

HOW-TO GUIDE:

Tilapia Farming

A Community Project



Tilapia Farming

WHY TILAPIA FARMING?

Fish farming is great for a quick creation of a dependable protein source. Protein is a very important part of our daily dietary needs and fish farming gives us not only access to this important part of our diet, but also allow us to do it for less money. Tilapia is the second-most popular fish to raise and are well suited to tropical areas. Tilapia has a good characteristic for fish farming and are now so domesticated that they have earned the title the "aquatic chicken". For communities who have access to a good source of fresh water and are looking for a good community project and source of income for the community, tilapia farming is an area that they might wish to explore.

ABOUT TILAPIA FARMING

In this booklet we will talk about tilapia farming as the raising of tilapia in an earthen pond, to eventually harvest them when they grow. However, there are also other places/ways to raise tilapia. To farm effectively you need to ensure you provide your tilapia with an ideal environment for quick and healthy growth. You need to always think about your pond's water quality, natural light, the food you give your fish, and the space you give them to live and grow.

Tilapia

Tilapia are mainly freshwater fish that are very profitable because they fast growing, easy to raise and are able to reproduce easily.



CAN YOUR COMMUNITY SUCCESSFULLY RUN A TILAPIA FARM?

Before you commit to tilapia farming, you must make sure you are able to provide your tilapia with good conditions and care and that you know what this project means for your community.

It is important that the community:

- Is committed and willing to follow through with the project.
- Is aware of the amount of work, equipment and resources needed for profitability and productivity.
- Is aware of their needs as a community and how this project can meet them.

It is extremely important that the site:

- Should contain an abundant supply of fresh water free of pollution of any sort.
- Must be isolated from densely populated areas.
- Should be large enough to contain your 30x10x1 meter pond.
- Should be close to a natural water source.
- Must be away from industrial and extensive farming localities to prevent chemical seepage.
- Should contain good clay soil texture with good water retention qualities.
- Sufficient amount of organic matter and elements.
- Good pH values that permit animal growth.

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DOES YOUR COMMUNITY HAVE THE ABILITY TO FOLLOW THE TILAPIA FARMING TIMELINE CORRECTLY AND COMPLETELY?

Pond Stages

ACTIVITIES	MONTHS									
	1	2	3	4	5	6	7	8	9	
1. Project appraisal→									
2. Pond preparation	→								
3. Pond stocking		→							
4. Pond harvest/marketing							←.....→			
5. Monitoring	←.....→									

If your community meets these requirements then you are ready to begin the planning stage.

PHASE I: COMMUNITY CONSULTATION

Do you want to raise your own tilapia? Do you have the interest and energy to plan and follow through? To answer these sorts of questions, it is very important to meet as a community and discuss the way forward. Before making the final decision, the community should have a clear idea of what the fish pond means to the community, and the possible positive and negative consequences of implementing the project. People can share views of support or share concerns about the tilapia project.

In this meeting, in addition to member concerns and questions, try and answer the following questions:

- Why do you want to implement this project?
- Are community members able and willing to put in the time to maintain the pond?
E.g. check water, feed fish, check growth regularly etc.
- Where would you set up the pond?
- Do you have the funds to cover the capital and operational costs for things like feed, excavation, water pump etc.?
- What are the benefits of the pond to the community? Is the project useful for the community's needs?

After all questions and concerns have been addressed, decide whether or not the community will move forward with the project. If the community has decided the project is not appropriate at this time, consider thinking of other options to meet the community needs. If the community supports the tilapia-farming project, choose a project leader or chairperson to guide the project. Choose the location, assign responsibilities to members (including nominating someone to purchase the materials), and decide on expectations of the community and results you wish to achieve from the project.

Community Cohesion

It is important that the majority of the community supports this initiative before it is implemented. A community working together and supporting each other will ensure a project's success and sustainability. Also when beginning new practices it is easier to work in a group to ensure there is support and fellowship in terms of sharing of ideas and best practices.

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Proposal Writing

Once you have decided on all the major details of the project, assigned responsibilities, shared expectations and gained community commitment, you are ready to begin! Do this by putting all the planning into words. It is very important to plan and put things down in writing as this makes the project more official and makes it easy to follow through and be successful.

In your proposal you need to include:

- Why you are choosing this project and what it means to your community.
- Project goals.
- Timeline.
- Role and responsibilities.
- Where materials will be got from .
- When you will produce a progress report.
- Total cost.
- How you will monitor your tilapia and make sure they are healthy and growing well?

PHASE 2: CONTACT THE DEPARTMENT OF FISHERIES FOR SUPPORT

Department of Fisheries

The best step a community should take once it is ready to continue with the tilapia farm is to contact the nearest Fisheries Office. Once they are contacted, the Fisheries Officers will firstly test the soil and water source to assure that the location is suited for farming. At this stage there is no cost required to be paid by the community although you might be asked to provide transport if transport is required. After all the tests have come back positive, the Fisheries Office will write a report with all the necessary requirements and cost.

AREA	CONTACT
Naduruloulou Research Station	3477781
Fisheries Headquarters	3301611
Western Division	6665859
Northern Division	8812833

PHASE 3: GETTING STARTED

Step 1: Choosing your site

It is important that the community owns the identified land for the pond to be set up, or if not owned by the community it is critical that the landowner gives consent. It is best if the land is leased from the owner so that it will ensure the sustainability of the farm.

You need to also think about what location will provide the best environment for your tilapia to grow in:

- *Water:* You need a reliable water source that will not be polluted, as this will put both the fish and your health in danger.
- *Soil:* Choose a place where the soil is clay-like (thick and dense), and is able to hold the water in the pond instead of soaking it up. An easy test for this is to roll the soil into a thick stick shape, and bend it slightly. If the stick breaks, the soil is too dry to hold the pond's water. If the stick bends, then the soil has enough clay content.
- *Temperature:* Because tilapia grows fastest in warm water at 25°-30°C, your location should be at a low elevation with maximum sunlight.
- *Distance:* The pond should be close to community members so that it is easy to take care of and protect.

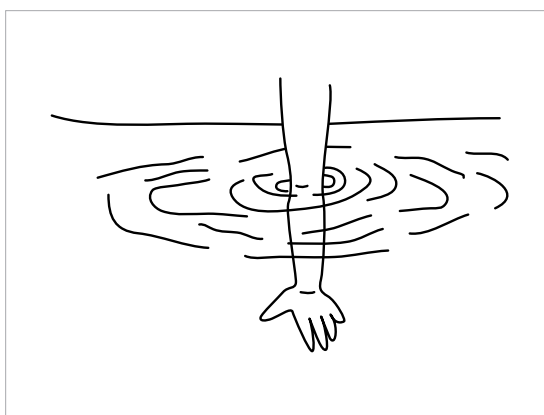
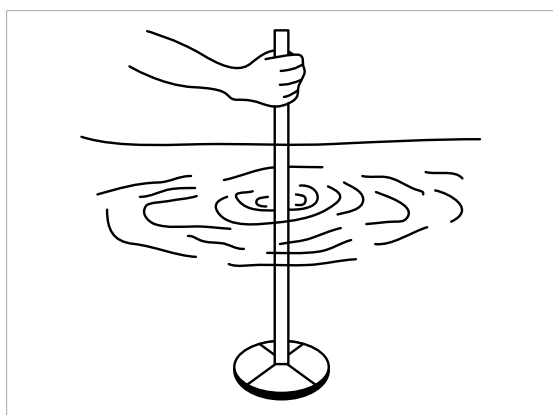
The Department of Fisheries is a very helpful contact at this period as they will provide specialized advice for your location and its suitability.

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Good Water Quality Requirements

Good water quality provides a good medium for the survival and rapid growth of tilapia. An optimum water salinity range for the culture of freshwater fish/prawns comes in the range of 0-5ppt. PH range of 6.5-8.5 is regarded as a safe range for freshwater commodity. It is also important to check oxygen concentration in the water and to maintain oxygen levels for tilapia. Again, the Department of Fisheries offers help with measurement and reading of water quality and will be able to provide you with advice.

You can test water turbidity (transparency) of 20 – 35cm using a standard Secchi Disk of 28cm in diameter (see diagram below). If you do not have a Secchi Disk, it is easy to make one. To use the disk, dip the stick in water and mark the distance at which you can no longer see the disk. If you cannot make a disk, it is just as easy to use your arm. The purpose of this is to make sure your water is not too muddy or dirty for the tilapia.



Step 2: Creating your pond

Your pond should be 10m x 10m, with depth 30cm-1 meter and should take around 3 weeks to complete. Your pond bank should be at least 30cm above water.

Once your pond is complete and has been approved, add tilapia (around 3000 hatchlings) to it as soon as possible so that mosquitoes do not take over, and so that you can get started. If you make a smaller or bigger pond than 30x30, add 5 fingerlings (juvenile fish) per square meter of pond. This will allow you to take most advantage of your pond and also give tilapia room to grow healthily.

PHASE 4: POND MANAGEMENT — GOOD MANAGEMENT IS CRITICAL TO TILAPIA FARMING SUCCESS

In an environment you have created to raise fish, it is your responsibility to maintain the pond and constantly care for the fish.

Feeding and fertilization

You should visit your pond every day to feed your fish and check the pond. Feeding should happen at the same time and same place every day. Feed them twice a day and only use the recommended amount so the pond is kept clean and oxygen levels are correct.

Add fertilizer to allow plankton to grow; amount – 6-8kg/100m² every week. Make sure to remove weeds so that the fertilizer helps the plankton to grow rather than giving nutrients to the weeds. Supplying the required amount of chicken manure (high in nutrients and moisture) at regular intervals will increase the productivity of pond water and enhance the fish growth. Tilapia fingerlings will grow to a marketable size of 200 grams in 4-5 months.

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When the water is a green/brown color, the pond is having a plankton 'bloom,' meaning that there is enough plankton to provide nutrients and natural food for the fish. If the color gets too dark, there is too much plankton growth, which is dangerous for the tilapia because it means oxygen levels can drop. You can control the plankton growth by adding fresh water early in the morning when oxygen levels are lowest. You can use a Secchi disk or your arm to make sure that plankton growth is not too much by marking where you can see the disk disappear. If you cannot see it before the disk reaches the maximum depth, there is too much plankton in the water and new water needs to be put in.

PHASE 5: HARVESTING YOUR TILAPIA

Harvest the bigger fish every three to four weeks and release the smaller ones back into the pond. Try and harvest early in the morning when the pond water is cool and the fish will not be too stressed.

Dry Out

After 6-12 months, you should complete a final harvest, where you harvest all the fish and drain the water from the pond. You can put the fingerlings in another pond or purchase new fingerlings when you are ready to fill the pond. Leave the pond to dry out for around two weeks. This allows the pond to stabilize and allows the mud to re-energize and increase oxygen and mineral levels to contribute to a healthy ecosystem for the next cycle.

PROBLEMS AND POSSIBLE SOLUTIONS

Water Source

A clean and controlled water source is critical to tilapia growth. If the water sources becomes polluted by external chemical run-off or harmful substances, empty the pond and refill it. You should also consider changing the water in times of disease, or taking out some water and adding fresh water if oxygen levels get too low as a result of algae overpopulation.

Weather

When cool, decrease the water depth to increase sunlight reach to the tilapia. In times of hot weather, add a few plants around the pond to provide shade (but make sure you are still letting sun through).

SUSTAINABILITY

When organizing community projects, you should have sustainability on your mind: how can I continue this project? Can we build on this project in any way? How can we improve the quality of this project? How will we deal with any problems that arise and keep the project going?

The good news is you have already taken the first step by deciding to grow organic, community-grown fish that is naturally more sustainable. To sustain your project, you need to stay committed to pond management, monitoring and tilapia care. You can then think about growing your project.

Prawn Farming:

Prawn farming can be started by rotating between tilapia and prawns, or by growing both species together. The advantage of cultivating both species together is that you do not have to increase the feed, as prawns will feed off leftovers and broken down fish waste. Moreover, there is a better chance of maintained water quality. However harvesting both together is complicated and you would have to be very careful of fish health, as both groups are vulnerable to different diseases.

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Scale of farming:

There are three types of tilapia farming you can consider when looking at long-term planning for your project: subsistence aquaculture (where you breed the fish to harvest for yourself and your community), artisanal aquaculture (small-scale farming with a basic level of technology/capital investment), and mid-scale aquaculture (increased scale, capacity and technology).

Innovation:

Once you are comfortable with your project and how it works, you can begin using innovative thinking to continue the project in a new direction. This could mean better monitoring, using different fertilizer to enhance tilapia growth, creating a drainage system etc.

ADVANTAGES OF TILAPIA FARMING

1) Fast Growth

Tilapia are a fast growing fish, so you will be able to see results soon after starting. This is a very promising experience for a community and means that you can work on improving and developing the project soon after beginning it.

2) Disease and Stress Resistant

Monitoring is always important and should always be done to check progress and improve a project. However, because tilapia is more resistant, this should hopefully mean there will be fewer problems during a project cycle.

3) Reproduces in Captivity

Tilapia are not stressed in captivity and breed as per usual.

4) Food Flexibility

Because tilapia are herbivores and omnivores, their diet is flexible, which means it is easier for us to take care of them. There are quite a few food options for tilapia, which you can discover by asking the Department of Fisheries.

5) Adaptability

Fiji's tropical climate creates one of the most economical environments for tilapia farming. Tropical and Subtropical climates have temperatures that are suited to tilapia.

6) Accessibility

The size of the pond makes it easier to monitor, care for, and harvest the pond in an optimal way.

7) Economic Benefit from Tilapia Farming

Anticipated Tilapia Production (5yrs)

Assumptions

<i>Pond size</i>	<i>30m x 10m</i>	⋮	<i>Market price</i>	<i>\$7/kg</i>
<i>Stocking rate @</i>	<i>5 pcs/m²</i>	⋮	<i>Market size</i>	<i>200g/pcs</i>
<i>Survival rate improves by</i>	<i>5%/annual</i>	⋮	<i>Farming Duration</i>	<i>4.5 months</i>

Absence of natural disasters/disease/flood/drought, absence of theft, uninterrupted fees supply, farm operation and management is well exercised and maintained.

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PROJECT COSTS

Item	Total Cost (\$)
Clearing, excavation, soil spreading & compaction, trimming, battering, drainage, cartage, access to the pond	2,600.00
Water inlet and outlet (complete pvc connections)	290.34
Water pump, hose & fittings	1,450.00
Total Capital Cost	4,340.34
Lime	75.00
Fertilizer	30.00
Feed	741.60
Total Project Costs	\$5,186.34

REVENUE FROM SALE

Year 1		Year 2		Year 3		Year 4		Year 5		Total	
kg	\$	kg	\$	kg	\$	kg	\$	kg	\$	kg	\$
1,012	7,084	1,080	7,560	1,146	8,022	1,214	8,498	1,214	8,498	5,666	39,662

Using the total project cost figure, and the revenue from sale for five years, below is a table showing possible profit earned if you start tilapia farming following the assumptions listed.

PROFIT FROM SALE FOR FIVE-YEAR PERIOD

Year	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Profit (\$)	1,097.66	2,373.66	2,835.66	3,311.66	3,311.66	12,930.03