Business Opportunities in the Value Chain of Aquaculture and Fisheries

in Addis Ababa City Administration and its surroundings

A project co-funded by the European Union

BIC ETHIOPIA
AFRICAN BUSINESS INCUBATOR COMMUNITIES

Study developed

አዲስ ቻምበር
ADDIS CHAMBER

Table of Contents

Contents

Abbreviations

The following abbreviations are used in the report:

AACCSA :	Addis Ababa Chamber of Commerce & Sectoral Associations.
Das:	Development Agents
EU:	European Union
FAO:	United Nations Food and Agriculture Organization
FFARM PLC	Farmers Access to Remunerative Markets Private Limited Company
FVC:	Fish Value chain
GOE:	Government of Ethiopia
GB:	Government Bodies
GTP:	Growth Transformation Plan
HH:	Head of Household
KII:	Key Informant Interview
MFIs:	Micro Finance Institutes
MOA:	Ministry of Agriculture
MSMEs:	Micro, Small and Medium Enterprises
NGO:	Non-Government Organization
SMEs:	Small and Medium Enterprises
SWOT:	Strength Weakness Opportunities and Threats
TOT:	Training of Trainers
UNs:	United Nations

Acknowledgement

Facilitating Farmers Access to Remunerative Markets Private Limited Company (FFARM PLC), the undertaker of the consultancy service, would like to thank Addis Ababa Chamber of Commerce and Sectoral Association (AACCSA) for the opportunity it provided us to work on Business Opportunities of Aquaculture and Fisheries in Addis Ababa City Administration and its surroundings. We also thank the management staff members of AACCSA that played a great role in facilitating the smooth running of the study.

FFARM PLC would also like to thank various personalities such as individuals and cooperative members engaged in fish business, government organizations and the private sectors for their kind cooperation to provide us the necessary information during our field work, Key Informant Interview and Focus Group Discussions.

Study conducted by: FFARM PLC

Addis Ababa, January 2024

Project background and introduction

BIC Ethiopia

BIC Ethiopia targets strengthening the incubation ecosystem for entrepreneurs and micro, small and medium-sized enterprises (MSMEs) active in agri-tech and agri-business in Ethiopia. Key challenges addressed are sustainability of business models for incubators, quality of business support services, availability of services outside Addis Ababa, access to finance for MSMEs and strengthening the relevant regulative framework supporting start-ups. There is a specific focus to expand services beyond Addis Ababa to also cover secondary cities and rural Ethiopia to support geographically inclusive growth.

The project aims to address these bottlenecks in the Ethiopian startup ecosystem by working with fifteen (15) selected existing and newly established incubators and by supporting them in developing sustainable and technically sound business models. The incubators are thus enabled to better support start-ups and MSMEs in agricultural technology and agribusiness to improve market access, generate higher incomes and create jobs.

The action is implemented by a consortium of five organisations, led by sequa gGmbH, a German non-profit specialist in private sector development in low-income markets, active internationally since 1991 and in Ethiopia since 2002. The Addis Chamber of Commerce and Sectoral Associations capitalises on its reach-out to 50,000 SME members and its experience to shape national policies in favour of the private sector. adelphi gGmBH and GrowthAfrica Foundation contribute their vast experience in curriculum development towards start-ups, entrepreneurs, the capacity building of incubation hubs and acceleration programmes, and access to finance strategies. icehawassa, a national grassroots innovation centre, and the Ethiopia-focused foundation Menschen für Menschen (MfM) establish, expand, and manage incubation centres in the southern and northern regions.

BIC Ethiopia also works with the Ethiopian Association of Startup Ecosystem (EASE) and the regional network BIC Africa. The former is currently being established by private, academic, and non-profit incubators to serve as a network and discussion forum for incubation centres in Ethiopia, while the latter is a regional network supporting business incubators in Africa to excel and spark a wide impact in society.

This publication was produced with the financial support of the European Union. Its contents are the sole responsibility of the BIC Ethiopia consortium and do not necessarily reflect the views of the European Union.

Executive Summary

The fishery sector is considered as one of the government priority areas within the development programs of livestock and fisheries sector to enhance food security and provide alternative source of income to the rural and urban people. In line with this, the overall objective of the study commissioned by AACCSA is to assess business opportunities in the supply/value chain of aquaculture and fisheries sector and form a better knowledge base that will be used to provide inputs to Micro, Small and Medium Enterprise (MSMEs) to expand and realize businesses ideas in aquaculture and fisheries to enhance investments and create an employment opportunity.

To achieve this objective, there is a need to assess and identify the magnitude of aquaculture and fisheries business in the intended study areas as well in the country level. Thus, AACCSA took this initiative and commissioned FFARM PLC to undertake the assessment of the fish business in Addis Ababa and its surroundings in a value chain approach.

Addis Ababa City Administration is the capital city of Ethiopia, and it is divided into eleven sub cities. The total population living in the city is about 5,704, 000 in 2024 and it is increasing from year to year by about 4.4% (www.macrotrends.net).

Addis Ababa lies on a plateau in the country's geographic centre at an altitude of about 2,450 m above sea level. The City is estimated to have an area of approximately 527 square kilometres. It is endowed with few rivers that pass through the city, which are not clean enough to be used for drinking and aquaculture development as well and this is due to problem of sewages from inhabitants and some companies.

The annual rainfall of Addis Ababa city administration is 1098 mm per year, and it gets rainfall for about 148 days per year. The maximum monthly rain amount in Addis Ababa is around 300mm that occurs during the months of July and August (Conway et al.2004) and low rainfall magnitude occurs from November to January. The average temperature of the city is 18.6°C, with the minimum of 12.2°C and a maximum of 25.1°C (www.climatestotravel.com).

According to the result of the study fish supply to Addis Ababa and its surrounding is mainly from far areas that include Koka, Ziway, Arba Minch, Bahir Dar, Afar, Fincha, Tekeze, etc, since there is no various water resources around the city that are suitable for fish production.

In general, fishing in the country is mainly artisanal. Most fish caught are used for family consumption while the remaining amount is sold at urban markets to get extra cash income. Some people that live near water bodies meets their animal protein requirements through fish consumption. Fishery is practiced using traditional technique and tools and there is no significant variation throughout the country in the fishing methods and it is traditionally employed.

Fishing is both collective and individual activity in the country. Riverine fishing is seasonal, and the supply of fish is largely available during drier period from mid of October to May. However, occasional fishers catch fish during the wet season (June–October) as well.

Modern or improved fishing gears were introduced long time ago, during the support provided from European Union through the project organized by Ministry of Agriculture (around 1990) and are being used by individuals and fisher cooperatives. These are gill net, seine nets, hooks and line, and cast net. Some of the gears are supplied by relevant government bodies and NGOs. Generally, there is a scarcity of fishing net accessories such as twine for net making and mending, floaters, sinkers and

different water-resistant ropes at local and national market. Most fishers, from rivers and small lakes, are operating using traditional wooden dig out canoe with traditional fishing gears. Hence, no improved fishing boats have been introduced in most parts of the main water bodies.

Due to the limited control mechanism, the exact numbers of fishers are not well known. But few numbers of legalized cooperatives are found in major water bodies of the country.

The mode of fish utilization is in fresh, dried, fried-dry and smoked form. All types of fish and all parts of the fish except the gut content and scales are consumed. However, fresh fish handling practice is poor and less hygienic. After landing, whole fishes are transported by non-standard sacs with other food crops, plastic dish or hand hanging to take to the markets. The marketplace in some towns has no adequate facilities such as shade, racks, potable water etc., for handling fresh fish. Fish grading is also done based on freshness, size and fish species. The fresh fish in the morning costs higher than long displayed one.

The demand of fish in each market varies and the team observed that there is unbalance between demand and supply. In addition, the supply of fish in each market is irregular in terms of amount as well as delivery time. The price of fish is also different from in landing sites and from town to town.

The estimated fish production potentials of major lakes, reservoirs, small water bodies and rivers in the country are found to be about 94,500 tons/year (Gashew 2014) whereby much of the production potential is expected to come from the lakes (42% of the total potential yield) followed by major rivers (27% of the total).

The current level of fish production in Ethiopia is below the anticipated maximum sustainable yield, which is less than 40% of the potential. The country has a huge diversity of fish species, but the bulk of the catch and the fish markets are dominated by 19 genera and more than 20 species.

Percentage contribution of the major lakes to the average annual landings in Ethiopia include Chamo (29%), Langeno (7%), Ziway (19%), Koka (7%), Hawassa (7%), Tana (17%), Abaya (8%), Turkana (4%) and South Wallo lakes (2%).

The inland fish diversity of Ethiopia represents 12 orders, 29 families and 70 genera, and the total number of fish species are about 180 including 37–57 endemics. Species diversity and composition vary within the Ethiopian geographical areas. Among the drainage systems, the White Nile system within the territory of Ethiopia accommodates the most diverse fish fauna. However, it has been observed that there are challenges that affect effective fish production in Ethiopia. These are:

- Over exploitation: Some lakes have shown signs of an over exploitation, and these include lakes such as Hawassa, Ziway and Chamo,
- Proper fishing method: Mesh size regulation and type of fishing gear are not strictly monitored,
- Time and place of fishing: Fish caught during breeding time in shallow areas of lakes is not well monitored,
- Introduction of exotic fish: Introduction of exotic species is done without taking into account the necessary precaution,
- Water hyacinth and pollution,
- Inappropriate fishing gears, and
- Capture during spawning time and lack of considering place and time of capturing fish.

The federal fisheries proclamation was ratified by Parliament on 4th February 2003 and the proclamation is referred to as the Fisheries Development and Utilization Proclamation No. 315/2003 (FDRE, 2003). This is the latest legal document specific to the fisheries sector. It has the following objectives:

- Conserve fish biodiversity and its environment as well as prevent and control over exploitation of the fisheries resource,
- Increase the supply of safe and good quality fish and ensure a sustainable contribution of the fisheries toward food security, and
- Expand the development of aquaculture.

The National Aquaculture Development Strategy of Ethiopia developed in April 2009 is to integrate fish sub-sector to others to facilitate the development of viable and sequential aquaculture plans to develop and establish national and regional capabilities for development planning, monitoring, surveillance and enforcement in aquaculture.

The observation made during the study has also shown about the importance to consider and implement according to effective management practices of fish production. These include:

- Prohibition of destructive gears and any poisonous and explosive materials,
- Mesh regulation including both twine type and mesh size,
- Area, seasonal and reserve (park) area closure,
- Regulation on number of fishing gears, and
- Licensing and taxpaying fishers.

It has also observed that there are different types of fish market channels in fish business that include individuals, cooperatives and other actors. These are:

a. At Cooperatives level:

1. Input (boat, fishnet, etc.)-cooperative-retailers-Hotels-Consumer
2. Input (boat, fishnet, etc.)-cooperative-retailers-consumer
3. Input (boat, fishnet, etc.)-cooperative-Hotel-consumer

b. At Individuals' level:

1. Input (boat, fishnet, etc.)-Individuals-retailers-Hotel-consumers.
2. Input boat, fishnet, etc.)-Individuals-coop-retailers-Hotels-consumer.
3. Input (boat, fishnet, etc.)-Individuals-coop-Hotels-consumer.
4. Input (boat, fishnet, etc.)-Individuals-Hotels-consumer.
5. Input (boat, fishnet, etc.)-Individuals-consumers.

Supports from Bureau of Agriculture, livestock and fishery development and cooperative promotion offices are expected to be provided to the fish cooperatives at Federal, Regional States and Addis Ababa city administration. Hoverer, the result of the assessment made has revealed that relevant staff of these organizations needs to have proper direction and supervision, adequate technical training, experience and a sustained job interest in order to be able to effective service provision.

If the fish business is well managed, its contribution to food security is very high in the country and the untouched rivarine fishery could also offer several opportunities in creating employment

opportunities for poor members of society who have little access to land and alternative income generating opportunities.

It has also been observed that there are several identified fishery development problems that mainly include fish resource utilization, fish quality assurance and marketing system, fisher community development and institutional capacity building process. Hence, to ensure sustainable fish resource utilization, there is a need to pay attention to more awareness creation, strengthen input service providers (refrigerator, gears, ice box, fish conservation mechanism, etc.), strengthen/reorganize fishers cooperatives, facilitation of appropriate open market places (local selling shades), access to credit service, capacity building through training, infrastructure development, promoting entrepreneurship in fish trade, resource monitoring and management and sustainable market linkage.

“

Aquaculture development in Addis Ababa and its surroundings is still in its infancy, but there are efforts to promote its growth and positive impact on livelihood and food availability.

01: Introduction

Fisheries play a pivotal role in ensuring food security and employment opportunities for over 59.5 million people globally. Fish provides 19 % of Africans' animal protein consumption (Obiero et al., 2019).

Fish marketing in Africa, including Ethiopia, is often informal in which actors in informal markets may not give due attention to food safety since the commodity could pose a possible health hazard to consumers (Lokuruka, 2016). The Ethiopian water body could support a yield of about 94,500 tons of fish per year, indicating substantial contribution to food security and income generation (Deng, 2020). Coincident with the potential volume of fishery resources, there is a need to enhance fish consumption habit and improve the quality of available fishery products (Alemu and Adesina, 2016; Yilma et al., 2020). It is evidenced that the annual per capita consumption of fish was 240 g/person which is less than 10% of fish consumption in East African sub-region (Tesfaye and Wolff, 2014). However, currently it is about 500g/person.

Ethiopia remains at a lower status in fish quality due to a number of determining factors, including the location of the fishery, season, the degree of pollution of the fishing ground, and the infrastructure available for handling and processing of fish (Deng, 2020).

Fish consumptions are influenced by cultural, geographic, and socio-economic factors (Verbeke and Vackier, 2005). In addition, the frequency and preference of non-sensory factors (risk perception, behavior, personal attributes and beliefs) as well as sensory elements (texture, taste, smell, freshness) may influence food preferences (Honkanen et al., 2005).

Moreover, it is reported that fish consumption in Ethiopia is limited due to lack of interest, limited areas of availability, fear of spoilage, religious matter and lack of habit of consumption (Alemu and Adesina, 2016). Fish consumption, production, and export could be improved by implementing practical and long-term plans to solve linked obstacle factors in one's own country (Supartini et al., 2018).

According to the 10 years Development Plan of Ethiopia fishery sector is considered as one of the government priority areas within the development programs of livestock and fisheries sector in the Ministry of Agriculture. This is in connection with the program of enhancing food security and provide alternative source of income to the rural and urban people. In addition, it is attempted to promote fish culture along with the water resource development program that includes water harvesting and formation of multifaceted reservoirs. The objective of the fishery development program is then to increase fish production and supply fish from natural and manmade water bodies in a sustainable way without affecting the diversity of aquatic life and then linking the product to markets.

It is in line with this objective that the study has been initiated to identify the opportunities and challenges of fish value chain development in general and in Addis Ababa city administration and its surroundings in particular.

Addis Ababa has no enormous water bodies that can be used for diverse fish resources. The fishery resource has been exploited from distant areas and sent to Addis Ababa for marketing by different value chain actors.

It has also been observed that the current level of development and utilization of the fishery resource to achieve food security and economic growth in Addis Ababa and its surrounding is not as it would

be. A wide range of constraints contributed to this problem, of which lack of skilled human power to explore the opportunities and appropriate intervention devises are the critical ones.

To this effect, Addis Ababa Chamber of Commerce and Sectoral Association (AACCSA) has commissioned FFARM PLC to undertake Business Opportunities of Aquaculture and Fisheries in Ethiopia, Addis Ababa and its surrounding in a value chain approach.

02: Objective

The overall objective of the assignment is to assess business opportunities in the supply/value chain of aquaculture and fisheries sector and form a better knowledge base that will be used to provide inputs to Micro, Small and Medium Enterprises (MSMEs) to expand an investment and realize businesses ideas in aquaculture and fisheries sector**.**

The specific objectives of the study include:

- Analyze trends in aquaculture and fisheries input supply, production, processing, marketing, and consumption,
- Identify business opportunities and challenges in inbound logistics, production, processing, and marketing of aquaculture and fisheries and propose the possible interventions for the identified challenges to be benefited from the opportunities, and
- Identify bottlenecks and challenges and put forward recommendations from the vantage points of promoting MSMEs in input, production, processing, distribution, marketing, and processing, investigate the future potential/outlook and appraisal of the sector for industrial processing and investment potentials.

03: Scope of the study

The scope of the study covers assessment on fish sourcing, producing and marketing of the product, analysis of the product in a value chain approach, future business potential of the product, success stories of business actors, challenges facing the business of the product and recommendations for future improvement.

04: Methodology

The study was made by visiting and discussing with relevant stakeholders on aquaculture and Fisheries sector development. The methodologies employed were review of different reports and other existing pertinent literatures, field assessment, consultation and exchange of information, ideas and opinions with relevant institutions and individuals in Addis Ababa city and its surroundings, and other relevant areas. The participants during the discussion included, Ministry of Agriculture, Federal Fishery and other Aquatic Life Research Centre (Sebeta), Addis Ababa Urban Agricultural development Commission, Sheger city Agriculture Office, Oromia Agricultural Bureau and

cooperative promotion offices, Non-government Organizations, relevant fish experts at various levels, cooperatives, processors (hotels), super markets and consumers using structured and semi-structured questionnaires. Observation was also made at fish market sites in Addis Ababa that include private shops in Pizza and Kera, restaurants, supermarkets and Fishery production and marketing enterprise.

05: Water resources and Fisheries in Ethiopia

Ethiopia is gifted with large volume and several inland water resources. It has been a landlocked country since 1993, so its fishery comes exclusively from inland water bodies. These water bodies include lakes, rivers, streams, reservoirs, ponds, huge floodplain (e.g. Gambella). It has substantial wet lands that are of great socio-economic, ecological and scientific importance.

Fishing has been the main source of protein supply for many Ethiopians particularly for those who are residing in the vicinity of major water bodies (Gambella region, Rift Valley lakes and Lake Tana).

Modern fishing techniques were introduced in the 1980s and 1990s, with fisheries development programs (by Ethiopian Orthodox Church) and Lake Fisheries Development Project financed by European Union.

Ethiopian scientists became increasingly involved after the 1970s ((Shibru, 1973; Getachew, 1980; Shibru and Fisha, 1981). Later studies were focused on Limnological features of lakes and reservoirs, Biology of some fish species, fish diversity, ecology and preliminary estimates of fish production potentials.

05.1: Inland water bodies of Ethiopia

The country has 12 river basins with a mean annual flow (runoff) estimated as 122 billion m3 (Awulachew et al., 2007) and a total length of all rivers estimated as 8,065 km. Rivers such as Awash and Omo-Gibe terminate into Lakes Abbe and Turkana, which are shared by Ethiopia with Djibouti and Kenya, respectively.

Table 1: Major water bodies, with their length and potential yield

Water bodies	Area (km2)	Length (km2)	Potential yield estimated Ton/year			
			Brueil (1995)	FAO (2003)	Gashaw & Wolf (2014)	% of 2014
Major Lakes	7740	-	47,400	23,342	39,262	42
Major Reservoirs	1447	-	4,100	4,399	7,879	8
Small water bodies	4450	-	-	1,952	25,996	27
Rivers	-	8065	-	21,788	21,405	23
Total	13,637	8,065	51,500	51,481	94,542	100

Source: Buueil (1995), FAO (2003) and Gashow and Wolf (2014)

The country has also many lakes and reservoirs, and a number of small water bodies and large floodplain areas distributed throughout the country and covering a total surface area of about 13,637 km2 Inland water bodies of Ethiopia. The estimated potential Fish yield is increasing from year to year as shown in the table below.

05.2: Commercially important of fish species

Fishing in Ethiopia is improving from time to time and it is caught for family consumption as well as for marketing. Most of the population that lives near water meets more of their animal protein requirements through fish consumption. Fishery is practiced in a traditional technique and tools as a past time activity. Riverine fishing is seasonal, and the supply of fish is largely available during drier period from November to May. However, occasional fishers catch is during the wet season (June–October). The significance of fishing in terms of economics, food security and employment opportunity is enormous. However, currently the available fish resource is not fully utilized in Ethiopia to benefit the local people due to several factors.

According to the result of the assessment (table 1), the annual potential yield of fish production in Ethiopia increases during the last fifteen years and reaches about 94,500 ton/year. However, the actual catches of fish are believed to be significantly lower than this estimate. But still the current level of production is below the anticipated maximum sustainable yield, which is insignificant related to the total fish potential.

The result of the study has also shown that there is a huge fish potential with diversity of fish species out of which 49%, 20%, 9%, 8% and 8% are Nile Tilpia, African catfish, Labio, Nile Perch and African big Barb respectively. Commercially important fish species are indicated in the table 2 below with their percentage composition.

Table 2: Commercially important fish species in Ethiopia

No.	Type	% landing	Location
1	Nile Tilpia	49	All main water bodies and rivers
2	African catfish	20	Most main water bodies and rivers
3	Nile Perch	8	Lake Abaya, Chamo, Baro Akobo
4	African big barb	8	Most widely distributed rivers and Tana Lake
5	Labio	9	Lake Abaya, Chamo, Baro Akobo
6	Bagrus	2	Lake Abaya, Chamo, Baro Akobo
7	Common carp-exotic	1	Central and Northern rift valley lakes
8	Crucian carp-exotic	1	Central and Northern Rift Valley Lakes
9	Others	2	

Source: Compiled by the study team, 2024

05.3: Fish production potential of water bodies

Although the method of assessment is not indicated, Gashaw and Wolf (2014) estimated (table 1) that out of the total fish potential, 42% and 27% are from major lakes and Small River bodies respectively. It is worth mentioning that there is a need to study in depth and identify the potentials of each water bodies so that effective fisheries management strategies will be employed accordingly.

05.4: Fishing

According to the result of the assessment, there is no registration or licensed investors involved in fishing activities. The exact number of individual fishers is not known as well. However, there are cooperative that organized in the business of fishing activities mostly at the main water bodies of Ethiopia. The role of women in the fish business needs to be redefined (e.g., cleaning, drying, packing, transporting fish to markets could be some of the activities that they can perform) since it is not easy for them to hunt for fish during night and daytime for longer hours. In general, it is worth mentioning that most people inhabiting the water bodies of the rivers fishing would become a subsistence activity and family members including children involved in this business.

05.5: Fish handling

In many of the landing sites, fishes are displayed directly on the ground with or without plastic sheet for a long time. Less preservation methods used. With these conditions, fish will be easily contaminated and losses its quality and finally becomes spoiled.

The storage life of fresh fish is depending mainly on the storage temperature, the size of the fish, the catching methods and time of the catch. The small fish spoiled fast within half a day, while large fish can stay up to one day keeping other parameters constant. The main problems of fish marketing, according to their importance are sanitation of landing sites, site (location) of market places, time of accessibility of fish, availability of fish type and less quantity of fish supply to market places. Hence, the main hygiene practice for fish supply chain is shown here below.

Table 3: Practices of hygiene along the supply chain of fish

On boat	On landing site	Transportation	Fish processing Plant	Selling markets
Boat	Personnel hygiene	Vehicles or trucks	Personnel hygiene	Stands, tables
Fishing nets	Washing facilities (showers, lavabo, liquid soap, etc,)	Iceboxes	Cold room hygiene	Washing facilities
Fish boxes	Public toilets	Cristal Ice	Ice boxes hygiene	Cold chain
Fishermen hygiene	Ice facilities	Fish Boxes	Temperature	Fish inspection

Source: Compiled by the study team, 2024

05.6: Fish season

Fishing is highly seasonal in some rivers that include Baro, others rivers, etc,. Flooding between June and October prevents most fishers operating and thus the main fishing season is mostly restricted to the drier periods from rivers. However, fish is caught and sold in all seasons from lakes and reservoirs, but its availability may reduce during rainy season due to road inaccessibility and inconvenience of boat and fishing nets handling.

05.7: Fish preparation methods

The main fish preparation practices are indicated as follows:

Dried fish: In most cases, dried fish are prepared only in dry season. This is mostly happening in areas where there is sunny and hot. In these areas, the external side of fish is split, which is exposed to direct sun, hardens rapidly forming a crust which keeps moisture inside the fish. The breaking of dried fish due to poor handling is the common problem. Hence, the overall quality is low and increases the post-harvest losses.

Fried dry fish: Women processed and marketed fried dry products and mostly they prepare for self-consumption. They also used as supplementary cash income. Fried-dry products are prepared mainly from African catfish.

Smoked fish: There is a tradition of preparing two types of smoked fish. The first one is smoked on wooden shelf. The other one is simply smoked the fish above the fire. However, firing is not purposely done for smoking fish but cooking other foods. Modern smoking ovens are also applied.

05.8: Fresh and dried fish handling

The main reasons for post-harvest loss were found to be poor handling and processing at landing site. They usually use sun drying as a means of improving the shelf life. It is done simply on the ground or just few centimeters above the ground with rack but without any cover, resulting in high contamination of fish with soil, sand and different microorganisms and thereby high loses and health risks.

Solar drying is more effective and efficient than open drying. In addition, solar dried fish products have higher quality, with significantly less contact of sand and soil; have firm texture, fresh fish odor, and an extended shelf-life of over six months. Therefore, solar drying should be introduced for better quality products and income generating.

05.9: Readiness of the community to work on fishery

The local people who live near riverside and other water bodies are mostly dependent on fishing. The result of the study has revealed that most of the members of the community who live in nearby of the water bodies have carried out in fishing activities and transport what they harvest to market by using human labor, bicycle or Bajaj. The people use different traditional equipment for catching fish. These equipment are locally made and most of them are not effective. They actively involved in fishing particularly for securing their family daily food requirements and covering minor costs of home. Generally, the people surrounding the rivers/lakes are willing and enjoy engaging in fish production and resource management, but they need to reorganize and have a tailor made training and regular monitoring in order to ensure supply of the quality fish product to the markets without affecting fish stock.

05.10: Fish marketing and distribution

The demand of fish in urban markets is increasing and during the study time the team observed unbalance between demand and supply. In addition to this, the supply of fish in each market is

irregular in terms of amount, quality as well as delivery time. Most fishers and traders who look for transportations are unable to supply fish on time. Due to this, processors (Hotels) and consumers in towns face a problem on waiting for fresh fish. As a result, the fish which can be delivered to the market becomes much liable for spoilage due to improper transportation facility on time.

The price of fish in the towns is also different from place to place. The major difference lie on many factors including taste preference (how much tasty the fish is), freshness (how long the distance of landing site from the towns), the availability of transportation facilities to distant areas.

05.11: Fish consumption

The existing food culture for the people in Ethiopia depend predominantly on meat and the desire for fish consumption is not well developed mainly because of limited access of the product to the needy people. According to the results of the study made by the team, most of the people do not include fish in their daily consumption program and few of them eat fish occasionally or not at all. The choice of fish species depends on many factors including abundance of the species in the market, unit price of fish, size of fish, purchasing capacity of individual and testiness of the fish species. The result of the study has also indicated that Tilapia (Koroso), Nile Perch (Nech Asa), Cat Fish (Ambaza), Common carp (Aba Samuel/Duba) rank first to four in that order, regarding consumers preference. It has also been observed that there are good markets for roasted fish followed by cutlet and fish soup.

06: Aquaculture and fish resources

06.1: Aquaculture-general situation

Aquaculture is defined by the UN's Food and Agriculture Organization (FAO) as the farming of aquatic organisms including fish, molluscs, crustaceans and aquatic plants. Fish farming implies some sort of intervention in the rearing process to enhance production, such as regular stocking, feeding, protection from predators, etc. Fish farming also implies individual or organized groups' ownership of the stock being cultivated by considering the planning, development and operation of aquaculture systems, sites selection, facilities and practices, production and transport.

According to FAO analysis(2016), given that many wild fisheries are fully fished or over-fished, it is evident that aquaculture will play a central role in filling the gap between the increasing demand for seafood and what capture fisheries can provide.

A recent study (University of Stirling, 2016) estimates that 14 million tons of whole fish from capture fisheries and 2.7 million tons of fish byproducts (e.g. through the landing of previously discarded fish and processing waste) are used to produce 4.6 million tons of fish meal and 0.9 million tons of fish oil at present. This is likely to grow by 25–30% over the next 10 years, mainly as a result of increased fish by-product availability.

Similar source has indicated that in Europe, aquaculture is mainly dominated by micro and small enterprises; it accounts for about 20% of fish production and directly employs some 80,000 people. While the volume of aquaculture production in the EU has remained relatively constant over the last decade, the value of production has grown by over 40%. It has also been noted that Aquaculture is

dependent on clean, healthy, fresh water and soil type.

Table 4: Classification of aquaculture types

	Commercial			Subsistence
Description	Industrial aquaculture	SME aquaculture	Small-scale commercial aquaculture	Subsistence aquaculture
	Large-scale commercial	SME enterprises	Small-scale aquaculture enterprises	
Production systems	Tanks (flow/ recirculated), cages, ponds arrays	Tanks(flow), pond, cages	Mainly ponds, lagoons, tanks, small cages/pens	Ponds (rain-filled)
Labor	Salaried employees	Mixed, presence of permanent employees	Mainly family members. Activities are integrated into other small-holder farming	
Capital	Shared ownership	Family or family groups	Family ownership only	
Management	Financial management with on-farm technical support	Mainly family members, with some professionals Assistance	Mainly family, possibly with some professional assistance	Family only
Market type	100% sales, including export	Mainly sales, both local and regional	Mixed sales and subsistence	Fully subsistence, little or no sales
Legal status	Operated as a limited company	Limited company or association, independent or none	Sole trader/farmer, or none	Little or no legal status as operators
Access rights to land and water	Legal concession for use	Land owned by the operator or family, or rented	Access to land through customary or family rights	

Source: Adapted from Oswald and Mikolasek, 2016

Asia dominates global aquaculture accounting for 92% of all production. China (57 million tons) and Indonesia (13 million tons) are the main producers, together with India, Vietnam and the Philippines. The second largest regional producer in volume terms, the Americas, produces around 3 million tons of aquaculture–just over 3% of the global total (FAO, 2016).

Africa produced around 1.74 million tons of aquaculture produce-less than 2% of global production. This is mostly produced in Egypt (1.1 million tons) with other major producers being Nigeria (313,000 tons) and Uganda (111,000 tons). Almost half (43.6%) African production is of Nile tilapia. Other freshwater fish species such as African catfish (11.9%) and common carp (10.5%) are also important aquaculture products. Much of the tilapia and catfish are semi-intensively produced, thus requiring an additional feeding.

The observation during study has revealed that there is considerable impetus to develop aquaculture in sub-Saharan Africa, including small-scale cage farming in the large lakes as well as small-scale fish farming integrated into family agriculture systems.

In Africa, commercialization of small-scale aquaculture has been hampered by various factors, such as poor availability of inputs, limited government support and socio-economic circumstances. Productivity in African aquaculture in general has failed to grow at the same pace as in Asia and is falling behind demand as human populations increase (WorldFish, 2010).

Hence, there is an essential aspect for investors /SMEs to identify classification of aquaculture and have a clear understand before its implementation. The main classification of aquaculture types are indicated in the table below.

06.1.1: Explanation of type of aquaculture

Industrial aquaculture: Industrial aquaculture is a highly controlled commercial activity. Most companies will be vertically integrated, owning their own broodstock and hatchery, and often post-harvest processing facilities. The stocking is at high densities (usually focused on a single species) thus requiring a high level of environmental management and husbandry; a process that is increasingly being automated. In all intensive aquaculture, the fish are feed concentrated diets, water quality is often optimized and thus growth rates are high. All this requires considerable investment and ongoing costs (feed, power, labor, maintenance, know-how, managerial capacity, etc.) and thus intensive aquaculture usually focuses on high-value species to ensure a good profit margin.

Small to Medium Enterprise Aquaculture: SME aquaculture is characterized by its high levels of entrepreneurship. Although unit area productivity may not necessarily be high, SME operations-especially when run in groups or associations can spread over wide areas and contribute substantially to local fish production. They also tend to be highly entrepreneurial and innovative, taking calculated financial and technical risks. They often look into different opportunities to diversify into new species, production systems, or increasing vertical integration, for example, through developing hatcheries. The most common type of semi-intensive system for finfish are ponds, normally made of earth and sometimes lined with clay, fed by a stream or other water source.

The production systems usually require some investment in water management and environmental control. The juvenile fish species are stocked at high densities and there is normally some form of ongoing husbandry, including the fertilization of ponds (to enhance natural feed production), the use of additional feeds, and regulation of the water levels and quality. This process can be materialized through developing a specific SME Aquaculture Strategic Plan focusing on integrated aquaculture/agriculture schemes and using the entrepreneurial spirit of SMEs to develop new strains

and production systems for wider adoption.

Small-scale commercial aquaculture: Small-scale aquaculture provides an opportunity to diversify small-holder farming activities at the family level. As such, it competes with other crops for land, labor, and cash, and the farmer must combine those different agricultural activities to get a better income.

Subsistence aquaculture: Subsistence aquaculture is similar to small-scale aquaculture in terms of its integration into other small-holding activities on the family or communal farm, except that it is at a lower scale, is technically simpler and the production is for family consumption only.

The other important issue for consideration about aquaculture farms is understanding the risks associated with its impacts, management, and preprocessing of its implementation (table 4).

Table 5: Risks of aquaculture and management or mitigation approaches

No	Risks	Likelihood/ impact	Management and mitigation approaches
1	**Environmental**: habitat damage, eutrophication, pollution, Disturbance	Risk heightened by poor siting, farm design, and management. Some impacts are reversible, but many are long-term.	Use of robust spatial planning (e.g. cumulative and/or strategic environmental impact assessments), as well as site-specific that ensure good siting, farm design and mitigate potential impacts. Impacts can be reduced by decreasing farm intensity, promoting integrated systems, and if necessary, as well as site following. Education, careful management, and regulation are essential to ensure any production is sustainable in the long term.
2	**Climate change impacts:**	Risk of loss of activities, jobs, and revenues in certain aquaculture areas.	Spatial planning and mapping of vulnerable areas (relocation). Use of satellite data for follow-up of water level and water quality.
	Changes in the altimetry level of water, water quality, vulnerability of certain areas	Some impacts could be mitigated at the local level but with uncertainty and long-term issues.	Mitigation measures for climate-resilient aquaculture: breeding of species resistant to oxygen deficiency and degradation water quality (e.g. for freshwater fishes, climbing perch, catfish), combination of species with short and adaptable cycle of exploitation, use of local foods, shifts in spawning seasons of the breeding stocks fishes, etc.
3	**Resource use:** impact on wild stocks (adults and juveniles), water resources, and Land	Aquaculture can demand large volumes of fish meal and in some cases, wild juveniles. Canal so utilizes large areas of land that might	Responsible for sourcing of fish meal/oil for feed store Duce to Upstream impacts. Alternately it might be focused on low-tropic species with lower protein requirements, alternative feed resources, and increased feed efficiency (food

		have vulnerable dependents.	conversion ratios) through better husbandry. The development of hatcheries can reduce dependence upon wild juveniles. Proactive resource use planning will reduce land/water Resource conflicts
4	**Genetic and biodiversity:** introduction of exotic species, inter-breeding and unintentional Hybridization	Genetic pollution from introduced species, as well as their habitat/food competition with native species, can have profound negative effects on biodiversity and natural productivity	Local species should be used where possible, which may require research and development/government support to develop viable farming systems and capacity. A strong policy on introduced species, supported by a robust risk assessment, reinforced by import regulations and controls, and strict quarantine facilities is also essential. Strong control and traceability are needed to ensure brood stock lines remain pure, with hatchery and product Certification.
5	**Insecurity:** introduction of pathogens, parasites, Increased resistance to Antimicrobials	Disease epidemics, either from imported animals or from poor management can quickly decimate production. Irresponsible use of antibiotics increases local resistance.	Capacity needs to be established both at the government level to ensure that risks are reduced through preventive sectoral management and where necessary, control, as well as at the industry level to be precautionary against disease risks and react quickly and responsibly at an early stage of an outbreak Good disease diagnostics, quarantine, and inspection services; disease surveillance, monitoring and reporting; national pathogen lists; legislation and enforcement; contingency planning; canal reduce these risks. Applied research is essential, especially in ways of reducing dependence upon antibiotics.

Source: Compiled by the study team, 2024

06.1.2: Approach for investor intervention in Aquaculture

Aquaculture is not just a matter of producing fish, it is part of a complex value chain that is itself influenced by a range of environmental, societal, and governmental factors that make the difference between a successful or failed initiative. Hence, there are some key requirements that need due attention for intervention in Aquaculture development. The key points include:

- **A strategic aquaculture policy, strategies, and development plans:** Food security and economic growth are two main objectives that are commonly promoted for aquaculture. When such guidance does not exist, the elaboration of a national policy based on large consultation should be promoted. It is then essential to refer to the National Aquaculture Development Strategy of Ethiopia, which was launched in 2009.

- A good understanding of existing aquaculture and its value chains, together with the opportunities and constraints to development: The successful production of seafood is just one part of the value chain. In order to succeed long term, aquaculture needs to be profitable, and it is essential that reliable markets are secured with a potential value chain that ensures financial viability for all participants. This aspect needs serious consideration during the design phase, as it might influence key design criteria, such as: species selection (reflecting market demand, price and seasonality), system design (which in turn influences input costs, margins and risk), production scheduling (pick time for more fish consumption) processing and transformation.

- **Involvement of the private sector, farmers, and producer groups:** Aquaculture development should be mainly private sector driven and it is important to find ways to interact with farmers and the other actors of the value chain, possibly through multi-stakeholder groups. Small-scale farmers can, through organization, gain the advantages of economy of scale in accessing services and markets, which are otherwise limited to large commercial farmers. In line with this, farmer groups also improve information exchange and sharing among group members.

- **Adequate and affordable credit availability and financing instruments**: Aquaculture requires an up-front investment in terms of land, infrastructure, and inputs (e.g. fingerlings and feed). Insufficient access to capital and cash liquidity is one of the most commonly stated constraints to aquaculture development. It is therefore important that financial structures are in place to provide responsible and reasonably priced lending to investor beneficiaries as they expand. However, small-scale farmers may lack the credibility and collateral for accessing formal credit, sometimes resulting in unfavorable borrowing from informal sources. It may be a useful project intervention to both develop the capacity of such proponents to prepare business plans as well as to facilitate lending linkages along the value chain.

- Clear and established rights for access to land tenure and water usage rights, allied to a transparent, fair, and supportive permitting framework: Successful aquaculture is dependent upon the use of a good site that has controlled access to suitable water resources. Therefore, securing long-term tenure is essential, with full support from the government body allocating production rights. On land, ensuring land tenure is equally important, and the development of pond farming or other forms of extensive or semi-extensive aquacultures is highly dependent upon reliable access to suitable water resources. Therefore, robust agreements to access land and water need to be established in advance. It is also essential to have a core of expertise on which to base intervention activities.

06.1.3: Principles for sustainable aquaculture development

There are a number of key principles to be followed when designing interventions of aquaculture development. These are:

- **Align the initiatives with local policy and strategic objectives:** Clear policies for aquaculture development that are supported by plans and measures are necessary. It makes evident sense to align new initiatives with these policies and plans, although they should be reviewed in terms of their current relevance.

- **Build on the existing local situation and learn from past experience:** This might mean using species that already have a viable production base and value chain.

- **Avoid investment in large, expensive infrastructures:** If infrastructure development projects (e.g. hatcheries) are being considered, they should be demand-led and where possible, consider renovating existing facilities rather than new builds.

- **Essential to consider the whole value chain**: Even if there is an initiative then focus on identified weak points. In addition, Communal or collective working initiative is needed to ensure a strong feeling of ownership among the actors.

- **Build economic, social, and environmental sustainability:** This could be done through capacity building, diversifying production with new species or promoting polyculture, improving business management and planning, or focusing on sectoral-level governance. Another approach along these lines is adding value to production along the value chain.

- **Initiatives should consider an appropriate level of risk and impact assessment:** This is essential to ensure that social, economic, and environmental factors are fully considered to reduce the likelihood of any unintended consequences.

- **Initiatives should support technical intervention with suitable capacity building:** It is essential to build the long-term human capacity that is required to ensure sustainable aquaculture development. This needs to be built at multiple levels: for instance with government management and sector support institutions, the private sector (especially at the SME level with fish farm and hatchery technicians), the community, and individuals.

06.1.4: Partnership and coordination

Considering the technicality of aquaculture development, it seems essential to work with experienced implementing partners. These might be development agencies having expertise in this particular field, research institutions, specialized NGOs, banks, etc.

06.2: Aquaculture in Ethiopia

Aquaculture (Fish farming) refers to the raising of aquatic animals in regulated aquatic habitats for any kind of profit-making, leisure-seeking, or public use. It is the managed practice of cultivating aquatic creatures to increase output. It is one of the fastest growing food production systems in the world, with the bulk of its output currently being produced within developing countries, and with expectations for aquaculture to continue its contributions to food security and poverty alleviation.

Technological advancements are also a key trend gaining popularity in the aquaculture market. Major companies operating in the aquaculture market are focused on developing new technological solutions to strengthen their position.

The Aquaculture farm in Ethiopia is at small-scale, subsistence-oriented, and only to a certain degree commercial. The activity on the aquatic resources started in the early 20th century in Ethiopia (Boulenger, 1904) and was mostly done through short expeditions by European travelers and short-term residents around Bishoftu and Dukam areas.

It is estimated that there are more than 1,300 subsistence fish farmers in Ethiopia with different pond sizes of 100-300 m2 (Alayu and Eshete, 2015). The freshwater fish species that are frequently

named as Aquaculture candidate practices in Ethiopia are Tilapia Nilotic, African catfish, common carp, and Rainbow trout.

The discussion made with the Ministry of Agriculture, fishery development directorate experts, and the owner of Fibertech Fiberglass products Manufacturing Industry-dealing with fish input suppliers have revealed that in Ethiopia, the main challenges contributing to low production fisheries and aquaculture practice include limited expert inputs, in site and species selection, knowledge on environmental impact, and lack of awareness, inefficient fishing gears, poor transportation access, poor post-harvest handling, low price at the landing site and improper market place.

In general, the observation made during the study has revealed that there is a need for investors to have guidance that is intended to assist them in identifying their own criteria and options for actions, as well as partners for collaboration, in support of sustainable aquaculture development. Given the diversity in aquaculture and sometimes different perceptions of sustainability, more balanced and informed approaches are required to address developmental and environmental issues at any given location.

07: Aquaculture development in Addis Ababa City Administration

07.1: Location of the city

Addis Ababa has eleven sub cities that include Addis Ketema, Akaki Kality, Arada, Bole, Gulele, Kirkos, Kolfe Keranio, Ledeta, Nifas Silk Lafto, Yeka and Lami Kora (see the map below). These sub cities are categorized into two geographical locations that include the following (table 6).

- Inner sub cities that have no practice of agriculture activities. These include Kirkos, Ledeta, Arada, Gulele and Addis Ketema, and

- Outer sub city: Here, there are some Woredas of the sub cities where famers are also involved in agricultural activities and these are Bole, Nifas Silk Lafto, Akakai Kality, Lemi Kora, Kolfe and Yeka.

As mention above, Addis Ababa has an altitude of 2,450 m above sea level. The annual rainfall of the city is 1098 mm per year. The average temperature in the city is 18.6°C, with the minimum of 12.2°C and a maximum of 25.1°C. Hence, the fish species that can adapt to the climate zone/temperatures of the city needs to be taken into account. Furthermore, Addis city is covered with settlements/buildings and the practice of doing aquaculture has not been well practiced.

However, an attempt has been made to work on Aquaculture development but according to the observation made during the study, there are factors that affect its implementation effectively. These are: limitation in professional supports, inappropriate site selection, lack of available water, limited experience in pond construction, and selection of improper aquaculture fish species, limited knowledge of pond fertilizing and supplementary feed supply and ineffective management practices.

According Ato Mulugeta Jovani, who has an experience in constructing ponds (kirkos, Bole sub cities, etc) for aquaculture development, there is a need to consider construction materials, electric

box, water system, soil type, temperature, PH, Oxygen, hatchery, feed, etc. to establish ponds.

In addition, he estimated the total cost to construct the pond that has 100 m2 (rectangular shape) to be Birr 1.7-2 million (price is in Dec. 2023), which is for enforcement, concrete work, masonry work, cementing, waterproof, Mechanical and biological work, plum barging system, Fingerling stock/feed, starter and growth area, etc.

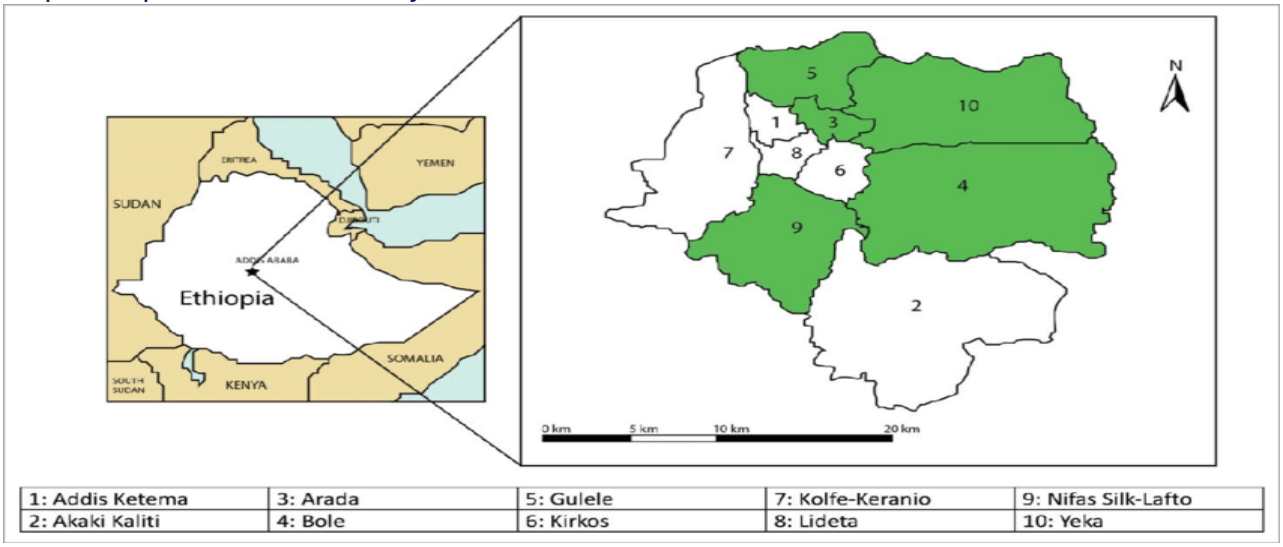
The current status of aquaculture development in some sub-cities of Addis Ababa is shown in the table below.

Table 6: Initiation made to develop Aquaculture in Addis Ababa

No.	Area	Individual	SME	School*	Sub-city	Total	Status
1	Bole sub city	1		1	2	2	Initial level
2	Ledeta			2		2	Initial level
3	Kirkos				1	1	Failed
	Total	1		2	2	5	

Source: Addis Ababa Farmers and Urban Agricultural Development Commission
*Name of the School: Lemat and Mekedela
Table 6: Map of Addis Ababa City Administration

Map 1: Map of Addis Ababa City Administration



1: Addis Ketema	3: Arada	5: Gulele	7: Kolfe-Keranio	9: Nifas Silk-Lafto
2: Akaki Kaliti	4: Bole	6: Kirkos	8: Lideta	10: Yeka

Note: Lemi Kora is one of the sub-cities of Addis Ababa which is not located in the above map

07.2: Land availability

Addis Ababa city is mostly covered by buildings and to get input that includes land for aquaculture farm is not an easy business. However, the discussion made with the expert of Addis Ababa Farmers and Urban Agricultural Development Commission, located in Addis Ababa, has indicate that there is a possibility to organize SMEs and facilitate for them to establish fish farm using ponds. This possibility is justified by indicating the availability of land and water (ground and pipe water) in most sub-cities of Addis Ababa, which have enough land holdings around their premises. It has also been observed that tap water can be used for the intended purpose after undertaking the process of evaporation to purify from water treatment chemicals.

07.3: Rivers

Rivers that pass through the Addis Ababa City Administration are not appropriate for fish production. For instance, the Akaki River flows through Addis Ababa and has been polluted by sewage from factories and residential areas. Tributaries of the Akaki River are Kebena, Banche Yeketu, Kortame, Bulbula, Lequ Soramba, kotebe and Fincha rivers, etc. which are not currently appropriate for fish farms.

07.4: Key challenges of aquaculture production in Addis Ababa city

- Lack of skilled manpower for aquaculture development at the level of support providers, SMEs (to be organized) and individuals,
- Scarcity of land and water and limited know-how about fish production and expansion of aquaculture,
- Limited access to variety of fish seed that can be suitable for different climate zones,
- High cost for feeding farm fish,

- No appropriate demonstration centers of aquaculture development for experience exchange,

07.5: Opportunities for aquaculture development

- Increased demand of fish in Addis Ababa city administration,
- Availability of manpower (to be trained) that wishes to undertake fish business,
- Favourable policy direction for fish business development at Federal level,
- Availability of Sebeta Fishery Research Canter, which has a better experience on the process of Aquaculture development,
- Possibility to prepare feed from agricultural and industrial products, which could be available with lower price,
- Existence of a company/Alema Koudijs Farm at Bishoftu town that prepares feed for fish,
- Existence of better developed infrastructure in the city,
- An attempt made to design and construct ponds at some sub cities of Addis Ababa for experience exchange (success and failure),
- Availability of pond constructors (at some AA sub cities (Mulugeta Jouani) and general Winget college (Adey Agri-tech development PLC)

08: Aquaculture development surrounding Addis Ababa

08.1: Location of Sheger City

The study team has considered sub cities of Sheger to be the surrounding of Addis Ababa. However, the discussion made with the experts has indicated that there is a need to consider/define surrounding of Addis Ababa to be up to 100 km radius to get an appropriate land, water, ecology, etc. The study team has however focused on Aquaculture development in Sheger city. This city was formed by merging Burayyu, Kolobo, Sululta, Laga Xafo-laga Dadhi, Galan, Sabata, Welmera, Barak, Akaki, Sabata Awas, Ertu Mijo, Koye Fache into one city. Sheger covers an area of 160,892.8 hectares of land, which can be adjusted as per requirements.

08.2: Aquaculture development

According to Sheger Agricultural office, it aims to provide support for on aquaculture development so that SME and individuals can be able to get jobs and involved in Fish business. However, aquaculture developments initiated in the areas are at an initial level and this is indicated in table 7. In order to enhance the development of this sector, Sheger Agricultural office, Micro enterprises and the sub cities of Sherger have responsibilities to organize groups of Small and Medium Enterprise (SME) to facilitate for them on how to get land and water (spring, ground water, tap water and river). It has been noticed that tap water can be used through the process of evaporating chlorine/chemical,

which can be verified by experts on this matter. Accordingly, they have been providing supports in preparing ponds, which is 100 m2 (10mx10m) although the Sebeta Fishery Research Center advised them to prepare a pond of 250 m2. Therefore, Sheger city and its surroundings could be one of the potential areas for establishing fish farm.

Table 7: Location of initiated aquaculture developing

No.	Area	Sub City	No. of Existing aquaculture practice	Development Status
1	Sululta	Sululta	1	At initial level
		Mana Abichu	1	At initial level
2	Gelan	Gelan	1	At initial level
		Koye Fechi	1	At initial level
3	Lega Tafo	Yeka	1	At initial level
4	Gefersa	Gefersa Guje	1	At initial level
		Melka Nono	1	At initial level
5	Sebeta	Furi	1	At initial level
		Sebeta	1	At initial level
	Total		9	

Source: Sheger Agricultural development

Map 2: Location of sub-cities of Sheger

Source: Download from the Internet
Note: The white color in the center indicates Addis Ababa

08.3: Key challenges of aquaculture development in the surrounding Addis Ababa city

- Limited technical inputs for the process of developing aquaculture,
- Limited skilled of manpower at Sheger agricultural development office and SMEs (not well organized) levels,
- Diversified Climatic of Sheger city affects the adaptability of fish seed (Sululta area) when compared to better climate areas in Galen, Koye Fache and Sebeta,
- Limited access to variety of fish seeds that can be suitable/adaptable for different climate zones,
- Unavailability of strategies on Aquaculture development at Oromia Regional state.

08.4: Opportunities

- Sheger city agricultural development office has a willingness to provide the necessary supports for the development of aquaculture in the sub cities,
- The availability of land and water in the sub cities of Sheger will contribute to the development of the sector,
- The location of Sheger city is adjust to Addis Ababa and hence this is a favorable condition to supply fish product from Aquaculture farm to the city, which has better market demand,
- Sheger city location has an advantage to access to tailor made training from the other existing institutions to enhance their skills and knowledge about aquaculture and fish marketing.

09: Gender division of labor in fish production

The gender division of labor in Aquaculture development in Addis Ababa and its surroundings is not practiced since the sector is at an initial level. However, the number of women that participate in fish caught area is insignificant and their involvement in fish processing and marketing of dried fishes is increasing from time to time. Their role in processing and preservation of fish is also magnificent and this is one of the areas that need to improve their active participation.

10: Analysis of the fish value chain

Fishery value chain is an interlinked value adding activities that describes how fishery businesses receive raw materials as input (capture and culture fishery), add value to the raw materials through various processes and sell finished products to customers.

The value chain actors including different support functions is shown below. One needs to keep in mind that the value chain in the intervention area is dominated by artisanal or traditional operations, suppliers and markets.

To analyze the fish value chain, cooperatives, individual fishers, and respective buyers were considered. More specifically, the fish value chain is composed of actors, supporter, suppliers of technology input and these include relevant government bodies, non-government organizations, the fisheries (cooperatives and individuals/farmers), processors (Hotels, restaurants), retailers and consumers. The rural households participate in a cooperative or individually as fishers, processor, seller, and user (consumer). Rural households gain economy benefits from fish sales and employment and feed households contributing to household food security/nutrition. The fishery sub sector is diversified sources of income for the actors involved in the business. They get income from sales and food supply for the households.

According to the observation made during the study, Agriculture development offices have attempted to develop the fishery sector to exploit the sector's potential. Inputs suppliers provides supports on fishing boats, refrigerators, fishnets, Fish box, Ice box and other operating supplies-life save jackets. The result of the study has also revealed that the activities of cooperatives include fishing, processing (removing internal organs, fish bones and scales), packing, distribution and selling fish and their members participate in most of these activities.

Cooperatives raise the insufficiency of relational markets (contracts) and contractors sometimes failed to buy the fish stock that they made available to them. Cooperatives also raise the practice of unregulated fisheries and propose the implementation of policy to regulate fishing operations around the fish sources. The unregulated fishery may endanger the future of the fish stock and affect their livelihood as well.

There is also lack of qualified aquaculture and fisheries business personnel and these inadequate demands more capacity building process. Hence, new training institutions should be established, and the existing institutions should be assisted with exchange program and logistics to undertake more work on value chain development.

The transaction relationship among the actors takes an agreement with local suppliers (persistent relationships), whereas the rest buy on the spot market on transactional bases. Actors largely supply fish to consumers. Demand variation, price changes and lack of effective chain were also mentioned by the actors as problems facing the chain. Absence of quality assuring and standardizing institution was also mentioned as a challenge.

The result of the study has also indicated that fishing activities were mainly by male, and this implies that fishing is male dominated because of the difficult for female to undertake the activities of fishing specially by using a boat in the rivers/lakes. Female members of the fishing cooperative participate mainly in processing and selling activities rather than fishing in rivers/lakes. This may call for implementing measures to attract female headed households in the sub-sector since they are very few in number in most of the cooperatives.

Fishers are relatively younger and this implying that the sub-sector is attracting the youth and contributing to the employment opportunity for the increasing young labor force in Addis Ababa and its surroundings as well.

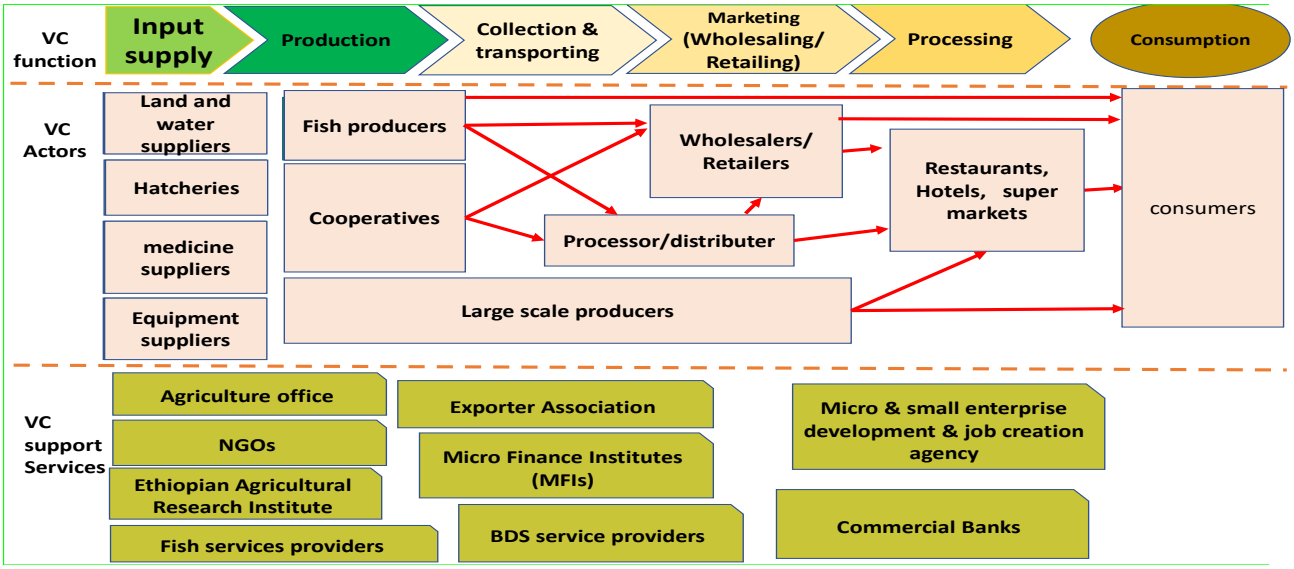
This analysis clearly indicates that the importance of fish to food security and nutritional needs of the consumers and fishing families. However, despite the large fish potential in the country, a few organized fisheries are operating attributed to lack or absence of effective fish value chain

development. Hence, it is important to organize and build the capacity of SMEs in a value chain development that calls for a sound approach to address the complex trade-off between income generation, food security, gender equity, sustainable natural resource management and the overall livelihood resilience.

10.1: Mapping of the fishery value chain

Value chain map shows the flow of product and services among the major actors from early supply of inputs and production up to consumption. It summarizes major value chain actors, enterprises (input suppliers) and value chain supporters. The value chain also illustrates the different market channels that a product takes before reaching the final consumer. Therefore, a value chain is an important tool to use for identifying bottlenecks, as well as possible opportunities that may not be apparent otherwise. Accordingly, the following shows value chain mapping that indicates actors and their service providers and supporters.

Map 3: Map of Fish Value Chain



Source: Result of the field study, 2024

10.2: Fish value chain actor's function

The following explanations indicate the functions of Fishery value chain:

Fisheries: are one of the actors that harvest fish from rivers, lakes, reservoirs and ponds. The major value chain functions that these individuals perform include harvesting, dry, packaging using traditional materials/sacks and make ready for the cooperatives for transporting and marketing. They also sell fresh fish in the nearby markets.

Cooperatives: the members give to the cooperatives their daily catch by a specified and agreed price and they collect cumulative value of their monthly catch by deducting a certain amount as a commission for the cooperatives.

Processors: these are Hotels and restaurants and supermarkets that purchase dry and fresh fish

for consumers. Processors are participating in the gutting, filleting, salting, drying as activities of fish processing**.** The processor or wholesalers transport to their distribution center and will sale to wholesalers and retailer to other part of the country after some processing activity (gutted or filleted). The retailer's distribution area process it more by grading into species, processing type and sale to consumers.

Process retailers: the first are retailing gutted or filleted wet fish in all areas, and some retail activity of dried fish. The second groups are hotels and restaurants participating at the end level of processing both wet and dried fish for the final consumers.

Retailers: these are usually retailing at their shop centers and landing sites as well

Wholesalers- they accessed the fish from fishermen, local assemblers or cooperatives and the processed fish to distributors, retailers, domestic sellers, hotels and restaurants.

Exporters- this is to export fish product some years before. Number of these groups was very limited.

Consumers: These are the final actors of the chain who buy the product from Hotels, super market individuals (at landing site), cooperatives, and retailers for their own consumption.

10.3: Value adding activities

10.3.1: Outbound logistics

Outbound logistics are activities required to get the products to the customer. The major one in the fish market value chain is the transportation activity. Transportation is one of the major value-adding activities that are undertaken by individuals and cooperatives. Most of individuals and cooperatives sale fish at the local markets and linking to distance markets on a sustainable way has not been well practiced. However, the fish harvesters use different transporting means that include cycle, cart, car and Bajaj to supply the product to the markets. Accordingly, the following are their activities that need due attention for improvement:

- Transport:

✓ Fishermen transport their catch from inner to border/landing site part of the water body using fishing and motorized boats to the next level value adding actor. But there is problem to access these materials and this limitation has affected the performance of the fishermen,

✓ Fishermen or local assemblers are carrying the product by themselves in an inaccessible area or use animal drawn carts, and this affected the quality of the product,

✓ Trucks like "ISUZUS" are at road accessible landing sites. Trucks having cold chain system/insulator owned by middlemen participating in the operations. But spoilage and delay in supply of the product has been observed.

- **Sorting and packing:** Packing is essential to protect the product from spoilage and keep the product quality. Some producers in the areas use different materials to supply their

product to the market mainly by using sacks that are not recommended for packing. It has also been observed that most of fishes are supplied to market in two ways, which include dry or fresh.

- **Cool box and refrigerator:** To keep the quality of fish, cool box and refrigerator are essential to be used by individuals, cooperatives, and distributors. The result of the study has however revealed that there is shortage of equipment's at individuals and cooperatives levels. Hence, supports of equipment for fish harvest and keep it in safe is an essential area that needs intervention.

- **Processing:** This is one of value adding activities in the fish value chain, which is undertaken by fisheries, distributors, supermarket, hotels, restaurants and retailers as well. Here the hygiene issues is one of the challenges that need due attention.

10.3.2: Inbound logistics

Fish product marketing flows in different channels by different functions for marketing. These logistics are:

- **Net makers:** the significantly important tool for fishing practice is net (gill net and beach net, cast net),

- **Fishing boat:** applies for fishing activities,

- **Motorized boats:** applies for product collection,

- **Other industrial fishing material suppliers:** different materials to the operation, marketing and sales activities of the whole market value chain that include twine for nets preparation, hook and other related materials. Constraints have been observed in inbound logistics mainly due to shortage of foreign currency to purchase the required inputs. There has also noticed that there is shortage of locally available materials.

10.3.3: Operation

Operation is a value creating activities that use the inputs to have different products. The categories need to build their capacity to undertake their business in an effective and efficient way. These actors include the following:

- **Fishermen:** These are the basis for the whole primary value chain activities (fulltime and seasonal fishermen). Fishermen sell the whole fish at landing site of any water body,

- **Local assemblers-** These are primary value chain actors that assemble from fishermen at the landing site and transport the whole, gutted or filleted fish to the urban centers. These local assemblers are usually transfer the non-processed fish to the middlemen that most likely the whole or portion of it.

- **Cooperatives:** Members of the cooperatives give to the cooperatives their daily catch by a specified and agreed upon price and they collect cumulative value of their monthly catch by deducting a certain amount as a commission for the cooperatives. Cooperatives buy fish from members and transfer to fish merchants.

- **Processors:** These are participating in the gutting, filleting, salting, drying activities of fish processing,

10.4: Assessment of fishery value chain support service

According to the result of the assessment, fish value chain actors are expected to be supported by different organizations and these include ministry of agriculture, Fishery research Institutes, Bureau of Agriculture and livestock development, cooperative promotion offices, trade and Industry office, relevant NGOs, and financial institutions, etc., These organizations are required to provide tailor made trainings, create access to equipment's and provide capacity of fish processing. However, support provision in this regard is not effective and hence there is a need to pay due attention for future improvement.

11: Challenges and opportunities of Fisheries

11.1: Challenges

Fisheries are still an open access resource with no effective and efficient management. Fish has been considered as unlimited resource where anyone can access and harvest with whatever means and methods of fishing practices.

The process of Aquaculture is still at starting stage in Ethiopia. The aquaculture activity that has been undertaken so far is mainly in small fishponds for subsistence or demonstration level except culture-based capture fishery in the big reservoirs.

Currently, in most big water bodies several fishermen are organized as cooperatives. However, most of them have limited capacity in terms of organization, leadership, own policy, monitoring and evaluation, equipment's and having necessary documents. According to the discussion made with fish cooperatives (Batu and Koka), the illegal fishers are estimated to be about half of the legal cooperative members. Hence, having a plan and effective implementing fishing activities will improve the water body administration system. The following challenges are identified as the main challenges of Fisheries.

- Scarcity of modern fishing gears, existing ones are improper and destructive fishing gear,

- Improper landing sites, limited availability of storage and transportation facilities with cold chains,

- Inaccessibility of the fish producers/cooperatives to potential market areas which could affect a sustainable market for their product,

- Lack of quality standard applied during fish processing and limited processing capacity and

marketing infrastructure,

- Fishing is an open activity for anybody and this way of doing the business could affect the fish stock management,
- Lack of awareness of the producers about the limit of fish resources,
- Existence of poor road access to potential areas of fish sources, and
- Limited awareness of the fishers about breeding grounds and breeding season,
- Opportunities for Fisheries

11.2: Opportunities for Fisheries

The following are the opportunities for the Fisheries. These are:

- Availability of high natural inland water resources in the country,
- Existence of constructed and expansion of new dams,
- Fish consumption pattern has been improved,
- Fish resource in most of the water bodies is untouched,
- The idea of aquaculture development has been initiated,
- Government policies gave attention to the fish sector development,
- Availability of experienced individuals and company to provide support/advice on Aquaculture development.

12: Fish value chain SWOT analysis

12.1: SWOT analysis of Fishery management in Ethiopia

S Strength

Fishery legislation at federal level,

Structure for fishery officers from region to district level,

Existence of Gov't bodies at kebele level (DAs)

Legally organized group of resource users (Fishery cooperatives)

Awareness of the coops on fishery resource management. So that they can protect the lake from pollution and degradation of fish breeding

High demand and attractive price of fish,

Availability of stakeholders from different sectors (District agricultural office, Fishery research centre, coops, etc,)

Scientific information on fish biology, lakes' limnology that can be used as an input

Universities started to graduate fishery professionals

W Weakness

Lack of proclamation, directives, bylaws at regional level,

Lack of professionals

Limited fishery knowledge,

Argo-chemical Pollutions and mass fish death observed.

(Lake Ziway),

Erosion and siltation problems coming from water shade area and lake sides,

Open access nature of the resource,

Fishers do not use proper fishing gear,

Fisheries do not provide correct fishery data,

Poor administration and record system,

Competition of resource among each other's,

Conflict between fishermen,

O Opportunities

Political will of the Gov't to give attention to fisheries development,

Aquaculture initiative as an option to reduce fishing pressure,

Fishermen try to shift to other untouched water bodies during risk time

Possibility to involve in value addition of their product.

Technology improvement (storage, transport)

Export possibilities of the product

Possibility to revive over exploited water bodies under good management.

T Threat

Lake of employment opportunities in the community,

Increasing pressure on fisheries,

Expansion of horticulture farm, industries and hotels around the water bodies causing pollution to aquatic environ.

Climatic change

Lack enforcement on effective implementation of fish business,

Environmental degradation,

Conflict among resource users,

Resource depletion under unsustainable utilization

Religious aspects in fish consumption habit

12.2: SWOT analysis by fish chain actors

NO	Actors	S Strength	W Weakness	O Opportunities	T Threat
1	**Producers/ individuals**	• Have a practice in fish harvesting and selling, • Use fish as an income generating and food.	• Low access to inputs (hock, cool box, boat, refrigerator), • Low quality of fish supply to markets, • Lack of proper shade for fish processing and sale • Lack of initiation to organize into groups/cooperatives.	• Increased demand of fish buyers, • Accessibility during dry season, • Availability of water bodies • Existence of cooperatives	• Flood during rainy season, • Pollution of water bodies, • Climatic change • Over exploitation,
2	**Cooperative/youth groups**	• Willingness to organize and do business of fish, • Gain experience of fishing and selling, • Have some fishing equipment's.	• Little supports from government bodies, • Lack of trust by non-members to join the organized groups, • Ineffectiveness of cooperatives, • Finance limitation, • Lack of organizational capacity building, • Limited technical capacity, • Shortage of equipment's for fishing and processing, • Limited access to reliable markets,	• Willingness support provision from Gov't • Huge potential of fish in the area, • Existence of different types of fish, • Support from some NGOs, • Accessibility (Main Road),	• Same
3	**Wholesalers**	• Develop some experiences of buying and selling of fish.	• Lack of facilitators to create a market linkage with individuals and fish cooperatives, • Lack of having a business agreement with fisheries/cooperatives,	• Availability different type of fish to supply to buyers, • Increased fish demand,	

4	**Processors-Hotels**	• Undertake fish process according to customers demand, • Able to prepare fish meal according to the interest of customers.	• Technological problem, for instance to get market information using cell phone, • Low quality of fish supply to markets, • Lack of getting the required type of fish on time, • Lack of having a business agreement with cooperatives, • Lack of promotion about the potential of fish in the water bodies.	• Increased demand of customers to have a fish meal.	
5	**Retailers**	• Better understand about the fish business, • Availability of customers	• Low quality of fish supply, • Lack of having an agreement with fish cooperatives, • Unwillingness to provide business information.	• Easily get fish from suppliers/distributors	
6	**Consumer**	• Some of them understand the need to eat fish.	• Fish is not regularly eaten, • Limited knowledge about the benefit of eating fish,	• Availability of fish in the open markets and supermarkets	

13: Fish Value chain Constraints analysis

According to the result of the study, the following major constraints have been identified with respect to economic growth and sustainable production and marketing of fish resource utilization.

a. **Fish resource management:** Lack of basic continuous fishery data about fish stocks on all water bodies to guide management decisions. There are also limited technological innovations to ensure easy access to fish stocks, reduce post-harvest losses, and increase enterprise productivity.

b. **Fish quality assurance and marketing:** The main constraints regarding to this issue are: Poor handling of fresh and dried fish along the distribution chain mainly due to lack of handling facilities, absence of strong fish trader and cooperative that collects fish from different sites, and Lack of attention by the Federal and Regional States (at grass root level) to practically support fishery development effectively,

c. **Community development**: Communities that involve in fish business lack knowledge in planning, using appropriate technology and business management effectively,

d. **Capacity building:** There is limited skilled fishery extension workers, business development service and research on fishery to support those that engaged in fish business accordingly,

14: Conclusions and Recommendations

14.1: Conclusion

The fishery activity is an important source of food and job creation in the country in general and Addis Ababa in particular. It was concluded that fishing has created employment opportunities for young labor force and large family size households. It has contributed to diversifying household livelihoods, generating more income by engaging business people. The fish consumption has grown timely, implying the food security contribution of fish in the rural and urban areas. The households' income improving the livelihood conditions hence calling for the governments extended supports to attract more fish business people to engage in the sector and scale up the strategy on its sustainability. In addition to building of the productive capacity, linking fisheries to the market through cooperatives/ SMEs would also essential as it minimizes fish waste. Improving fisher-actor coordination would also improve the productivity and enhancement of the chain to attract more actors (SME) in the sector. Given these findings, designing an effective policy to regulate water use would improve the sustainability of the sector and minimize conflicts among the fisheries surrounding the lakes, rivers and ponds. Water use polices will minimize competition among the individual fisheries and cooperatives which may lead to overfishing and waste of resources, and this will provide a great incentive to properly manage the fisheries. It is expected that the value chain studies can further provide substantial bases for future interventions that will promote sustainable fisheries, ensuring the improvement of the livelihood conditions at the same time.

The Aquaculture development in Addis Ababa and its surroundings is at an initial level which needs to implement it in a coordinated way that involves relevant government bodies, research institutions,

service providers, NGOs, fish traders and SMEs.

14.2: Recommendations

The following are general recommendations to improve fisheries and Aquaculture value chain performance. The suggested recommendations are based on the critical issues identified during the focus groups and KIIs discussions and issues raised by fishers during the interview. These are:

- **Awareness Creation:** Fishery development in the area can help those who engage in the business in terms of nutrition, employment opportunity and economic importance. Moreover, fish food is not well practiced since they are not well accustomed to eat fish and there is also limited fish shops that the consumers can easily access. Therefore, in most cases, fish consumption is limited to most urban people. To improve this situation, creating an awareness on its nutritional importance is very crucial and this can be done through integrating fisheries extension service with the general agricultural extension, public health education, and home economics with nutrition knowledge.

- **Organizing cooperative**: Strengthening of the existing fish cooperatives and establishing new ones is essential to ensure the effectiveness of the fish business. Working in group provides a base for share responsibility/risk, protecting the fish stocks, accessing credit, and bargaining power in buying and selling fishery inputs and outputs in bulk quantities and at favourable prices. Through cooperative, other services can also be channelled to members and surrounding communities.

- **Facilitating access to credit:** It is so essential for fishers to have the necessary equipment for fish harvesting and processing, which some of them are not available at some fishing areas. Hence, credit facilities should be arranged for fishers to purchase locally available equipment's to undertake the business in a better way.

- **Capacity building through training:** It is necessary to make available trained fishery experts to work as an extension worker at various levels of the value chain actors to ensure skill and knowledge transfer to enhance their capacity for undertaking the business accordingly.

- **Availability of Infrastructure:** The necessary facilities need to be available at fish marketing towns. The landing site should be suitable to bring fishers and traders together for daily fish transaction. Sites and selling shops of the intervention area should be improved through constructing fish cleaning and selling shade, storage, and transport facilities.

- **Entrepreneurship knowledge in fish trade**: Individuals and cooperatives members in fish business need to have concept of entrepreneurship in order to have a clear direction to undertake the business accordingly. In addition, each cooperative needs to prepare its business planning for the coming few years, which is going to be updated from time to time.

- **Monitoring and management:** Fisheries management system needs to be in place. To ensure the continuity of benefits from rivers, lakes and reservoir fisheries, regular monitoring is required, which will enable the effective management of fish catch (yield) without negatively affecting the fish resource.

- **Extension Support:** The growing fishery development requires continuous supports in the process of ensuring individuals and cooperatives autonomy to run the business smoothly. It is also essential to follow functioning of fishery data collection and analysis system for the rivers and other small water bodies, which will form basis for resource management. Therefore, there is a need to enhance the capacity of livestock and fishery sector for providing effective extension service to individuals and cooperatives engaged in fish business.

- **Research on fish development:** In order to sustain the benefit of the society and biodiversity of water resources, undertaking research work on this matter is essential. It has been observed that there is a need to work on identification of challenges of ecosystem of existing rivers and ponds and irrigation canal/dam. In addition, the impact of future expansion of agriculture, construction of irrigation canal on upper and lower streams on fishery business should be studied.

- **Institutional partnership:** Ethiopia has a huge fish resource and because of this fact an effort is required, especially by the Federal and Regional States, to work on this sub sector with relevant institutions inside and outside of the country. This linkage is essential to protect the environment from pollution, degradation, and experience exchange on catchment management.

- **Working with NGOs:** There are some relevant NGOs working on different development sectors. The observation made during the study has revealed that there is a possibility to work with some NGOs on fish development by providing supports for fishers. Therefore, it is essential to approach the NGOs working on this sector and discuss with them on how to work together to support the fishers (individuals and cooperatives) for capacity enhancement.

14.3: Strategic interventions

The following are recommended actions to improve Aquaculture and fisheries value chain performance. The suggested recommendations are based on the result of critical issues identified during the study.

No.	Recommended Action	Why this Action? (Justification)	How to implement? (Strategies)
	Aquaculture development in Addis Ababa and its surroundings		
1	Lobby the local authority for the issuance of fisheries Regulation and its implementation at the level of all actors	It is essential to make the fish sub sector clearer among the stakeholders so that they can play their role accordingly	• Collaborate with relevant government organizations, NGOs, Media, Universities, Research centres and other relevant entities, • Ensure continued voicing for the issuance of the regulation at Sheger and Addis Ababa cities, • Work with the same stakeholders to promote the regulation and advocate for its implementation to improve the fish sub sector
2	Organize different action oriented consultative workshops for key stakeholders on development of fish sub sector	Consultation with key stakeholders that can make difference by devising mechanisms that can benefit all the actors of fish value chain	Bring together actors of fish business, relevant Agricultural development offices, pertinent local and international NGOs, research centres to deliberate and suggest way out for the benefit of the actors from Aquaculture development.
3	Focus on Sheger city and areas that are located at a radius of 100km from Addis Ababa for establishing and strengthening the development of Aquaculture	Land and water (ground and rivers) are available and possibility to access alternative climate areas for Aquaculture establishment	Discuss with relevant Sheger and sub cities administrations and other relevant government bodies at distant Woredas (100km radius), Micro enterprises, SME

			and design a strategy together on how to implement the activities of Aquaculture.
4	Discuss with Famers and urban Agricultural development Commission on aquaculture development	The commission has identified inner and outer sub cities of Addis Ababa that have potential for Aquaculture development	Work with the potential Woredas and Micro enterprises through the collaboration of the commission
5	Undertake specific discussion with Adey Agri-Tech Development Plc. and Mulugeta Jouani on their experience on Aquaculture development	Adey Agri-Tech Development PlC undertook the establishment of Aquaculture in Winget Tech college compound while Mulugeta has an experience in establishing it in Addis Ababa and its surroundings	Discuss with them the process of establishing the sub sector before the new initiatives to be undertaken
	Fisheries value chain development		
1	Promote the fish sub sector in Addis Ababa using different channels to ensure sustainable markets to benefit the actors including SMEs	Huge potential of fish in the country needs to be utilized effectively through active involvement of the actors, service providers and enablers(supporters) to create a common understanding and act on the sub sector accordingly	Collaborate with NGOs, various media, Cooperatives, research centres, local administrations, Agricultural development offices, cooperative promotion offices, individual fisheries, micro enterprises, capacity building offices to discuss on how to improve fish business.
2	Support cooperatives through legalizing the informal ones and strengthening legalized ones so that they can create better market linkage	There is significant number of fisheries groups that involve in the business. Thus, legalizing the informal ones and provide capacity building in a step-by-step approach towards decent works is needed	Work with the legalized cooperatives and cooperative promotion office to identify actual number of unlegislated fisheries and facilitate their registration as per the legal requirements
3	Support and promote skill training for fisheries, cooperatives/SMEs,	Majority of fishers lack technical and soft skills that have constrained their business. Especially, new fisheries	Facilitate TOT for Woreda Agricultural offices and cooperative promotion offices and other relevant institutions to

		need more capacity building program to cope up with the necessary conditions to run the business effectively	build capacity of fisheries/cooperatives/SMEs on harvesting, processing, preserving, packing and their business management
4	Facilitating the capacity building of Woreda/sub cities Development Agents (DAs)	DAs are front line agents that can easily interface with fisheries and buyers. If tailor made training is provided, they can transfer skills and knowledge to fisheries and then make a close follow up for its implementation	Capable DAs can be supported with necessary technical and material assistance, to set up work orientation and training, so that they can give skill training and orient the fishers on how to manage their business. Regular evaluation is also needed for improvement.
5	Support awareness creation activities on the importance and challenges of fishing activities and ways of improvement	The awareness among the fisheries and community on modern fish harvesting, processing, and marketing is to be enhanced	Use Woreda Agricultural offices, media broadcast, cooperatives, public gatherings, University, research centres to create awareness to the public.
6	Enhance formation of vibrant fish cooperatives network	They can serve as a forum of discourse and engagement on fish business in a value chain approach	Collaborate with Agricultural development and cooperative promotion offices, fish cooperatives at fish producing areas.
7	Document and share experiences of other parts of Ethiopia and Africa countries	Fish business and implementation processes can be useful to learn from others and adopt to the situation of Ethiopia	Publish in a booklet form and disseminate among the wider stakeholders to learn from and be motivated to effectively undertake the fish business.
8	Support monitoring and supervision activities of the respective Woreda Agricultural development offices to support fisheries	Strengthen capacity of those responsible bodies to undertake fishier supervision and monitoring at Woreda level	Train or orient those mandated organizations to supervise and monitor fishers, and to be responsive to the failure of the fish business when problems are observed.

9	Support and scale up the good practices of fish cooperatives in fish production areas	There is a practical experience in providing value added to business through practical observation	Organize and facilitate experience exchange forum for learning and then implement their business in a better way
10	Support in developing standard agreement format with essential terms among the actors, service providers and enablers	The contract agreement needs to be in place, respected and evaluated in a given time for adjustment	The contract form can be modified including specific agreement terms on the duties of each party. AACCSA can coordinate the key stakeholders to develop an appropriate format for this issue.
11	Support fish sub sector through case/best practice studies for learning	The number of individual fishier, and cooperatives and their performance need to be documented as case stories and best practices (success stories) to be used for improving and ensuring effectiveness of the business	AACCSA can work with relevant stakeholders to carry out best practice and case studies, and document successful stories for future use

15: Case studies

15.1: Case Studies 1

Name:	**Ato Aynalem Mulugeta**
Location:	**Bole Bulbula, Woreda 12**
Date:	**23/1/2024**
Business:	**Fish Farmer-Aquaculture Development**

1: Introduction

Ato Aynalem Mulugeta is a resident of Woreda 12 of Bole sub city. His parents are farmers with whom he grew up in the same place where he is currently living and undertakes collective agriculture activities. He is married and the father of two children. Ato Aynalem has been successful in his fish business since two years back. He started producing fish in a quarry dug out for collecting construction material about thirty years back. He learned fish harvesting during his childhood at Akaki River which is close to his village. He used pump to take water from Akaki River for his fish farm business. According to Ato Aynalem, the source of the river is Aleltu Reservoir, and it is rarely polluted at Samit area from discharges of dwellers and companies. But he knows how to identify the time when the water is not polluted by his own checking techniques. There are key factors that helped Ato Aynalem to acquire experience and succeed in the business. He uses marketing mix as his marketing strategy. This has ensured significant progress in his business. In addition, customers order him to harvest live fish and deliver to them.

2: Product and service

The product that Ato Aynalem deals with is a quality product (Tilapia nilticus and Common carp fish species, aquaculture candidates) meant for commercial purpose. He uses the pond (quarry), which has the size of 2,000 m2 where about 1,000 fish population has been stocked. These are Tilapia niloticus-Koroso (65%) and common carp-Duba (35). He used to sell 5-10 kg of whole fish per day for the surrounding people following their order. The information about the product is provided for customer on a regular basis to raise their awareness. Ato Aynalem sells his product by adding value (processing) to it. This distinguished him, in the area in dealing with his customers. His service delivery is good but needs to be enhanced.

3: Pricing

There is an area where Ato Aynalem excels is in setting of the prices for his products. The prices have been fairly set with the prevailing market standards. He has been successful since the prices of the product are not exaggerated for selfish gains. He sells one kg of fish for Birr 500.00. The person sets price based on the principles of demand and supply. This has been a critical area of his success.

4: Place

The business of Ato Aynalem is virtually at important location that ensured elevation of the business

to some standards. His retail outlet is at a good strategic place as it is nearer to the main asphalted road. The strategic placement of the pond has ensured that the market can be broadened by expanding other aquaculture businesses following the same Basin of Akaki River.

5: Product promotion

When it comes to promotion, Ato Aynalem has worked extremely hard to promote the business. Being a person is a market oriented; he uses mobile technology to disseminate information about the product. For instance, he has started using a Tik Tok, and sought to do what the rest of competitors may not engage in. The strategy adopted by Ato Aynalem with respect to product promotion is delivering the product to the market using his own vehicle. He knew that advertisements have played a significant part in promoting the business.

6: The staff

Ato Aynalem has dedicated workers including guard, fish feeder and fish harvester. These diligent workers are reason for the success of the business. The key determinant of a business's success is the fact that employees are able to perform results as required. The interest and endeavours of the owner of the business is to elevate the status of the business and this could lead him to be successful to a larger extent.

7: Customer experience

Customer satisfaction is important for a success of the business entity. The quality of the product determines whether the client keeps engaging with the business or takes a walk. The customer may have a complaint, but how the owner of the business responds to the complaints determines if customers maintain loyalty. Ato Ayinalem has succeeded in all these and making it as a successful business entity.

8: Conclusion

Looking at the market mix principles that Aynalem has employed over the years, it is clear that the success of the business cannot be questioned. His principles provide a unique approach over which different issues can be achieved. It requires focus and commitment to implement own strategies to ensure success in the business. Consequently, Aynalem, believes that the business entity has gone through the ladder of success by considering focus on pricing, product and service, promotion and competent staff. In addition, he emphasized that using pump to divert water from the river for replacement and feeding fish are challenges that may affect the profitability of the business.

The promoter has a plan to expand other pond(s) around the existing one in the future and he seeks expert advice related to the business. He also proposed for other SME to establish aquaculture activities at the upper stream of the same river by using earthen ponds.

Photo 1: Photo of Aquaculture developed using a quarry by Aynalem

Source: Taken by the study team, January 2023

15.2: Case studies 2

Name:	**W/ro Sara Abebaw**
Location:	**Around Danbel**
Date:	**5/01/2024**
Business:	**Fish Restaurant**

For the past fifteen years, Sara has been flourished as a business manager in her fish restaurant named as Samakna in Addis Ababa around Denbel (on the way to Bambis) area. What she loves is unleashing her creativity to work on with a wider customer and boosting their engagement. In just few years, she achieved a remarkable increase in return on investment. Sara keeps on contacting customers and passing her time with her husband. She mentioned that her husband is Sudanese who married her when she was in an Arab country. She said that the idea of doing fish business in Addis Ababa was initiated by him and that resulted in establishing the restaurant. She said that the idea encouraged her to become the manager of the restaurant. Sara stated that when the business was started, she hesitated about its profitability. Later she deeply became passionate about doing the business and embarked on it with her husband as an inspiring business.

Sara's greatest strength lies in her exceptional communication skills. She effortlessly conveys ideas through execution of impactful marketing campaigns, practicing active listening, embracing feedback, and seeking guidance when needed. She proactively sought clarification and adjusted her business accordingly.

Sara stated that her biggest weakness is the fact that she wants to be perfect business manager. But it used to hinder her ability to meet the demand of customers. However, she learnt the need to change by channeling her drive for perfection into efficient time management to improve focus and productivity.

She likes to work in collaboration and having an idea exchange approach and this passion inspires her to deliver exceptional work. Her collaboration with others resulted in to achieve an impressive profit on the restaurant's investment.

She prefers to buy fish from Bahir Dar (60% of the total purchased) and Arba Mich (40%) areas because of good taste and cleanness of fishes in that order. In both areas she purchases Koroso fish. She also mentioned that she has her own secrete in the preparation of quality fish meal. She purchases for 270 Birr/kg and prepare meals to sale for 350-450 Birr per meal, which is based on the size of the fish including bread/enjira and other ingredients. The relation with fish suppliers is based on contract agreement. W/ro Sara has a plan to establish additional fish restaurant in Addis Ababa city administration.

When it comes to promotion, she has worked extremely hard in trying to promote the sale of the products. For instance, she went to the Embassy of Sudan in Ethiopia and informed their staff that she has started fish restaurant in Addis Ababa. Following this promotion, the number of her customers has been increased of which the majority is from Sudan citizen. They are regular customers because of the taste of the fish is according to their preference.

Finally, she made a remark on issues that need improvement that include lack and shortage of supply of quality fish (not spoiled), increased transport cost and transporting of fish without cold chains and lack of awareness of some Ethiopia people to feed fish meal in addition to that of cultural limitation.

15.3: Case studies 3

Name:	**W/ro Mekides Abate**
Location:	**Kera vegetable and fruit shopping centers**
Date:	**10/1/2024**
Business:	**Fish Trader**

W/ro Mekides Abate started the fish business a decade ago and she is known for selling fish on the spot and providing delivery services to other parts of the country. Despite tough competition from other fish business people in the area, she has been successful in capitalizing on the market in many areas. For instance, she purchases fish from suppliers of Batu (filleted fish), Afar (filleted fish), and Arba Minch (Nile perch) and sells to Addis Ababa (35% of her total products), Jimma (40%), Adama (20%) and Chiro (5%). 75% of her buyers are hotel owners while the remaining are individuals.

She is successful in doing her business mainly because of her networking, adaptability to the local markets (located at vegetable and fruit market center-Atkilt Tera), innovation, and the ability to maintain strategic partners through good communication. Furthermore, she has a strong commitment to customers' satisfaction.

Mekides has indicated that she purchases Filleted fish and Nile perch for about Birr 300 per kg and her selling price is for Birr 350. In addition, she purchases Nile perch for Birr 500 and the selling price is Birr 550.

Finally, she mentioned that success is indeed achievable with the right strategies and dedication to good quality supply and customer handling.

The strategic placement of the outlets, which is in the vegetable and fruit shopping center, has become an opportunity for her business to be profitable. In addition, she is well aware about the importance of packing and setting fair price, working on promotion, and assigning an appropriate

staff that work effectively and efficiently.

Photo 2: Packed product for sale

Source: Photo taken by the study team, 2024

15.4: Case studies 4

Name:	**W/ro Mekides Abate**
Branch Location:	**Sanford Somalia Police Kibeb Mesalemia Kirkos, and English Embassy**
Date:	**10/1/2024**
Business:	**Fish Trader**

This enterprise was established about fifty years ago. Discussion was made with the staff members of the enterprise that include W/ro Etagegn Teshome and Enkanyelesh. It has been observed from the discuss that the main sources of fish supply of the enterprise is from Tekeze(not now), Turkana (sometimes), Arba Mich, Batu, and Bahir Dar. The type fishes that the enterprise purchases from these areas are Whole fish, Filleted fish (Catfish, Nile perch and Tilapia). The enterprise undertakes fish process, specially by slicing the Nile perch using its own machine.

The supply chain of the product is from producers-traders-the company- marketing–consumers. The product is then distributed to big hotels and their own retail shops. Walking customers are also buying the product from their shop centers.

According to the discussion made with the participants, fish spoilage, fish shrink, less supply, late supply and issues related security are the main challenge that affect their business.

The company wants to buy fishes without compromising on quality issue and has shown the willingness to buy from fish suppliers (including SME) on the basis of the agreement to be made, mainly related to quantity, quality, type of fish and time of supply.

Finally, the participants of the discussion made a recommendation on the need to organize fish producers into groups and capacitate them accordingly so that they can link their product to their enterprise in a sustainable way.

16: References

Mulugeta, Taye (2013): Aquaculture development in Ethiopia

Aquacultures sub-sector (Yalew, 2015)

Opportunities and challenges for aquaculture in development countries, 2017

Fish value chain and its impact on rural households' income, Northwestern Ethiopia, 2018

Value chain analysis-an assessment approach to estimate lake Nasser fisheries performance, 2018

Value chain analysis: Senegal fish,2018

Value chain analysis in Zambia, 2018

Johann Bell and Tarub, 2018: A new climatic change vulnerable assessment for fisheries and aquaculture

Agumassie Tesfahun 2019: Breeding season of fish in Ethiopia

Riverine Fishery assessment in Gambella Regional State, 2020

Mapping and value chain analysis of fishery in sub-sector in Somalia, 2020

Value chain analysis of fish in Gamo zone, 2021

Sustainable aquaculture development in sub-Saharan Africa, 2022

Aquaculture in action, FAO 202

17: Annexes

17.1: Checklists

This interview guide is prepared to gather information and opinions from relevant actors, service providers and supporters on fish value chain study. The interview guide is intended together in-depth information from the informants, which are expected to provide reliable information for the assessment under consideration. The interview guides are indicated as follows:

a. Key Informant Interview (KII) guide (Supermarkets and Fish retailing shops)

- Is there fishing harvesting center in Addis Ababa and its surrounding?
- From which area do you get fish and who are your suppliers?
- Are you receiving processed fish, Whole fish? (Gutted, Filleted, smoked
- Who are your customers? Mention by priority, (fixed and walking customer)
- Do you sell imported fish?
- If yes from which country and type of fish?
- Is the fish business profitable?
- Do the fish selling business year-round or season dependable? Which season?
- What challenges are there on fish business?
- What opportunities are there on fish business?
- What do you recommend to be improved in the sector?
- What are your customers comment?
- For how long you are on fish business?
- Can you mention purchase and sell prices of fish?

b. Key Informant Interview (KII) guide (Ministry of Agriculture)

- What is the status of fishery in the Ethiopia?
- What are the main water bodies for fish production?
- What is the maximum sustainable yield of total water bodies?
- What is the difference between Capture and Culture fishery?
- What % of the country population engaged in fishery?
- Please explain fish eating habit and per capita fish consumption?
- Are there Fishery training institutions for capacity building?
- Does the Ministry follow up Fishery research and Extension activities?
- Please tell us about fFish production and marketing history in Addis Ababa and its surroundings?
- How does fish supply to Addis Ababa and its surround to be improved?
- What do you think the possibilities for fishery development in Addis Ababa and its surrounding?
- What are the key challenges faced within the aquaculture and fisheries value chain?
- Can you mention opportunities in this sector?
- How do fish supply to Addis Ababa and its surroundings be improved?
- Can you give us an idea how captured fish from distant water bodies can reach Addis with recommended quality and quantity?

c. **Key Informant Interview (KII) guide (for aquaculture development, research centers, cooperative promotion office, Ato Mulugeta, Abey Agri-tech PLC, etc.)**
   - List of actors of value chain in Addis Ababa and surroundings,
   - Potential and constraints in aquaculture development and recommend interventions,
   - Process of establishing aquaculture in Addis Ababa and surroundings,
   - The status of the fish value chain in terms of employment, production, local consumption,
   - Mode of transporting fish from landing sites to end markets and its challenge,
   - Condition of processing and preservation of fish,
   - Role of women within this value chain and identify gender challenges/opportunities,
   - Assess the governance including rules, regulations and actions designed to regulate the contribution of fish sub sector to the improvement in livelihood of individuals and nation at large,
   - Potential in place on job creation in fishery? And share considerable recommendations on how could be possible to create youth targeted job capacities,
   - Future investment opportunities especially on value addition?
   - Evaluate the potentials of the value chain using selection criteria(SWOT) analysis
   - Analyze the main required inputs and their source for production of the selected Value chain(s),
   - What are main skills and technologies required for implementation of fish value chains in pproduction, post-production handling, and mmarketing
   - Indicate required services (finance, training, advice, etc.) for development of the value chain,
   - Identify providers of the required services and indicate their readiness to provide.

d. **Focus group discussion and Interview guide.**
   - How often do you consume fish or fish-related products?
   - What types of fish products do you commonly consume?
   - When purchase fish, which factors influence your decision the most?
   - Where do you prefer to obtain fish or fish products?
   - Do you have challenges that affect you from consuming fish frequently? If yes, please list them?
   - How satisfied are you with quality of fish or fish products available in the market?
   - Where do you usually seek information about the fish products you want to purchase?
   - Can you please give us your recommendation how to improve the availability of fish for consumers?

17.2: Contact List: List of participants

17.2.1: Focus Group Discussion

No.	Name	Sex	Position	Contact
1	Almaz Mideksa	Female	Wife	0911421480
2	Dinku Gurmesa	Male	Head of HH	0911866834
3	Zenia Abba Dura	Female	Wife	0907269522
4	Rahama Mohammed	Female	HH	0937287551
5	Marta Melaku	Female	Wife	0953436494
6	Meseret Daber	Female	Wife	0911478925
7	Tizita	Male	HH	0949093489
8	Mizgana	Male	HH	0949093489

17.2.2: Interview via cell phone

No.	Name	Sex	Position	Contact	Sub City
1	Shufele Kebede	Female	Wife	0913327352	Kaliti
2	Alemi Ragasa	Female	Head of HH	0931464977	Kolfe Keraniyo
3	Wami Damasa	Male	HH	0911899586	Bole
4	Abebe Diro	Male	HH	0911762643	Lemi Kora
5	Bamulak Tesfaye	Female	Wife	1010843159	Ledeta
6	Teresa Mideksa	Male	HH	0911958463	Ledeta
7	Senahit	Female	HH	0911896280	Kirkos

17.2.3: List of participants for KII and discussion

No.	Name	Sex	Position	Contact	Organization	Address
1	Ayele Birhanu	M	Aquaculture Expert	0947513183	Ministry of Agriculture	Addis Ababa
2	Worku Wondimu	M	Fishery dev. Expert	0973795811	Ministry farmers of Agriculture	Addis Ababa
3	Kasahun Beru	M	Livestock Development Extension Expert	0920114694	Addis Ababa Urban Farmers Agriculture Development Commission	Addis Ababa
4	Rufael Estifanos	M	Livestock Development team leader	0911898155	Bole sub city farmers and urban Agriculture Development Office	Addis Ababa
5	Mulugeta Takele	M	Milk production Expert	0912871105	Sheger Sub city Agriculture Office	Sheger city
6	Dr, Adamineh Dagne	M	Milk production Expert	0911685795	Ethiopian Fisheries and Other Aquatic Life Research Centre	Sebeta
7	Dr. Megersa Hindabu	M	Research team leader	0911044974	Batu Fisheries and Other Aquatic Life Research Centre /Ziway	Batu
8	Dereje Berile	M	Company owner and General Manager	0912177096	Fiber tech Fiberglass Products Manufacturing	Addis Ababa
9	Etagegn Teshome	F	Co-worker	0912719150	Fishery production and Marketing Enterprise	Addis Ababa
10	Andualem	M	Owner	0942377121	Fish restaurant	Addis Ababa
11	W/ro Sara Abebaw	F	Owner	0932519354	Fish Restaurant	Addis Ababa
12	Kasahun Beru	M	Expert	0920114694	Addis Ababa Urban Agriculture Development Commission	Addis Ababa
13	Mulugeta Takele	M	Expert	0912871105	Sheger Sub City Office of Agriculture	Addis Ababa

14	Dararo Hora	M	Cooperative and union secretary	0942450544	Ziway /Batu Fisheries cooperative	Batu/Zuway
15	Abu Agonafer	M	Chair of the Common Interest Group	0968480523	Koka dam Common Interest Group on Fisheries	Koka
16	Samuel	M	Private Fisherman	0910944211	Bishoftu Fisher man	Bishoftu
17	Mulugeta Jouani	M	Vice President	0911431646	Ethiopian Aquaculture association	Bishoftu
18	Aynalem Mulugeta	M	Owner	0913545916	Bole sub city fish farmer	Addis Ababa
19	Ato Birhanu	M		0918469849	Exporter	Addis Ababa
20	Adey Agri-Tech dev't PLC			0910715828/ 0931308180		Addis Ababa
21	W/ro – Shure Jibicho	F	Oromia Coop Promotion Agency	0916839492	Expert	Addis Ababa

18: Contact details

BIC Ethiopia
Impress Hotel & Office Building (3rd floor)
(Near Bole Medhanialem Church)
Addis Ababa

Email: info@bic-ethiopia.eu
Mobile: +251 978 220 194
Website: www.bic-ethiopia.eu

Consortium members:

sequa
Alexanderstr. 10, 53111 Bonn
Germany

Contact person(s):
Oliver Petzoldt, Project Team Leader
Email: oliver.petzoldt@sequa.de
Mobile: +251 (0) 978 220 194

Sabine Schacknat, Project Director
Email: sabine.schacknat@sequa.de
Phone: +49 (0) 228 982 38 – ext. 35

Website: www.www.sequa.de

Addis Ababa Chamber of Commerce
Mexico Square, P.O. Box 2458
Addis Ababa, Ethiopia

Contact person(s):
Shibeshi Bettemariam, Secretary General
Email: shibeshiandsons.plc@gmail.com
Mobile: +251 (0) 903 102 864

Hanna Bekele, Project Officer
Email: hanna.addischamber@gmail.com
Mobile: +251 (0) 902 491 935

Website: www.addischamber.com

Menschen fûr Menschen
P.O. Box 2568
Adds Ababa, Ethiopia

Contact person(s):
Yilma Taye, Country Director
E: Yilma.Taye@menschenfuermenschen.org
Mobile: +251 (0) 978 220 194

Dr. Sebastian Brandis, CEO
E: sebastian.brandis@menschenfuermenschen.org
Phone: +49 (0) 228 98238 – 35

Website: www.menschenfuermenschen.org

Icehawassa
A8, Hawasssa
Ethiopia

Contact person(s):
Fikir Belete, Project Manager
Email: fikir.belete@icehawassa.org
Phone: +251 (0) 923 577 911

Markos Lemma, Co-founder & CEO
Email: markos.lemma@iceaddis.com
Phone: +251 (0) 912 615 214

Website: www.icehawassa.org

adelphi
Alt-Moabit 91, 10559 Berlin
Germany

Contact person(s):
Kathrin Kirsch, Manager
Email: kirsch@adelphi.de
Phone: +49 (30) 89 000 68 - 143

Lina Gutierrez, Analyst
Email: gutierrez@adelphi.de
Phone: +49 (0) 228 98238 – 35

Website: www.adelphi.de

GrowthAftrica
Impress Hotel & Offices Building (3rd floor)
Addis Ababa, Ethiopia

Contact person(s):
Merselu Worku, Growth Catalyst
Email: byo@growthafrica.com
Mobile: +251 911 728 209

Ian Lorenzen, Exec. Director & Partner
Email: ilo@growthafrica.com
Phone: +254 731 51 39 51

Website: www.growthafrica.com

Project lead *Consortium partners*