the reared fish species by district
   - Determining the pond and cage production by district from DFOs.
   - Determining the Tilapia and Catfish FCR by district from DFOs for both pond and cage.
   - Determining the total cage production from UCFFA
2. **Market Segmentation**
   - Determining the average pond production per region.
   - Computing the production per species
3. **Pond Market Sizing**
   - Determining the Tilapia and Catfish from ponds triangulated from production figures obtained at district level
   - Computing the average pond production per species per region
   - Tilapia production from cages figures obtained from UCFFA
4. **Feed Market Assumptions**
   - FCR for Tilapia and Catfish taken as average FCR reported from different districts visited.
   - Computing the average FCR for Tilapia and Catfish in both ponds and cages
5. **Feed Market sizing**
   - Target Feed market sized based on total production volumes from ponds & cages and the average FCR for Tilapia and Catfish in pond and cage
6. **Feed Market Sizing**
   - Total feed market range computed using minimum and maximum production per species.

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List of interviewees

Number	Name of actor	Category
1	Peter, Busia	Pond farmer
2	David, Busia	Pond farmer
3	Omar, Mukono	Pond farmer
4	Vincent, Busia	Pond farmer
5	Salama Farm & Hatchery, Busia	Pond farmer
6	Francis, Busia	Pond farmer
7	Acres of Hope, Nebbi	Pond farmer
8	Musoke, Mayuge	Pond farmer
9	Bogere Fish Farm, Buikwe	Pond farmer
10	Joseph, Buikwe	Pond farmer
11	Silvatorio, Lira	Pond farmer
12	Geofrey, Lira	Pond farmer
13	Mapema fish farm, Mbarara	Pond farmer
14	Dejafa mixed farm , Mbarara	Pond farmer
15	Nicken fish farm, Isingiro	Pond farmer

Number	Name of actor	Category
16	Augustine, Kasese	Pond farmer
17	Ntanda model fish farm, Kasese	Pond farmer
18	Sanga aquaculture, Bushenyi	Pond farmer
19	Kabeihura mixed farm, Bushenyi	Pond farmer
20	Jamuji fish farm, Bushenyi	Pond farmer
21	Peter, Kayunga	Pond farmer
22	Ali, Kayunga	Pond farmer
23	Global View Holdings, Nebbi	Pond farmer
24	Glorious Streams Farm, Wakiso	Pond farmer
25	Katwe fish city farm, Masaka	Pond farmer
26	Pallotine fish farm, Masaka	Pond farmer
27	Masaka Youth Devt organization, Masaka	Pond farmer
28	Wilber, Luweero	Pond farmer
29	Johnson, Mayuge	Cage farmer
30	Erisa, Mayuge	Cage farmer

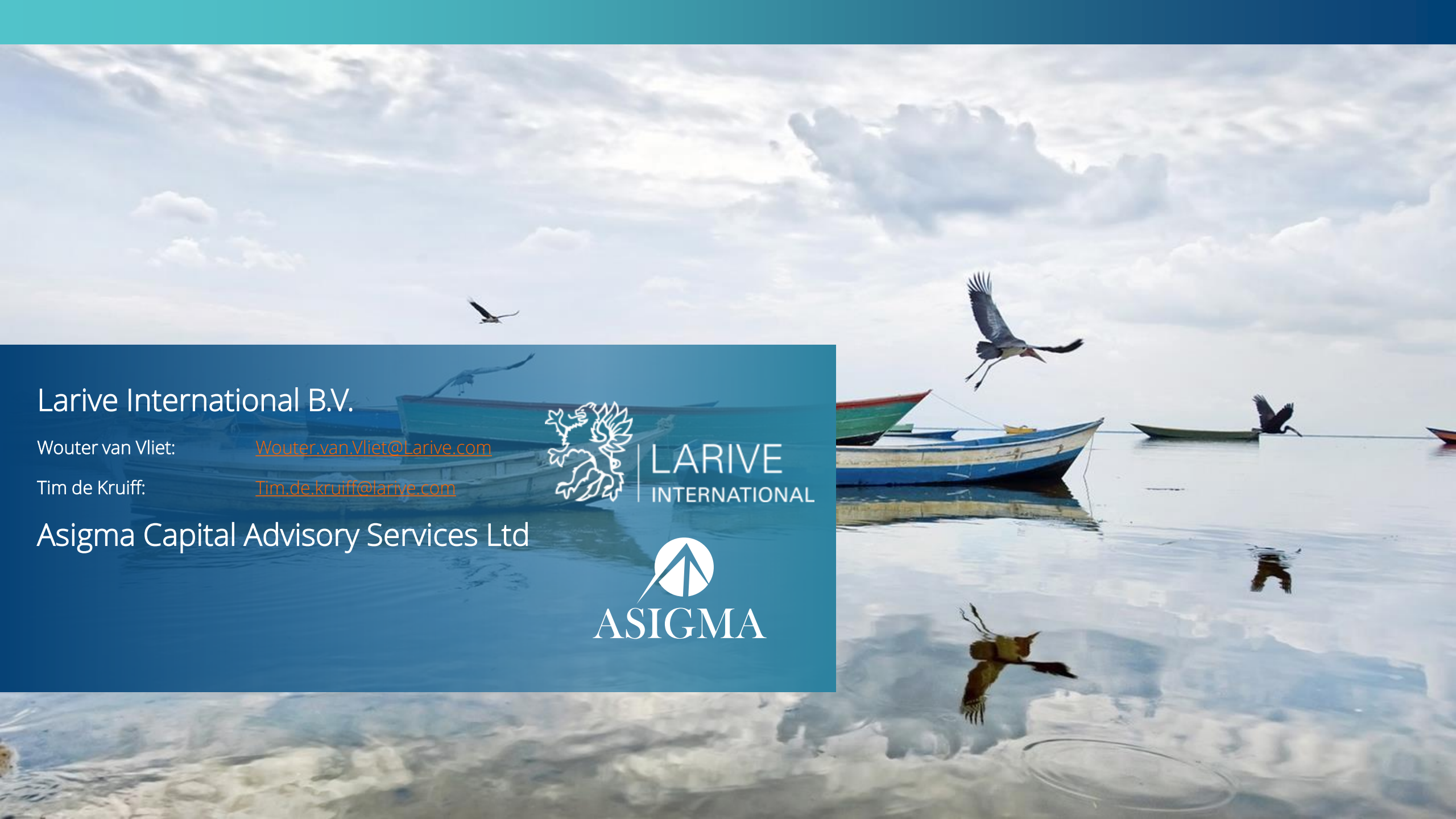
List of interviewees

Number	Name of actor	Category
31	James, Wakiso	Cage farmer
32	Anthony, Mukono	Cage farmer
33	Farouk, Jinja	Cage farmer
34	Buikwe	DFO
35	Mukono	DFO
36	Kayunga	DFO
37	Luweero	DFO
38	Wakiso	DFO
39	Tororo	DFO
40	Masaka	DFO
41	Mbarara	DFO
42	Bushenyi	DFO
43	Kasese	DFO
44	Lira	DFO
45	Busia	DFO

Number	Name of actor	Category
46	Nebbi	DFO
47	Mayuge	DFO
48	Sylvia, Busia	Trader
49	Yasin, Busia	Trader
50	Ayob, Busia	Trader
51	Rosemary, Busia	Trader
52	Patrick, Busia	Trader
53	Edward, Kisoro	Trader
54	Kanyana, Kasese	Trader
55	Ugachick	Feed producer
56	Naschick Fish Feeds Ltd, Kampala	Feed producer
57	Angir Feed Millers, Nebbi	Feed producer
58	Enoch, Wakiso	Feed producer
59	Rocksprings fish farm, Tororo	Hatchery
60	Salaama farm and hatchery, Busia	Hatchery

List of interviewees

Number	Name of actor	Category
61	Kabeihura mixed farm, Bushenyi	Hatchery
62	David, Luweero	Hatchery
63	Lira District Farmers' Association	Association
64	Uganda Commercial Fish Farmers' Association	Association
65	Walimi Fish Cooperative Society (WAFICOS)	Association
66	MAAIF	Expert
67	MAAIF	Expert
68	Albertine region expert	Expert



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