

The Tilapia Compendium

A Compendium for Tilapia Aquaculture businesses in Vanuatu, Fiji, and Tonga



March 2022



There are nine countries in the Pacific participating in the project 'Farmer Organisations for Africa, Caribbean and Pacific' (FO4ACP). With a total of 20 national Farmer Organisations (FOs) directly engaged in implementation and engaging in activities that are working in three components, namely: Component 1 – Linking Farmers to Markets; Component 2 – Farmers Have Their Say; Component 3– Farmers Helping Farmers.

Farmer Organisations are a relatively new trend in the Pacific where farmers are organised into formal organisations and provide key services to their members. In this project, the FOs are directly involved in implementing activities, amplifying the role of extension and research officers and providing critical agricultural services to their members.

About PARDI 2

The Pacific Agribusiness Research in Development Initiative Phase Two (PARDI2 – AGB-2014-057) seeks to promote sustainable livelihood outcomes for Pacific Islands households through research and innovation, catalysing and informing a more vibrant, diverse and viable agribusiness sector. It is supported by the Australian Centre for International Agricultural Research (ACIAR) implemented in partnership with University of the Sunshine Coast and Pacific Farmer Organisations.



About PFO

Pacific Farmer Organisations began operating informally in the region since 2008 and in 2013, it registered after hosting its Foundation Conference and has its Secretariat based in Nadi, Fiji. PIFON serves as a Regional umbrella organization for national farmer organizations. Since formation the network has progressively and sustainably added members and now has 30 member organizations in twelve countries (Cook Islands, Federated States of Micronesia, Hawaii, Marshall Islands, New Caledonia, Papua New Guinea, Samoa, Solomon Islands, Timor Leste, Tonga, Vanuatu and Fiji).



This publication is supported by the Farmers' Organizations for Africa, Caribbean and Pacific (FO4ACP) programme; it aims to increase the incomes and improve the livelihoods, food and nutrition security, and safety of organized smallholders and family farmers in African, Caribbean and Pacific countries by strengthening regional, national and local farmers' organizations. The programme is expected to directly benefit 150 000 farmers in the Pacific region comprising of 72 000 men, 64 000 women and 14 000 youth involved in Pacific Farmer Organisations. The programme is implemented by six regional farmers' organizations, PIFON, PAFO, AgriCord, and the FAO Regional Office for Latin America and the Caribbean.



Table of Contents

The Tilapia Compendium	5
Structure of the Compendium	6
Acknowledgements	9
About PARDI2	9
Module 1: Before You Start	10
Module 2: Test the Market	16
Module 3: Technical Set Up	21
Module 4: Planning for Growth	26
Appendix A: Business Planning Template and Guide	40
Appendix B: References	56
Appendix C: Regional Fisheries and Contact Points	62

The Tilapia Compendium



Tilapia is a popular fish for small-holder growers across the Asia-Pacific region, with good reason. It is very versatile, and is tolerant of a variety of aquaculture environments, and can be farmed in brackish or freshwater. Plus, it is a highly nutritious source of protein, and it is an easily marketed product for small-holder farmers to complement other food-production systems. In South Pacific communities, where fish already forms an important component of traditional diets, tilapia provides a potential avenue for income which is reasonably simple, low-risk and complementary with existing activities such as rice growing.

Due to its resilience, it is quite simple to grow tilapia in traditional garden or farm ponds, provided access to fry is available locally. Although some setup and maintenance of the ponds is required, it is not complicated or expensive, however it is important to understand the main difference between farming land and setting up an aquaculture operation.

The main difference is that farming is reliant on the environmental conditions of your land: mainly biology (soil and plants) and weather. The choice of what farm is dependent on what you can grow, and the growing seasons.



Aquaculture is slightly different because the owner has greater control over the environment that they create, that is the pond and the water in it. So, you can make decisions about your operation that are informed by what you want to sell (which is what your 'market' or your buyers actually want), rather than what you can grow. So you can 'design' your aquaculture operation, set it up and grow it over time depending on what you think you can sell.

No longer are you restricted in what you do by the context you farm in, but you can treat your operation as a mechanism to deliver exactly what you want to deliver to your markets. By becoming a tilapia farmer, you are building up an aquaculture system that best suits your skills, capacity and market opportunities. You may plan to simply grow enough fish for your family and neighbours; or you may plan to take a handful to local markets every one or two weeks; or you may find regular buyers from local shops and restaurants that buy bigger volumes more regularly. You can design and build the business that suits what you want.

The Compendium

This compendium will help you set up an aquaculture system by:

- Understanding the basics needs (ponds, fry, feed)
- Describing what you need to do to set up these basics
- Helping understand your market, and how to plan your business to meet this and or grow beyond this over time.

This Compendium is intended to help establish the simplest operations as well as larger operations such as multi-pond farms or hatcheries, but is targeted solely at small-holder farmers who need access to planning tools and knowledge. The Compendium is primarily designed to be online, but is structured to provide simple tools that can be used manually. To take full advantage of the tools, they will be made available for download at the PIFON website.

What aquaculture offers

In using this Compendium, be sure to remember aquaculture allows you to design a farming operation that suits your needs and skills and market opportunities, and allows you to grow over time as it is not as limited by environmental constraints as typical farming is.



Structure of the Compendium

This manual is intended to be an online tool for smallholder farmers and extension workers, to help prepare a simple business plan and cash flow projection.

With limited resources, the manual is not yet available online, and so the material is currently presented here as a downloadable document, so that the references mentioned below can still be accessed.

The most important components of the Modules are the **questions** and the **references**.

Take your time to answer the questions and write down your answers. The **questions** are designed to help you to think about your operation and find out the gaps you don't know. Most of the solutions to what you do not know should be found in the **references**. Or if you cannot find them, ask your **local Fisheries Officers**.

Writing the answers helps you get your planning in order, and will become the initial basis of a business plan in the future. You do not need to do a business plan at first, but if you answer the questions now, the plan will be much easier to complete in the future.

The online version also includes an Excel spreadsheet template, and Word Document template for business planning. These documents will be located online alongside this manual so they can be accessed in digital form.

The references section lists a large selection of relevant online material available for farmers to access, by video or PDF.

This Compendium will begin by looking at some of the reasons behind why you might start to explore the opportunity of growing tilapia and the market opportunities, and then move onto the technical requirements to set up and operate a tilapia grow-out business. Finally, it will map potential pathways to expanding your operation, and introduces some basic business planning tools for future stages of a larger business.



Fish farming can be profitable, there are good markets and good prices, and skilled producers are rare, so if you produce quality product, consistently and reliably, then your product will be in demand.

But it is a technical process and there are risks, so careful planning will make the operation more successful. This is the basis of business planning.

Experience has shown that families working together can be very successful at running aquaculture operations, where husbands can manage the hands-on and technical aspects, wives can often learn the business and financial planning skills required for managing the cash flow carefully.

This manual will help determine if you have the right conditions, then help plan for an operation that can grow, and finally helps you prepare a simple business plan that will help you get support from the Department of Fisheries in your area, as well as accessing bank loans for growing your business.

The main thing to remember about treating fish farming as a business, and not just another crop, is to plan ahead, and keep records. If you plan ahead, you will know how much profit you can expect to earn and you know how much you need to save for next year. If you keep records, you will learn from previous years and improve your yields. And if you plan carefully and show profits, then it will be easier to borrow money for growth.

The Compendium is split into four separate modules:

- Module 01** Basic requirements
- Module 02** Test the market
- Module 03** Technical set up
- Module 04** Planning for growth

In addition to these modules, the Compendium also includes a number of additional tools for planning your operation.

Business planning tools

As part of Module 04, there is a Business Plan Template that you can use to build your business plan for loan applications and so on. There is also a manual to guide you through this document.

In addition to the Business Plan, the Compendium also includes a simple Excel spreadsheet which can assist you to prepare your costs and returns. This is explained in Module 04, but you will need to download the full version to complete it.

References

There is a schedule of references and documents that are available online and may be useful as you develop your operation.

Contact details for Fisheries Officers

Finally, the Compendium includes a schedule of contacts for Fisheries Officers in your area. BE sure to take advantage of the knowledge of the Officers and the potential extensions services the Fisheries Agencies offer.

Getting started

Throughout this process we assume that any growth will occur over time, and so, if you are starting out, you start with a small-scale operation, and test the success of it before expanding. If you already have some experience in aquaculture or tilapia, you might be comfortable jumping ahead to one of the later modules, particularly Module 04 which will help with growing a business once it is set up.

We also assume you probably have some connection with tilapia or aquaculture, however limited. For example, you might have a pond on your land that has been used for rice or shrimp farming or some other aquaculture in the past. Or you may have friends or neighbours that grow tilapia, or have heard about people that do. You may already have a number of farming activities on your land and you are keen to diversify further.

We will explore reasons for starting in more detail in Module 01, but what is important is that it doesn't matter how much or how little you do know, you have already thought about starting and this Compendium can assist you to work your way through the decisions of what to do.

As we noted, it is best to view your aquaculture business as an enterprise that evolves over time which is summarised in the flowchart below. You may not feel the need to move from the yellow box to green or blue, which is fine, but if you do move from one to the next, you should ensure you have understood each of the previous steps.



For each of these steps you should use:

1.0 : Module 01 Module 03 SPC technical manuals	2.0: Module 02 Module 03 SPC technical manuals Read Business Plan process	3.0 : Module 02 Module 03 Module 04 SPC technical manuals Business Plan process Spreadsheets	4.0: Module 02 Module 03 Module 04 SPC technical manuals Complete full Business Plan process with Spreadsheets
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How to get started

Start off small so you can test the market, and the risks. Modules 01, 02 and 03 will help you get started. We also recommend that you should refer to the SPC Manual as it is the key technical resource for tilapia farming for the Pacific Islands. This is the first of the references listed in Appendix C, and can be downloaded at no cost. You should also talk with your local Fisheries Officers at all stages of the process, as they can provide extension services, advice and inputs such as fry to get you started. Contacts for your local Fisheries Officers can be found in Appendix B of this manual.

As you learn more, you can increase the yields of your operation, and start to talk to more buyers and expand your business. Module 03 can also help with changing how you manage your operation to increase your yields. The main resource that you should refer to for this is the SPC Manual mentioned above, as well as your local Fisheries Officers. You should also start to look at the business planning documents in Module 04, so that you are familiar with them.

Over some years, you may be comfortable to think about growing your operation to supply increasing demand and if this is the case, then you can use the business planning tools in Module 04 to help you plan your business cash flow, and potentially look for financing assistance. If you are thinking about borrowing money from banks or government lenders, then preparing a business plan will be a pre-requisite to this process.

Acknowledgements

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About PARDI2

The Tilapia Compendium is an outcome of the Pacific Agribusiness Research in Development Initiative Phase 2 (PARDI2) project and supported by the Pacific Island Farmers Organisation Network (PIFON). PARDI2 seeks to promote sustainable livelihood outcomes for Pacific Islands farmers and households through research and innovation, catalyzing and informing a more vibrant, diverse and viable agribusiness sector. This project (PARDI2, AGB-2014-057) is led by the University of the Sunshine Coast and funded by the Australian Centre for International Agricultural Research (ACIAR). The project spans 2017-2022, with a geographical focus on Fiji, Tonga and Vanuatu.

MODULE 01: BEFORE YOU START

Module 01 Basic Setup

Getting started- Why farm tilapia?

There are many possible reasons why you might be interested in growing tilapia. You may have an unused pond or have seen neighbours try aquaculture or you may already have a small operation and you want to expand its output. Therefore, different people reading this compendium may use different sections depending on their level of experience.

The compendium is designed so that you can reference different modules at different times or skip some modules altogether and use the modules to fill in gaps of your knowledge. Therefore, before we start looking at aquaculture straight away, we will summarise what you need to think about in terms of tilapia farming.

What to think about before starting?

It is useful to step through each of these main points and at some stage write down your thoughts or get your family to write down your ideas as you talk them through with your family.

All of these thoughts and ideas may be useful in the future if you decide to move to the more advanced operations described above, but even if you don't plan to grow, writing your ideas down helps to get your ideas clear and prioritise what needs to be done, and what you do not yet know.

So, let's get started:

Give some thought to why you think farming tilapia is a good idea.

We already know that tilapia is becoming more and more popular in markets and restaurants as a tasty fish, as well as being a good source of protein. When cooking at home, it is a versatile fish, and easy to cook in a number of dishes.

In terms of starting in aquaculture, it is also a relatively easy fish to grow and manage.

But you may also have a specific interest or reason: do you have some unused ponds you would like to utilise? Have you tried or worked in aquaculture before? Do you have neighbours that grow tilapia, or maybe you simply see a good opportunity to sell an extra product in the markets?

Whatever your reasons might be, talk about them with your family and write down what your strengths are. For example, you have a pond, you have neighbours who are growing tilapia, you have people in markets asking you to try and who will buy, you have tried before and what to try again. All of these are reasons to start and form part of your strengths. Other strengths might be that you have time capacity, or your family has time capacity, you have been successful in other pond management operations, you have neighbours with experience who will work with you and so on. Write all of these down and list them as your strengths for starting an operation.

You should also list areas that you are less strong in, for example, no previous knowledge, a long way from markets, no ponds and so on. Each of these weaknesses can then be resolved over time, or it may turn out that the weaknesses outweigh the strengths and you decide not to try aquaculture.

Your Markets

Next, you need to think about whether you can sell your product. Module 02 covers this in more detail, but here you need to consider at least the likelihood of how much you can sell.

One of the reasons for starting an operation needs to be that you can sell your product, just as you probably do with other farming produce. So, you need to write down some initial thoughts and talk to a few people about selling.

One way to find out about selling is to go to a number of local markets and talk to the sellers about how much they sell, whether demand is growing, and of course you will also learn the price. If the market is strong, most local sellers won't be scared about talking about it, as they will be less threatened by other sellers in a strong market, as it will only improve demand. If the market is weak, they will also probably tell you and this might be an indication to look further afield to other markets.

You might also see whether neighbours are selling on the roadside or from their farm-gate. This is a good way to understand demand and pricing. Plus, your neighbours are probably happy to help you get set up.

As you grow, you may be able to access bigger markets in towns or cities in your area, rather than just local markets, and these may include selling directly to restaurants or supermarkets. However, at this stage, you should be able to sell enough of your product to get started. All you need to know is where to go, how strong the market is, and the price.

Then there are two final steps before you can get started.

Fisheries Officers

Contacting your local Fisheries Officer is an important step for a number of reasons:

- They have access to a lot of the details set out in the references and can help you make sense of the technical requirements to set up.
- They will often be the key source for tilapia fry which you need to get started as well as helping source feed and other pond inputs.
- If you do plan to grow beyond your basic pond operations, you will probably be in a strong position to apply for finance from local banks or government grant programs. To apply for these finance sources, it will be a requirement to have the local Fisheries Officers be involved in your business plan submissions, and so it is best to have them involved in your operation from the very outset as you grow.

Plus, they should be a useful resource to answer your questions as you work through this compendium.

By the time you make time to see your local FO for the first time, you will already know why you want to start with aquaculture, what elements you do or do not have (ponds, water, land) and what market you are targeting.

Together you can calculate the likely yield from the ponds that you have and calculate costs to set up and operate (fry, fish feed, labour).



SPC Manuals and other online references

Throughout this compendium we reference the SPC Tilapia Growers Manual, which is referenced in Appendix C.

This is a critical document that you should download and have accessible all the time.

As we have already stated, aquaculture requires a lot of technical inputs, for both pond set up (and hatcheries) as well as ongoing operations and maintenance. There is too much of this material required to cover in this compendium, and so we recommend that for all technical requirements, the SPC manual is used as a guide and ongoing reference. Your local Fisheries Officers are also able to help access this manual and help you with specific questions.

Finally, there is a list of YouTube videos and other online resources that you can access from your computer or smartphone to help you start and manage your operation. The more you read and watch before you start, the better prepared you will be as you work your way through these modules.

Once you have gone through this initial process, you can tick the checklist below and move on to Module 02.

If you have answered No to a small number of these questions, you can still move on, but keep a record of the item, as this will be one of your 'weaknesses'. You can work through the list as you set up, but make sure you do this in collaboration with your Fisheries Officer so that you can be sure that you can resolve the issue before you spend any money.



Allen, New T.
Bibliography: 958

Keywords: Broodstock water environment, Freshwater environment, Aquaculture techniques, Cages, Culture tanks, Food, Feeding, Fish culture, Floating cages, Monoculture, Polyculture, Pond culture, Site selection, Stocking density, Submerged cages, Oreochromis

To link to this document, <http://dx.doi.org/10.3390/med5040240>

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1. For further work, see the book by [G. B. Arfken and J. J. Weber](#) (1995), pp. 153–154, which contains a table of the values of the function $\zeta(s)$ for $s = 1, 2, 3, \dots$.



Basic requirements

This section is a simple checklist to ensure you have the basic requirements for farming tilapia.

If you answer Yes to the key questions, you can then move to the next step. If you are unsure, or if you answer No, but with some work you can answer Yes, then you should talk to your local Fisheries officer to be sure. They can help guide you through the next steps too.

Do you have access to farmland, either your own or that you can lease?	Y/N
Does this land have enough free area to build ponds and drains? This area should be at least roughly 60 x 40m.	Y/N
Is there easy access to a water supply for the land (channel to a stream, spring or irrigation channel)?	Y/N
Have you checked to see if people in your local market sell tilapia?	Y/N
Are you willing to sell in the market, or do you have someone who will sell for you?	Y/N
Have you contacted your local Fisheries officials to see if fingerlings and feed is available near you?	Y/N

If you have answered No to a small number of these questions, you can still move on, but keep a record of the item, as this will be one of your 'weaknesses'. You can work through the list as you set up, but make sure you do this in collaboration with your Fisheries Officer so that you can be sure that you can resolve the issue before you spend any money.

MODULE 02: TEST THE MARKET

Module 02 Test the Market

There are several ways that you can sell your product.

You do not need to try them all, for example, you may wish to grow and sell a few fish each month to supplement your farm income, or you might be interested in investing some money in an existing pond to sell to a handful of regular buyers on a regular basis to command a higher price for the same produce. Alternatively, you might be interested in finding buyers in large towns or cities so that you can be sure of a higher demand more constantly, as you expand your production capacity.

Regular buyers for your product might include restaurants, either local or larger ones in nearby towns, or buyers might be traders who look for a certain volume to sell in cities or to supermarkets, or you might be able to talk to some fish sellers in cities yourself and sell direct to them.

Regardless of which path you might take; it is important to align your capacity as a producer with the potential market. If you are just starting out, then avoid making commitments of delivering volumes of fish regularly. If you are already operating and know how much fish you can produce, then you might look at other market options to get a better price for the same volume.



Testing the Market is all about knowing what people will pay, and how much you can produce and planning for this balance.

Fundamentals of understanding your market

Generally, the best ways to learn about your potential market is to start selling a small amount, and grow steadily over time, such as selling to neighbours, or a small stall at your local markets. This allows you to get a feel for demand from buyers, what sizes sell best, what volumes you can sell in a day and what price you can ask. These are the fundamentals to understanding your market and you will constantly adjust your expectations based on these fundamentals.

This module will get you to find out the expectations of your buyers. So, the first step is to know who your buyers are, as described above. It is important to talk directly with your potential buyers early on in your planning stage. You do not need to commit to any volumes or product, but you can get an idea about what targets you should be setting.

As with each of the modules, the focus of your research will vary depending on whether you are starting a new operation or growing an existing one.

If you are just starting an operation, it should be enough to talk to a few sellers in local markets about their sales, as well as potential buyers like neighbours or local restaurants. Have as many conversations as you can before answering the questions, and once you have the answers, then you have started the process of a business plan.

If you are expanding your current operation, you are probably moving into the part of the market where you will commit to delivering fish at an agreed time (for example, on a specific weekday morning, or a certain number of times a week). This might be the result of conversations with restaurants or shop owners, who need a constant supply.

This is an excellent opportunity to find a consistent buyer, so you can better plan your income, however it comes with a significant risk. While you can predict your supply requirements, be careful as the buyers will expect consistent size, quality and volume from you. You may have to agree to supply a minimum of 10kgs of 300gm of plate quality fish on a specific day each week.



This might be very profitable if you can achieve it, but it means you need to have 10kgs of fish reaching a specific weight each week, so you are constantly managing all stages of the growth cycle from fry to juvenile to young adult to grow-out every day, and this can be hard work.

If you fail to deliver to this agreement, you may struggle to sell anything to the restaurant or shop again.

It is better to agree to sell what you can produce for the first year or so, before committing to a fixed agreement. You may be paid less, but once you are sure of your capacity to deliver, you can start to charge more per kg.

As you talk to more potential buyers and improve your capacity to deliver, you will start to think about growing your capacity, and this is where you need careful business planning. Module 04 will help you work through this.

And as always, talk about your ideas with your local Fisheries Officer as they can offer feed-back and may even have possible buyers you can talk to.

Work through the questions below, and make notes as these will form part of any business planning you will do in the future, and will help you clarify your ideas in the short-term.

Test the market

This section is a series of questions to help you understand the market you want to sell to. 'Market' means anyone that will buy your fish. It might be your neighbours, local restaurants or the main regional markets.

Understanding the market opportunities

Are you starting a new operation or expanding your existing operations?

If you are starting a new operation where will you sell your fish, and who will be your main buyers?

If you are expanding, how do you currently sell your fish? What are you planning to do differently? Who will your new buyers be?

Is tilapia available in the local markets that you buy your produce from?

If so, ask the sellers how well they sell.

How much do tilapia sell for per kg?

When it is sold, do buyers prefer it live or dead?

What size do buyers prefer? 200gms? 250gms ? 300gms? Larger?

How often do they sell, and how much do they sell each time?

Do the sellers always sell out of their produce?

If they sell live fish, how do they transport it to market?

Do you know any restaurants or hotels who are interested in buying regularly? If so, what volume, size and how processed?

Have you thought about other market opportunities such as dried fish or pre-cooked options?

MODULE 03:

TECHNICAL SET UP

Module 03 Technical set up

Ponds

As discussed at the beginning of this compendium, aquaculture differs from farming because it is a technical system mostly independent from the environment (except ambient temperature and rainfall).

This means that the success of an aquaculture operation depends on carefully running a technical system. It also means that things can go wrong with your ponds or water supply which can lead to poor growth of your fish. However, since tilapia are very hardy, if you get the basics right, and apply the right maintenance techniques consistently, then your operation should be successful.

As there is a lot of detail relating to pond set up and maintenance, it is important to refer directly to existing manuals for this information. The best source for this is the SPC Tilapia Manual, written by aquaculture experts from SPC in Fiji, but applicable to all South Pacific Island nations. Make sure you download this manual, and if possible, print it off. Your local Fisheries Officer should also be able to help with this, or source a hard copy for you.

If you are planning to set up your first pond, be aware that it can be an expensive process, and requires careful planning in terms of water flows and discharge. If you have access to an old pond, or maybe a neighbour's pond that you can lease, you can do all your first-year trials without the expenditure of building a pond. It is better to plan a new pond once you have some experience. If this is not possible, and you are able to afford a new pond, then make sure you are getting the right advice from the SPC manual and Fisheries Officers before you start.

Fry and Feed

The next important consideration for your operation is sourcing fry (baby tilapia) and feed for them as they grow.

Because there is a risk that tilapia can get into the waterways and over breed, the strain of fish that you will use (Nile Tilapia) prohibits breeding from offspring, and so all fish you grow need to be bought as a fry.

Fry are often available from government hatcheries, however there are also a number of private hatcheries setting up in various countries. Of course, your local Fisheries Officer will know more, and help you source fry.

There are a number of feed formulations available commercially for different stages of fish growth. Ensuring you have the right feed mix, water quality and rate of feeding is a critical component in maintaining a healthy operation. The Fisheries Officer and the SPC Manual will provide advice on how much to feed under what conditions. It is also possible to create your own feed mix from a combination of different recipes, but this should only be attempted once you have some experience. You might talk to other fish farmers about this and pool resources to create your own shared mix.

Technical requirements

*This section contains a brief outline on how to set up ponds for a tilapia operation. This detail is drawn from an SPC publication **‘E4©’°∞©° ¶©≥® ¶°≤ in Pacific Island countries Volume: 2 Tilapia Growth** ©Æ 00Æ§≥Hý*

It is important to do some research on how much things will cost for this model. You need to know cost of labour, fingerlings, feed, as well as how much you can sell your product for.

The second part of this section is a link to a basic spreadsheet for preparing simple financial analysis of the operation. The output from this spreadsheet is a printable financial projection which should be included in your business plan document.

What you need to set up

1.0 POND

Your pond can be as small as 20m x 15m, but ideally would be around 20m x 30m or bigger.

It should be located near a freshwater source such as a spring, stream, creek, or flood zone of a river.

You should be able to change the water by draining and refilling using sluice gates. You can also pump using mobile pumps, but these are expensive and more costly to run. Careful pre-planning for a suitable location (talk to local Fisheries support for help) can reduce operational costs.

Think about whether the area is often flooded or in a high tide zone. If so, the banks should be high enough to ensure that the flood level is below the top of the bank.

The water level should be around 300mm – 500mm below the top of the bank (check with local Fisheries support for your area), and the water should be around 0.8m - 1.2m, with a clay content of around 20-50%.

Drainage can be controlled with a pipe and upstand, draining into an adjacent drainage ditch

2.0	POND PREPARATION	<p>Ponds should be drained and dried each year before stocking to maintain water quality. Lime can be sprinkled on the base of the pond before filling with water, although inland areas may not need it.</p> <p>The pond should also be fertilised, using fertiliser or chicken manure on the bottom at a rate of 100-200kgs/1,000m².</p>												
3.0	FINGERLINGS (SEED)	<p>Fingerlings are normally available from government hatcheries, although in some areas (Fiji) private hatcheries are emerging.</p> <p>While government hatcheries may offer free fingerlings for one or two seasons, you will have to plan ahead and buy fingerlings, particularly from private hatcheries.</p> <p>Private hatcheries should have a more reliable and consistent supply, and will supply male only (faster growing). So, establishing a good relationship with a private hatchery is good business practice to ensure consistent and reliable supply.</p> <p>Stocking densities should be around 3-8 fingerlings/m² for semi-intensive stocking. This will require some supplementary feeding, but no aeration. Over 8/m² will require aeration.</p> <p>In Fiji fingerlings will cost around 3-10 cents/individual, or (at 5 individuals/m², around FJD250 for a 1,000m² pond.</p>												
4.0	FEED & FEEDING REGIME	<p>The recommended feeding regime for semi-intensive stocking is based on the average, estimated body weight, which you should check every 2-3 weeks. Your local Fisheries Officer can help you calculate the body mass. Then for each period, feed twice a day (early morning, late afternoon) as follows:</p> <table><tr><td>0-3 months</td><td>10%</td><td>body</td><td>mass</td></tr><tr><td>4th month:</td><td>5%</td><td>body</td><td>mass</td></tr><tr><td>5th month:</td><td>3%</td><td>body mass.</td><td></td></tr></table>	0-3 months	10%	body	mass	4th month:	5%	body	mass	5th month:	3%	body mass.	
0-3 months	10%	body	mass											
4th month:	5%	body	mass											
5th month:	3%	body mass.												
5.0	WATER QUALITY	<p>Water quality is a function of feeding, fish waste and water change-over.</p> <p>If you over-feed the fish, the excess feed will generate algae, which the fish cannot consume, if you under-feed, the fish will be consuming natural nutrients in the water, which if fully consumed may lead to reductions in water quality.</p> <p>Your Fisheries officer can also help you monitor the quality, and advise on treatment to maintain quality.</p>												

6.0 HARVESTING

You will need to allow for some labour to harvest towards the end of the grow-out period.

Some fish will grow faster than others, and you will not sell all your fish in one sale, so allow for your harvest over 3-4 weeks. You might harvest once or twice a week across this period, depending on how much you can transport and how much you can sell.

You will also learn to grade your fish, so that you sell the bigger individuals and leave the smaller ones to grow for longer.

7.0 ACCESSING MARKETS

Tilapia can be sold live or freshly caught and dead, or smoked.

Understand your buyer's preferences for the best price.

If sold live, you may be able to have your fish transported by Fisheries tanks (Fiji), or you may need to arrange your own water tank on a truck. This is more complicated, as water is heavy and difficult to transport. Water volumes need to be big enough to ensure enough oxygen keeps fish alive for several hours (buckets are no good), so shared transport arrangements with other farmers will save money.

MODULE 04: PLANNING FOR GROWTH

Module 04 Planning for Growth

Preparing for growth in your business

We recommend that you start your operations at a modest scale that matches the strengths and weaknesses of your situation that you identified in Module 01.

If you have one pond on your land, start with this and run it for a year or two so you can better understand the capacity. This will give you a chance to test your assessment about the market: did you overestimate how much you could sell, or underestimate how much you could grow? After a year or two you will have a better idea of difficulties and challenges.

If you are at a stage where you think you can produce more and sell it, possibly at a higher price in bigger markets then start to write down your reasons why and what you need to do to produce more.

These are the fundamentals of a business plan which is a critical step if you want to expand, as you need to understand how much you think you can sell, and for how much. And then you can think about what you need to build to meet this goal, how much it will cost and how long it will take to build. You also need to know the extra maintenance costs of paid labour as well as your own time.

There are a lot of questions here, and in the Module below, but because you have been operating for a few years or more, you probably already have all the answers, and this process simply helps you to structure your thoughts and put it on paper.

Module 04 helps you answer all these questions, and put it into a form that allows you to talk to financing institutions about borrowing money.

This is really the main goal for Module 04: to help take your thinking and write a document that banks or government finance agencies will be able to use for an application. This looks more complicated than it actually is, because you will already have most of the answers, and it is simply a mechanism to make it simpler for you.

However, you might only be at the stage where you are not ready to borrow money, but want to use your own money to expand. If this is the case, then it is still very useful to go through this process to clarify your ideas about what it will cost. It might be simpler for you to answer the questions in the SWOT analysis first, and then get a family member to help you enter the numbers into the spreadsheet, without completing the full business plan document. This will then provide you with a clear idea of your costs and returns before you worry about borrowing money.

How to use Module 04.

This module looks a little more complicated than the other modules, and may look a little daunting, but like the others, the critical component is just a series of questions that you will be able to complete easily, as you already have most of the answers.

This first step is called a SWOT analysis. SWOT stands for **S**trengths **W**eaknesses **O**pportunities **T**hreats.

These four corners of a box are simply the answers to what you think about your business.

The basis of any business plan is simple. Identify:

My strengths

Risks

How I can reduce the risks.

SWOT Analysis

The SWOT analysis helps you answer the strengths (Strengths and Opportunities) and risks (threats and weaknesses). And once you write down a potential problem, you will automatically start thinking about how to solve it, and answer the third part.

Strengths and Opportunities asks what the opportunities and strong points are about your situation, including your market. You have already answered most of these in Module 01 and Module 02, and if you have been operating for a few years you will have even more answers to include. This will be surprisingly easy.

The Weaknesses and threats corners are a little bit harder, because you have to think about things that are not immediately obvious: where things could go wrong, what may cause you to not meet your targets, why might one buyer stop buying from you and so on. Although these are harder, the more you add to these corners the better the process will be.

Financials

Once you have completed your SWOT analysis, you may want to understand your financials. We have included an extract of the spreadsheet for you to look at, however, you only need to use this for more advanced decision-making.

The basis of any business plan is simply:

My strengths

Risks

How I can reduce the risks

Even without completing the financial spreadsheet component, if you answer these three questions, and put some rough costs together you have a business plan.

Now you can prepare a SWOT analysis of your operation.

What is a SWOT analysis?

*A SWOT analysis is a standard structure for helping to analyse your business idea. To do this, you list in four squares, the **S**trengths, **W**eaknesses, **O**pportunities and **T**hreats to your business.*

You will use these answers in your business plan. For example you can use the Strengths and Opportunities that you listed as reasons WHY you are starting a business, as well as identifying the determining that price and profit are drivers for you.

Most importantly, the Risks and Threats need to be addressed. That is, in the next section, you will list each of the risks and threats and then write down each of the components of your business that reduce the impact of these risks.

SWOT ANALYSIS

Think carefully about these responses, and then list the Strengths, Weaknesses, Threats and Opportunities in the SWOT Table below. Some of these questions will also relate to the module on testing the market (Module 2).

Market opportunity

How many buyers for your product do you have?

(If only 1 or 2, then this is a weakness: "I only have 1 or 2 possible buyers", if more than 2 then it is a strength).

Write some explanation and detail in this column, and you will later use these answers in a section of your business plan.

How many sources of inputs can you find locally (fingerlings, feed etc)?

If only one, then it is a weakness, but if 1 or 2 new hatcheries are established near you, then it is a strength).

How strong is the local demand from buyers?

If you have found a diverse range of buyers (markets and restaurants), then this is a strength and the opportunity is to expand this interest, however if they already have sellers for the fish they need, that you have to supplant, then the competition is a threat.

Resources and skills

Do you have access to labour (farm workers or casual labour) that can help you with simple regular tasks like feeding and harvesting?

They do not need to be skilled in aquaculture, but if they are it's an advantage, and you should record this in your strengths box.

Do you know other farmers or workers who are skilled in aquaculture that you can refer to for advice (in addition to Fisheries Officers)? Or do you have experience in aquaculture?

If so, write the details of your experience in the strengths box.

Does anyone in your family have skills in business management?

This can include book-keeping, record-keeping, computer skills, or financial management. If so, include these as strengths (particularly if the women in the family (mothers, wives, daughters) have business management experience.

It would also be an advantage if someone in the family is enrolled or has been enrolled in a business training course or program. So, if you can demonstrate that someone has done a course, then this can be included as a 'Strength', and an Opportunity if someone is enrolled. Make sure you include the details and qualifications of the course in your business plan, and attach the certificate as an appendix.

Your competitive environment

How many other farmers grow and sell tilapia nearby?

Find out how many farmers are selling the same product into the same market as you want to sell into. Find out what gaps the buyers currently have (eg: “no-one can sell me fish bigger than 50gms, but I need 350gm fish”. Or “I need 50kgs of fish on Tuesdays, but I can’t find a seller who can sell me 50kgs each Tuesday.” These are your market opportunities.

Can you or do you work with other farmers nearby?

If there are several farmers and low demand, then these growers are a threat (competitors), but if you can work together with them, and expand demand from buyers, then it is an opportunity.

The market demand is likely to be bigger than most small farmers can supply, so you are not threats to each other.

Cash flow

Can you save enough or do you have enough money to pay for fingerlings, feed and labour for your first harvest cycle (6 months)?

Do you have other income to cover living expenses?

How much of your profit do you intend to save for the next harvest?

The biggest risk for small businesses is cash flow. You need to show that you either have savings for the initial costs, or you can use income from other activities to pay for your own needs (food, fuel, phones etc), as well as your new business.

If you can show how much you have, or how much you will earn from other activities, then show this as a strength in your SWOT, and explain this in your plan.

Climate/Weather

Do you know the rainfall/ flood patterns for your area?

Can you plan to manage excessive or low rainfall?

Explain these in your business plan to show that you are thinking about external risks and planning to manage them rather than react to them.

Licensing/ Approvals

Are there any licenses or approvals that you need to build ponds, sell fish or operate a business?

Do you have these?

How long and how difficult is it to obtain any licenses/approvals that you don't have?

If you are unsure, you should check with your Fisheries Officer.

If you do have these, then make sure you include copies of them in your business plan.

Timing

Have you planned for enough time to prepare ponds, stock fingerlings, grow out and harvest?

Will the weather, rains or floods affect this timing?

Should you start earlier or later?

Explain the timing you are proposing, and how it accommodates weather and other external risks.

Do your prospective buyers expect your product at a certain time? Have you agreed to this and is it locked in? Or is it flexible?

If you have any buying agreements in place, make sure they are not binding for your first harvest. If you have flexible buyers, then this is a strength, if you have locked in agreements then this is a risk.

SWOT ANALYSIS

In each box, you need to list all the things about your business that are relevant for each box. Some examples have been included here, but you should use the SWOT analysis template in the business plan template to record your answers.

A. Strengths

B. Weaknesses

B. Opportunities

D. Threats

When to use the financial analysis

The following financial analysis can be used at any stage in the evolution of your business, however, don't be concerned if you are uncomfortable to use it during the earlier phases of your business. It is easier to find the data when you have been operating for some time.

It is important to have this financial analysis for loan applications.

The spreadsheet will be available for download with this document, and provides a basic cash flow analysis.

It is more important to complete a Financial Analysis if you are applying for loans or funding assistance from banks or government agencies. Fisheries departments may ask to see a cash flow plan to help understand larger operations or your plans for growth.

FINANCIAL INFORMATION

Enter answers for all cells that are this colour:

here

The template will calculate the specific answers in orange. These will be used elsewhere.

Like this

Then the template will automatically enter these into a cash flow projection on the next sheet. You can print this out as part of your business plan.

Basic pond information

What is the name of your farm or business or family name?

Enter company or family name here.

Do you have a business registration number? If so, enter here.

How many ponds do you have?

2

no.

How big is each pond?	1,000	m ²
Your total area for farming is:	2,000	m ²
What stocking density did the Fisheries officer recommend?	5	individuals/m ²
You need to buy this number of fingerlings	10,000	fingerlings
What price can you buy fingerlings for from a private hatchery?	50	FJD/1,000
<p><i>It is best to pay more for all males. At 5c per fingerling, this equals \$50 per 1,000.</i></p>		
This will cost this much upfront	500	FJD
How much do you think you can sell your tilapia for?	10	FJD/kg
<p><i>You need to check your market first- talk to other farmers, and visit local markets.</i></p>		

What is the average size fish people want to purchase?	<i>Aim for 250-300gm live, and talk to your fisheries officer about how long this will take to grow (around 5 months). The average size will be lower than this target.</i>	200	gm
Expected survival rate:	<i>You should aim for 80% after a year or two, but start lower.</i>	66%	
Total yield:	<i>This is how you can expect to harvest after 5-6 months.</i>	1,320	kgs
And this is your total REVENUE.	<i>Remember, from this revenue you need to subtract costs to get your profit.</i>	13,200	FJD

APPENDIX A: BUSINESS PLANNING TEMPLATE AND GUIDE

Business Plan Template

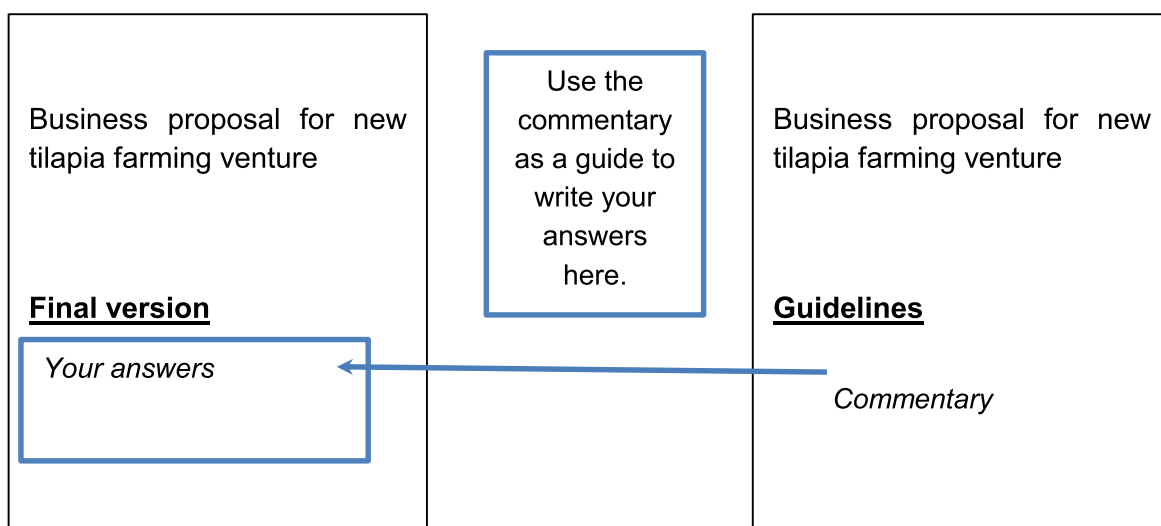
Use this template as a start point for preparing a Business Plan that you can use for your own records and planning, or for writing an application to borrow money from a bank, or for finding other investors as partners in your enterprise.

The template is in two parts: the first is a blank form that you can enter your writing into, and then print off, the second is a guideline which helps you understand what is required in each section. The second part explains what each section is for, why it is there and contains some useful language, or ideas to help you think through your answers.

Where do I get the answers?

Most of the information and answers that will form the content you have already answered in the earlier modules, so this step is really a process of putting it into a clear, structured format.

It is best to use the two parts of this template next to each other as you fill out the sections, as indicated below: the first section (pages 2-6) is the **Business Plan template** you will fill out, and the second section (pages 7-11) are **guidelines** for filling it out.



BUSINESS PLAN TEMPLATE

☐ **Your name or company name** ☐

Business proposal for new tilapia farming venture

☐ **Address of farm/operation** ☐

Prepared by: [Your name and phone number]

Date: [the date]



f

Contents

1. Introduction
2. Critical data
3. Strategy overview
4. The Plan
5. Risks and challenges
6. Financials
7. Appendices

1.0 Introduction

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2.0 Critical data

--

3.0 Strategy overview

4.0 The Plan

5.0 Risks and challenges

5.1 Introduction

5.2 SWOT Analysis:

Strengths	Weaknesses
Opportunities	Threats

5.3 Business risk analysis

Our strengths and how this will help our business
Key risks to our business and how we plan to address these.

6.0 Financials

7.0 Appendices

1. Financial projections
2. Photos (if available)
3. Location plans (including GPS) and outline of land and water source;
4. Map showing land and distance to local markets;
5. References or letters from Fisheries officials if you have met them,
6. Quotations for input supplies or capital works, any buyers' agreements that you can secure.

BUSINESS PLAN TEMPLATE GUIDANCE DOCUMENT

☐ **Your name or company name** ☐

Business proposal for new tilapia farming venture

☐ **Address of farm/operation** ☐

Prepared by: [Your name and phone number]

Date: [the date]

Contents

1. Introduction
2. Critical data
3. Strategyan overview
4. The Plan
5. Risks and challenges
6. Financials
7. Appendices

1.0 Introduction

This section introduces the proposal, what you intend to do (e.g borrow money for expansion), and what help you have received to get this far e.g talking to Fisheries officers, SPC, talking to banks etc), and how you plan to grow your operation to repay any debts.

You might find it easier to do an outline of the introduction firstwrite down a few ideas, and then come back to it and write in more detail when you have finished the rest of the document.

2.0 Critical data

This section introduces who you are, whether you have a business entity, if you own land, and the land you intend to farm.

It includes data on the land itself (leasehold details, location, assets on the land, previous and current activities, what access to the land is).

And details on you (your business history, how you currently work, what experience you or your neighbours have with farming, and aquaculture).

3.0 Strategyan overview

This section introduces your idea. Talk about why you want to start growing tilapia, what inspired you to start (“whys”), and how you intend to make it successful. The strategy can be a summary of your strengths and the strategies you will apply to address challenges you have identified (“how”).

plan, and then write the

Examples:

“I have started eating fish in the last few years and realise that more and more people want a reliable locally sourced fish, and that tilapia demand is growing in markets. I realise that if I can produce my own tilapia, then there is a growing market for it”.

Or:

“I have a neighbour who has some unused ponds that make no money for him. I have seen other farmers sell tilapia in local markets, so I would like to try. I have suggested leasing his ponds and he is open to a profit share arrangement.”

It is also useful to talk about what you have already discovered about the market and why your proposal is stronger than others - *“I have successfully diversified into more than five crops, and believe I have the skills to try aquaculture”*

Or:

“I believe I can aggregate the supply from 5 under-performing farmers in the area, train them how to increase their productivity and sell to a friend of a friend in Nadi who wants 400kgs each week. I couldn't do it on my own, but I believe I can increase the capacity of my neighbours.”

It will also set out how you plan to keep the business going for longer (state how long - 5 years, 10 years, and why), or an exit from the business in a few years (state when, why and how).

4.0 The Plan

The plan describes:

*What your proposal is (quality tilapia, consistently supplied);
Why it is a good idea (prices, skills, resources etc);
What your goals are (2 ponds at 300kgs per cycle; work with 5 farmers for 10 ponds);
How you will achieve this (start slowly, learn, train, and grow);
What risks, and challenges you might face to achieve the goal (floods, competition, disease, etc) and what you can do to reduce these risks.*

For this section, use the answers in Modules 02 and 03 to describe what you have learnt in as much detail as possible. Refer to the answers and numbers in the cash flow spreadsheet as well, to link your plan with the cash flow. Explain how you will improve your yields over time as you improve, and other strategies to reduce costs and increase returns.

Finally, you will use the financials to show how you will make a profit, but you will also have to explain how you finance the setup (pond preparation, seed purchase etc), and that you will reinvest some of your profits for growth.

5.0 Risks and challenges

Describing your risks:

When you address the risks and challenges facing a business, it means you have thought about what can go wrong, and what you are planning to do to prevent things going wrong. You are also showing what strengths and skills you have to reduce the risk of things going wrong.

The more you add to this section the more convincing the business plan will be. You can also add some lines into the financial modelling to link any extra costs you have identified in this section.

Remember that the work that you did in modules 1, 2, 3 and 4 should be included in the Business Plan, and if you have been thinking about the challenges and how to solve them, then that should all be included in this section.

5.1 Introduction

In this box, briefly write about the key strengths of your business proposal, and how you can use these strengths to address the risks in the business. You don't need to write about the risks until after the SWOT table below. The idea of this introduction is to start to demonstrate a 'strategy' in your thinking - you see an opportunity, you have quantified the opportunity, worked out what you need to take advantage of this opportunity, and then explained why you are in a good position to do so.

The analysis section then shows that you have thought about the gaps in your strengths, and how you will address them.

5.2 SWOT Analysis:

In Module 04, you should have already completed your SWOT analysis. You can copy the responses in here, and in the Lessons section below, you can use the answers to the questions in Module 04 as an explanation.

In the next section, you will use the detailed answers from Module 4 to write responses about your strong points and the business risks, and how you will address the risks.

SWOT Analysis	
Strengths	Weaknesses
Opportunities	Threats

5.3 Business risk analysis

The intent of the boxes below is to show that you have thought about the weaknesses and threats to your business and can explain how you will reduce these in your plan (e.g., building high pond walls to reduce flood risk, or finding more than one buyer to improve your sales prices).

Our strengths and how this will help our business

Key risks to our business and how we plan to address these.

6.0 Financials

This section includes the financial tables produced earlier in this module but will also include a description that describes the business over several years, including cash flows, reinvestments, cost of financing, and what you need to achieve the goals.

If the plan is well set out and compelling, you might find that a lender is happy to invest in your business in the first year, without waiting for some history.

This might be possible if you have already had some track record of aquaculture, and you have good records of this experience, however if you haven't it is likely that you will have to operate for at least a year, even in an extensive (low density, low feed regime) mode, to demonstrate a track record.

Do not be put off by this, particularly if you can secure government support for pond construction, as the discipline of record keeping is an important step for a profitable, successful business.

7.0 Appendices

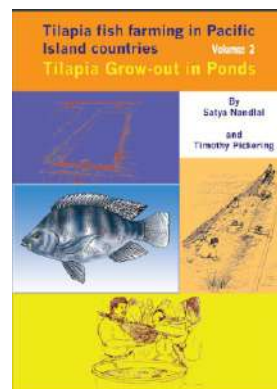

In this section, you need to attach several supporting documents for your proposal. This must include the financial projections prepared in Module 02, and can also include photos, location plans and maps, reference letters from Fisheries, quotations and any buyers' agreements.

1. Financial projections
2. Photos (if available)

3. Location plans (including GPS) and outline of land and water source;
4. Map showing land and distance to local markets;
5. References or letters from Fisheries officials if you have met them,
6. Quotations for input supplies or capital works, any buyers' agreements that you can secure.

APPENDIX B: REFERENCES

KEY REFERENCE MANUALS

TECHNICAL SOURCE	Title	Cover
SPC Manual	Authors : Satya Nandlal ; Timothy Pickering Title : Tilapia fish farming in Pacific Island countries Volume: 2 Tilapia Grow-out in Ponds Source : SPC Date : 2005	
SEAFDEC Guide	Authors : Eva T. Aldon Title : The culture of tilapia Source : SEAFDEC Date : 1998	

OTHER REFERENCE DOCUMENTS

Technical papers

Guide to information sheets on fisheries management for communities – SPC, 2011.

The culture of tilapia – Eva T. Aldon (1998)

Mohamed Din MS and Subasinghe R. 2017. *Basic biosecurity manual for tilapia hatchery technicians in Bangladesh*. Penang, Malaysia: CGIAR Research Program on Fish Agri-Food Systems. Manual: FISH-2017-10.

Cluster farming helps improve tilapia production in Fiji – SeafoodSource, 2014.

Policy papers

Introduction of tilapia species and constraints to tilapia farming in Fiji – by Satya Nand Lal and Roberto Foscarini -FAO

Fiji 2020 Agriculture sector policy agenda – MoA ; August 2014

Fiji Islands Freshwater Aquaculture Sector Plan 2005 – 2010; Ministry of Fisheries and Forestry, Government of Fiji Islands.

SEAFDEC Annual Report 2017 – Secretariat, Southeast Asian Fisheries Development Centre

SPC Aquaculture Action Plan 2007 – SPC

SPC Aquaculture Action Plan – Derived from 1st SPC Aquaculture Meeting, Building Capacity for Aquaculture in the Pacific, held at the University of the South Pacific, Fiji Islands, 11-15 March 2002 – SPC, 2003.

Aquaculture Development in Fiji Islands –Presentation during the ACP Ministers Responsible for Fisheries & Aquaculture 18-21 September 2017 Nassau, Bahamas

Fiji Aquaculture Bill 2016 – The Parliament of Fiji

Policy Brief on Aquaculture and Climate Change by Johna Bell and Tim Pickering, SPC, 2012.

Application of GIS tools to strategic planning of freshwater aquaculture in SPC countries and territories by Nadia Chagnaud, SPC, 2008.

Research surveys

Current status of aquaculture in the Pacific Islands – Tim Adams, Johann Bell and Pierre Labrosse

Profiles of high interest aquaculture commodities for Pacific – SPC

From drawing board to dining table: The success story of the GIFT project – M.V. Gupta and B.O. Acosta (WorldFish)

Status report: Pacific Islands reef and nearshore fisheries and aquaculture 2013 – SPC

A perspective on aquaculture development in the Pacific Island Nations: History, current status, problems and solutions – Contribution paper, 2014

Final report for Mini-project MS0507: Productivity and constraints in tilapia fish and freshwater prawn aquaculture in Fiji J. Teri and Tim Pickering (2010).

Fiji Fisheries Resources Profile – Forum Fisheries Agency (FFA) by Andrew Richards, Maciu Lagibalavu, Subodh Sharma, Krishna Swamy. FFA report 94/04

1st SPC Aquaculture Meeting – Building Capacity for Aquaculture in the Pacific, Suva, Fiji. March 2002.

2011 SEAFDEC/AQD highlights – SEAFDEC, 2012

Some notes on aquaculture development in the South Pacific – H. Tanaka, 1987 – SPC

Review of aquaculture policy and legislation in the Pacific Island Region
– Nathan Evan, Joytishna Raj, Duncan Williams USP – SPC, 2003.

Moses Amos, Ruth Garcia, Tim Pickering & Robert Jimmy, SPC,
Noumea, 2014.

Regional Approach to Risk Assessment for Aquaculture on the Pacific
Islands (a presentation) – by Ben Ponia, SPC.

Developing aquaculture-based livelihoods in the Pacific Islands region
and tropical Australia – Cathy Hair, Paul Southgate, Tim Pickering,
Pranesh Kishore, Monal Lal, Marilyn Vilisoni, ACIAR, 2013.

South, G.R., Morris, C. & Bala, S. 2012. Annotated Bibliography on the
Current Status and Product Development of Tilapia in Fiji, Samoa and
Tonga. Suva, Fiji: School of Marine Studies, FSTE, USP. SMS Technical
Report 02/2012.

South, G.R., Morris, C., Bala, S. & Lober, M. 2012. Value adding and
supply chain development for fisheries and aquaculture products in Fiji,
Samoa and Tonga: Scoping study for Tilapia (*Oreochromis* sp). Suva,
Fiji: Institute of Marine Resources, School of Marine Studies, FSTE,
USP. IMR Technical Report 04/2012. 18pp.

Lessons from past and current aquaculture initiatives in selected Pacific
Island countries by Pedro B. Bueno – FAO, 2014.

Final Technical Report – Study on aquaculture policy frameworks in the
Pacific Region. Project ref. No. PAC-1.2-B4 REL, September 2013. EU
& PBLH.

APPENDIX C: REGIONAL FISHERIES CONTACT POINTS

Fisheries Agencies and Technical Support, Fiji.	
Ministry of Fisheries	
	Aquaculture Division
<i>Phone number</i>	(679) 336 1122 - Lami Station (679) 990 8101 (Mobile)
<i>Website</i>	http://www.fisheries.gov.fj/index.php/divisions-fisheries/aquaculture-division
	Naduruloulou Freshwater Research Station
<i>Phone number</i>	(679) 347 7004
	Northern Division Office
	Govt wharf, Labasa - (679) 881 2388
	Savusavu - (679) 885 0267
	Nabouwalu, Bua - (679) 883 6064
	Central/Eastern Office
	Wainibokasi Rd, Nausori - (679) 347 9626
	Suva - (679) 336 1122
	Vunisea, Kadavu - (679) 333 6032
	Lakeba, Lau - (679) 882 3020
	Western Division Office
	Nasivi St, Tavua - (679) 668 0733

	Tavewa Ave, Lautoka - (679) 666 5899
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