

Commercial Fish Farming Guide



Aknowledgements

We thank all 40 participants of the Ogboinbiri pilot project for their dedication, the community leadership for their support throughout planning and implementation, and our technical partner, Zigha Ayibakuro, for steering the project and advising on this guide.



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Glossary

AQUACULTURE: The farming of aquatic plants and animals, such as fish

AQUAPRO: Drugs for fish

BRIMMING: All washed fish ready for drying will be introduced into the brim water (with salt) and kept for five to twenty minutes before shaping the fish for drying

CANNIBALISTIC INSTINCTS: The eating of the flesh of an animal by another animal of the same kind

CHORKO OVEN: A modernised fish dryer

DUTCH CLARIAS: One of the various types of fish

FINGERLINGS: A young or small fish

FLOATING FEED: Feeds that stay at the surface of the water

GRADING: It is the distribution of fish into groups of similar sizes in the pond, it is also known as sorting

GUTTING: Removing the gills and intestine of fish, slimes and tail fines

HATCHERIES: A place where fish eggs are produced

HARVEST: The period when the fish is mature for sale

HETROBRANCHUS: It's a species of fish

JUVENILES: A young or small fish but bigger than the fingerlings

LIVESTOVIT: Drugs for treating disease in fish

PELLETS: These are molds of feeds for fish

RECORD KEEPING: This is the act of recording business transactions in books for reference

SPAWNING: The process of depositing eggs for reproduction

SPOT FEEDING: The process of feeding that involves feeding fish that appear on the surface of the water



About the Guide

This is a practical guide aimed at existing and new aquaculture farmers, to scale up available opportunities in the fish farming market by providing step by step instructions from how to set up a commercial fish farm through to sale at local markets, including: capturing, culturing, processing, and aggregators. This guide is informed by a pilot aquaculture project between SDN and the Ogboinbiri community in Ogboinbiri community in Southern Ijaw LGA of Bayelsa state. The pilot project which aimed to create an alternative and sustainable livelihood for individuals in the community considered at risk of engaging in illicit practices, such as artisanal oil refining.

Aquaculture, and related economic activities, have huge potential to create jobs and lift many people out of poverty. Sadly, this potential is not fulfilled due to many constraints which limit the ability of farmers to competitively meet market opportunities in the local environment and country as a whole. Local producers do not make enough income to improve their lives due to basic skills, lack of new technologies, unavailability of finance, low-quality inputs, poor access to viable markets, and low levels of knowledge. These factors decrease farmers' productivity, efficiency, and ability to competitively grow and expand to secure a viable livelihood.



Factors to consider before starting a commercial aquaculture farm



Acquisition of basic skills

You must gain a sound knowledge of how to run an aquaculture business by attending seminars or trainings on aquaculture to learn the basics, including:

- Fish handling (feeding, changing of water etc.)
- Spawning
- Grading
- Harvesting
- Fish health and nutrition
- Record keeping

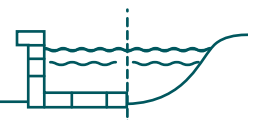


Selection of farm land

When selecting the location for your aquaculture farm, you need to consider many elements – including, its proximity from the nearest town, the security in the vicinity, and the presence or absence other animals that may eat the fish. Ensure the local environment for raising your fish is ideal for your business to thrive.

You need to consider the size of the land you intend to use for your aquaculture farm. Usually, a plot of land or two is suitable to start out an aquaculture farm. In cases where you do not have land space, you can start out in your backyard, and expand from there. The land should be flat, near markets, close to a good water source, and an accessible location. Find out from people that live in the area if it is swamp or upland before deciding to buy or rent land in that area.

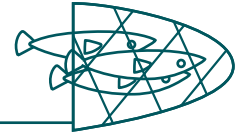
Pond Planning



Determine the type of pond that you need constructed. For an earthen pond, a flat area that has the natural tendency to hold water is needed. For a concrete pond, a well-constructed pond with use of bricks at the surface and well-constructed borehole for contact water supply is needed.

It's usually best to contract the services of an aquaculture consultant. They would get your full requirements, examine your goals, determine what you truly need, and ensure the construction work, and general requirements of the fish pond(s), are properly met.

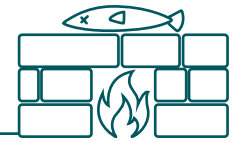
Harvesting of fish



It takes an average of four-six month of raising fish to market-size. Establish a functional feeding pattern to enable you reach the required weight of fish at the point of killing for sale. You need to know that the longer the fish live their lives in their pond, the more expensive it will be to you, and reducing the amount of profit you make when you sell the fish at market.

Earthen, or surface, pond harvesting of fish is done with drag nets, involving manual labour, and can take days to catch all the fish—depending on the size of the pond.

Preservation and Packaging of fish



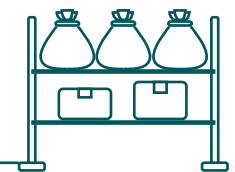
Your freshly killed fish can be sold both fresh or processed. Processing of fish with the aid of chorkor ovens, or smoking kilns, enables you to preserve the fish for a while before sale. It also adds value to the fish (you can charge a higher price) which mean that you can keep the fish (if preserve or dried well) for three months, and the quality remains the same with an increase in selling price.

Source of water supply



The source of water supply to the fish ponds is important for the proper development, health, and maturity of the fish for commercial sale. It is important to have a quality borehole built nearby to ensure a reliable and steady flow of water as the water in the pond will be changed at regular intervals.

Storage System



How the feed for the fish is stored has to be considered and set up correct from the start. Ensure the feed is stored in a cool and dry place. Ensure the feed is not within reach of other animals in the area that could make holes in the bags and eat the feed within.



Practical steps in starting a commercial aquaculture farm

Step 1

Construct a pond

With NGN ₦100,000 to NGN ₦150,000, you can set up a 10 feet X 10 feet earth fish pond with a mild depth of 4 feet to 6 feet. This size would hold about 1000 mature fish. You can also construct a pond from concrete, a plastic tank, or a drum.



Constructed Pond

Step 2

Prepare a pond

Before you start stocking your fish, you need to remove debris, screen the pond, and disinfect your pond with anti-fungi and an anti-bacteria wash. You should also balance your fish pond's organic and ion concentration by fertilisation with banana leaves or poultry dung.

Step 3

Purchase fingerlings

Purchase fingerlings for your fish pond. We recommend juveniles for starters and the species of juveniles should be the Dutch Clarias or Hybrid for a three to six month cycle, but if you have a customer demand, you can stock the Hetrobranchus species.



Fingerlings in Pond

Step 4

Follow the right feeding schedule

The way the meals are fed to catfish have to be done carefully because, for instance, 700 two months old fish can eat a 15kg feed bag in just 10 days. The high cost of catfish feed can greatly reduce your profits from selling the mature fish.

Proper feeding intervals can get the fish to weigh as much as 1.5kg after five months of care. Feed the fish once or twice a day, with the right food for the size of the fish:

- **Fingerlings:** Catfish in hatcheries are to be fed meals that are properly ground, or feeds that are flour-like, and contain 45% to 50% protein.
- **Larger fingerlings:** Small floating pellets (about 1/8 inch diameter) containing about 35% protein.

- **Advanced fingerlings (5-6 inches long):** Floating feed of approximately 5/32–3/16 inch in diameter containing about 28% to 32% protein should be fed to advanced fingerlings.

Feeding will be your main operating cost, generally about 60% of your entire aquaculture farm costs.

You have to feed your fish in such a way that the feed does not pollute the water. This can be achieved by 'spot feeding'. You also shouldn't change the water immediately after feeding, to avoid the fish vomiting their meals. And you should constantly apply supplements like Livestovit and Aquapro to protect your fish from disease.

Step 5 Sorting fish by size

As the fish grow, you need to constantly sort them to avoid larger fish eating the smaller fish. This is best done by putting fish of the same size inside a pond together to reduce their instinct to eat each other. This ensures bulk survival, and also ensures adequate growth and development because they can equally compete for food, water, and space.

Step 6 Change water regularly

Change the pond's water on a regular basis to improve the fish's longevity, and reduce the chances of disease on your aquaculture farm. Clean water should be used to replace the existing water every two to three days. Without proper water management, most of your fish will not survive to maturity.

Step 7 Understand your market

With the cost of catfish not being stable across states, you need to do a good market feasibility study to understand the type of buyers that would most likely buy your fish. Make sure your buyers are aware of your fish products about two months before the fish are fully grown, and try to agree that you will sell buyers your first to increase your chances of selling them out quickly.

The ultimate goal of every aquaculture farmer is to grow their fish to achieve a body weight of 1kg within the shortest possible time. If this is managed and done correctly, the fish can reach this weight in four to six months.



Training on pond management and market

Step 8

Processing of fish

- **Stunning of live fish:** Use salt to stun the fish for standard processing, and to weaken and remove the slime that coats the fish's scales, naturally protecting them from infection.
- **Gutting:** Remove the gills, intestine, slime, and tail fins of the fish
- **Washing:** After gutting, wash the fish completely to make sure no blood is seen on any part of the fish which is achieved through washing the fish three times in different basins of water lined up as part of the processing chain for complete clean up.
- **Brimming:** After washing the fish, put a small quantity of salt into a bowl of water. Thereafter, all washed fish ready for drying will be introduced to the brim water, and kept for five to 20 minutes before shaping the fish for drying.
- **Shaping of fish:** After the fish have been brimmed, shape the fish without using sticks or rope, but bending the tail to the mouth to make the fish round and ready for drying.
- **Lighting fire:** Traditionally, fire for smoking is started with kerosene or diesel, but it is better to use palm kernel shaft.
- **Layout of fish:** When smoking the fish, they should be laid side by side on the dryer, not overlapping, to allow proper circulation of heat.
- **Smoking time:** An average of five hours smoking time is required while using the chorkor oven, but it is also dependent on the type of fish to be processed and heat level used.
- **Post-smoking storage:** It's advisable to store processed fish in a warm place; fish processed in a chorkor oven can be stored for over three months.



Catfish



Processing fish before it is taken to chorkor oven



Fish processing



Processed fish



About the pilot aquaculture project

In 2018, SDN engaged remote communities, heavily involved in the artisanal oil industry—and marked by the associated violence, corruption, and environmental problems of this illicit practice. SDN piloted options with these communities for alternative livelihood options, to reduce participation in the artisanal oil industry—and the problems that come with it.

This guide is informed by a pilot aquaculture project between SDN and the Ogboinbiri community in Southern Ijaw LGA of Bayelsa state. 40 participants in total, of which 24 were women, were trained, supplied with ‘fingerlings’ (juvenile fish), nets, processors to produce and catch fish, and were given advice to sell processed fish at markets within, and outside, the community.

Trainings provided in the pilot project:

- History of modern catfish production
- Introduction to modern commercial fish production
- Methods of fishing /aquaculture systems
- Introduction to modern pond construction
- Types of ponds for culturing fish
- Pond water treatment
- Fingerling sourcing
- Method of introducing fish to ponds.
- Feeds and feeding methods
- Pond water treatment
- Fish fingerling production practical—part one
- Fish fingerling practical—part two
- Hatchery management
- Fish harvesting
- Fish Processing/marketing
- Farm business recording
- Fish disease health management
- Fish drugs and treatment application methods.



Nigeria Agriculture Enterprise learning curriculum for the pilot project:

- Fish farming cycles
- Keeping aquaculture farm business records
- Business planning
- Purchasing decision
- Simulation
- Calculating cost and benefits
- The value chain and market analysis
- Basic cash flow
- Savings and credit
- Group membership
- Individual action plan

Material support provided in the pilot project

Cultures: 2000 juvenile fish and 240 bags of fish feed were provided to support growing the fish.

Capturers: The pilot project made available fishing nets, hooks, and ropes to enable artisanal capturing of fish from the wild.

Processing: The pilot project made available a two 300kg chorkor ovens for smoking of captured or cultured fish.

Market: The pilot project identified three bulk-buyers that are willing and ready to buy processed fish from project participants to sell within and outside Ogboinbiri.

How does the market system work?

Fish are cultured and captured in Ogboinbiri community, but the community lacks storage capacity for consistent sales. The establishment of two chorkor ovens will help to bridge the gap, but there is still a need to invest more in the fish value chain. Institutional markets and financial institutions need to provide working capital for the pilot project participants to enable consistent capturing, production, processing, and sales of fish.

Three participants in the pilot project will serve as an institutional buyer of fish from culture, capture, and processed stages of the value chain to sell within, and outside, the community. Every actor in the system requires access to funding so the Bank of Agriculture and Central Bank of Nigeria has been engaged to finance the model.





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SDN supports those affected by the extractives industry and weak governance. We work with communities and engage with governments, companies and other stakeholders to ensure the promotion and protection of human rights, including the right to a healthy environment. Our work currently focuses on the Niger Delta.

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