IBAN AQUAFISH SOLUTIONS AND CONSULTANCY LIMITED

IBAN AQUAFISH

Your Reliable Fish Farming Partner

INTRODUCTION TO FISH FARMING – POND CULTURE

1. What is fish farming?

Fish farming is the raising of fish in ponds or other water enclosures for home consumption and for income generation.

2. Role of fish farming in income generation and food security

i. Provision of Household Income

Fish has high demand and farmers get income from the sale of table size fish and fingerlings. Farmers who harvest their fish regularly (every 4—6 months) get income from fish thrice or twice in a year.

ii. Provision of readily available protein for the households.

Fish provides a good source of proteins. When you raise fish your family will have more to eat and the proteins obtained from the fish will keep your family strong and healthy.

iii. High return to land and labour

Fish farming is highly productive if compared to other agricultural enterprises.

The table below summarizes the comparative potential yield and income that farmers can get using a 200m^2 piece of land for fish production and some crops.

Enterprise	Potential yield (kg/ha/yr)	Basic inputs	Yield from 200m^2 land	Potential income (Zk/yr)
Fish	4000	Fish feeds and family labour	120kg	2, 400.00
Maize	8000	More fertilizer and more labour	160kg	225.00
Cassava	22000	More fertilizer, more labour	440kg	264.00

iv. Agricultural Diversification

Fish ponds provide a means for diversifying the whole farm apart from providing fish. Ponds act as reservoirs for supplying water for irrigating vegetable gardens, growing crops such as bananas, sugarcane, and maize. Fish farming substantially increase the production of other agricultural enterprises.

3. What do you need to raise fish?

a) Suitable land

The first step in fish pond construction is to decide where to build your ponds. Four elements to consider in site selection are:

- The site itself and slope of the land;
- The source of water;
- The soil;
- The distance between your home and fish farm

What is an ideal site for building a fish pond?

i. Availability of land

Do not build a pond on a site, which would be better suited for another activity. Less productive or non arable land must be considered first in the choice of a site to avoid competing with agriculture needs

ii. Size

The size must be large enough to satisfy your needs; there should be enough space for other ponds, gardens and space to plant fish feed ingredients like maize and soya beans

iii. Land ownership

The farmer investing in fish ponds should be absolutely sure that he/she will not encounter ownership problems

iv. Slope of the land

The plot of land must have a gentle slope. The topography (slope) of the plot will determine the pond's form and size as well as the quantity of work required during construction. If for example the slope is too steep, you must find and carry a large quantity of soil to build a lower dike.

v. Drainage

One must be able to completely drain and dry out the pond on a swampy terrain as they are usually too flat and the pond will never be able to completely drain.

vi. Sunlight

It is necessary to have direct sunlight on the site. Shadows from trees are unfavorable to the site because sunlight must penetrate the water of the pond to heat it and promote growth of natural food for your fish.

vii. Availability and proximity to organic materials

The area where you construct the pond must have enough materials to feed your fish and fertilize the water. It is useful to farm soya beans, cassava, sweet potato, maize and other garden products close to home and your pond site to use as feed and fertilizer.

What makes a good source of water to raise fish?

Water must be of good quality and in good quantity

I. Quantity of water

The source of water may be perennial or a spring. Water must flow continuously throughout the year in the furrow or borehole.

II. Quality of water

The quality of water is an important element in fish farming. Contaminated water will harm the fish. Reproduction of fish in ponds may vary according to physical and chemical characteristics such temperature, transparency and color, acidity and turbidity.

III. Water rights

You have to make sure whether or not you need special permission from the village headman, chief or water affairs to utilize the local water

What kind of soil is needed to build a pond?

It is better to find soil that holds the water well. Clay soil is the best soil to hold water. If soils are not suitable you can line the pond with pond liners or construct concrete ones.

b) Pond construction

A pond is an enclosure for fish farming. It is a building which is made with the objective of creating the best environmental conditions for fish. The following is the order of activities in pond construction:

i. Getting water to the site
You must create a water furrow system before constructing the pond if you are getting water from a stream or river.

ii. Supply furrow
This must be situated above the pond level to be able to supply water to the pond. It is an open furrow a farmer diverts part of the water way to supply ponds and for other family needs. One has to carefully plan its layout so that it passes above the pond's construction site. The supply furrow constitutes the main water source required to fill the pond and maintain water level necessary for fish farming

iii. Drainage Pipe / Furrow
Install a drainage pipe at the lowest level of the pond with a difference of 1.3m between supply and drainage furrow. Each pond must be independent with their supply furrow and drainage system. Ponds must be filled by supply furrow and emptied by the drainage pipe and drainage furrow

iv. Clearing the site
After you have established a water furrow system and have an idea about the size of the pond you wish to build, you need to prepare the site before construction can start. You should remove all the grass, brush and trees cut and stumps and roots removed.

v. Demarcating the pond and dikes with stakes
Demarcating is an important stage in the preparation of pond construction. One usually starts staking at the drainage point. Demarcating must show the shape size of the dikes and of the bottom of the pond.

vi. Digging out the pond bottom
After placing the stakes, you now know where the bottom of the pond and the dikes will be. You know how many centimeters to dig at the drainage point. At this time you can start building the dikes with the soil from digging out the pond bottom. However if the soil is sandy you will need to dig and pack a core trench before doing anything else. To dig the bottom of the pond, you have to first dig a channel which passes through the middle of the staked bottom. The channel goes from the shallowest side of the drainage point in the pond, and through to the final drainage point. The channel must be open all the time to allow rain water to get out the pond

vii. Building the dikes

The soil taken while digging the pond bottom will be used to start constructing the dikes. To build the dikes always utilize the best soil possible. You must carefully follow the stakes from the demarcation to make sure the pond is well built. You have to compact after every layer of 30 cm. you do it by stamping on the soil strongly with a handmade compactor.

viii. Drainage pipes

Drainage pipes are an alternative for those who do not want to cut the dikes during harvest

ix. Planting grass on the dikes

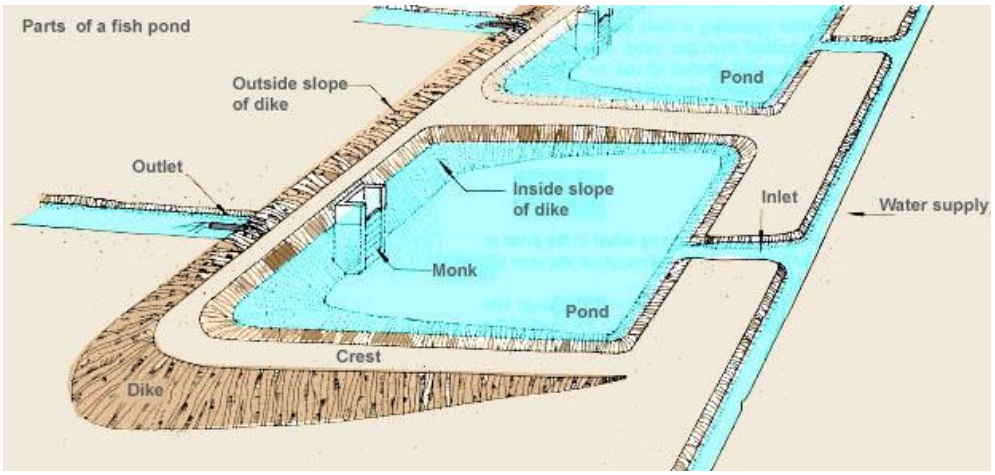
Plant grass so that the soil of the dikes does not erode away

x. Building compost crib

You have to build a place for the compost using wooden stakes

xi. Filling your pond for the first time

After construction is completed and the pipes are installed, it is time to fill the pond with water. Do not forget to put screens on the supply pipe to keep away unwanted fish. Now fill the pond gradually with water. This is very important the first time you fill the pond, because the dikes are still fresh and too much water at once may break the dikes. The pond should be filled at least three times to seal the leaks. Once filled manure can be applied in the crib to create food for the incoming fingerlings.



Components of a pond

c) Fish pond management

i. Stocking

How many fish do you stock in a pond?

The number of fish you stock in a pond depends on the size of the pond and management levels. To determine the size of your pond measure both width and length of the pond. Multiply length by width to find the surface area of water in square meters. Stock the pond with 3 -10 fingerlings for every square meter. For example a pond measuring 20m width and 25 meters length has 500 square meters surface area. It will be stocked with 500 multiply by 3 fish = **1500** fingerlings.

ii. What size of fingerlings to stock

Stock your pond with fingerlings that are 2-5 cm in length or 5 to 10g in weight.
Older fingerlings will start laying eggs too early. If fish start laying eggs too early, the pond will be full of fingerlings.

iii. Fish Feeds

Fish in the pond **must** be fed to grow. When fish are in a river, they look for their food themselves. In your case, you have enclosed them in your pond and therefore you must feed them.

What do you feed fish?

There are a lot of things that Tilapia or bream fish can eat. Plankton alone is not enough for maximum growth. Some of the food for fish is as follows:-

- ✓ Commercial feed (Formulated feed);
- ✓ Single feed ingredients
- Cassava leaves; Sweet potato leaves; Beer brewing leftovers; Maize bran; Millet and cassava flour; Paw paw leaves; Sunflower cake; Cotton seed cake; Termites; Rice bran; Soyabean cake Fish meal

These are known as single feed ingredients. You can also make simple mixtures by processing the above materials and mixing them together in the right proportions. For example you can mix 2 parts of fishmeal with 1 part of maize bran. This is very good and nutrient rich food for fish.

How do you feed fish?

Every day you should throw feed on the surface of the water. Fish must be fed 2-3 times in a day, preferably in the morning and in the evening. However, fingerlings must

be fed up to 5 times a day for fast growth. The best thing is to feed them at the same time and the same place. They will learn to go to the feeding place every day at the same time, and that way you will be able to observe them. You will watch them to know whether they are growing and are in good health.

It is also important to know the quantity of feed to provide them. After feeding them you will be able to see how much feed remains. Food quantity should increase as fish grow and multiply.

iv. Pond management

Daily tasks

- Ensure that the preceding day's feed has been eaten;
- Turn over the compost;
- Check water level in pond and add as necessary;
- Check whether overflow pipe is blocked and if screen is well in place;
- Remove frog eggs if any because if they hatch out the tadpoles will eat the feed and the frogs will eat the small fish;
- Make sure the dikes are not leaking;

Weekly tasks

- Add compost and ash to the compost crib;
- You should remove, dry and burn the stalks of plants and small branches from the compost crib which cannot rot.

Monthly tasks

- Remove weeds that may grow in the pond;
- Cut the grass and weeds on the dikes. Dry, burn and throw the weeds in the pond.

4. How to start a fish farming business

Fish farming does offer a good potential for financial returns and it can be a rewarding business and one you can be proud of.

- First you need to acknowledge that this represents a significant business decision and requires a serious commitment.
- Just like any other business venture, aquaculture requires a detailed feasibility study before investment decisions are made. Anything less than that puts you in the category of hobby farming, which is an excellent lifestyle choice but may not earn income.

i. Get your information together

- In order to avoid some of the above pitfalls, any farmer should seek a wide range of expert

advice before making any hard and fast decisions

- It is highly advisable that for farmers to take some college courses or some programs that are related to fish farming
- If the fish farming business owner has no experience, it is good he/she first try to work for an established fish farming expert to know the ins and outs in fish farming.

ii. Research in fish farming business

- This would be when the owner needs to study the conditions that surround his proposed location of the fish farm
- He must take into account the source of water in the area and how much is flowing from it, what rate and temperature of the water.
- He should also look into other naturally available resources around the area

Factors to consider in fish farming business

i. Registration and licensing of business

- The owner must register it as either sole-proprietorship, partnership, corporation or LLC.
- He must also attend to the commercial license, operating permit and other requirements that may be required by the state or local authority

ii. Financial aspects:

- If after this survey the fish farming business still seems possible, then it is time to chart the financial aspects by determining the expected and unexpected expenses of the business
- How much would everything cost and what would be the sources of funds.
- Through this financial analysis the entrepreneur will know in the long run how much he needs to profit, for how long to pay back the over head costs and if it is possible to start the fish farming business.

iii. Marketing

- Marketing of the product is an important aspect which is sometimes overlooked.
- Not only is it important to identify your market, but also to make sure that you can supply at the right time, in the right form and at the price.

iv. Economic considerations-Business and Investment Planning

- Before you start your business, you need to fully evaluate the economic considerations, time requirements, your available resources and the potential income and profit of your business venture.
- In most cases, a basic constraint on the economic study of existing aquaculture operations is the lack of reliable economic data. The best source of economic data is farm records from commercial, pilot, or experimental farms. There are many forms of farm record, but most of them simply list the input and output of the farm operation.

Farm records provide the information necessary.

- To determine the relative profitability of various production techniques or systems,
- to compare the productivity of major inputs, such as land, labour and capital with that of alternative production activities,
- to improve the efficiency of the farm operation

Types of fish farm records

i. Pond journal

Information on the day to day activities on your ponds

ii. Fish stocking records

Data on the fish stocked in each ponds

iii. Input records

Data on the types and quantities of inputs used in your ponds

iv. Labour records

Data on the labour used during your pond activities

v. Fish harvest records

- Data on the quantity of fish or fingerlings harvested.
- Data on the quantity of fish or fingerlings