



WorldFish
C E N T E R



giz



Manual 2011-30

Guidelines for Fish Production in Long Term Refugee Situations in Africa

Guidelines for Fish Production in Long Term Refugee Situations in Africa

Text written by Silvia Renn (WorldFish) and Dr. Fred Weirowski (WorldFish) with additional input from Dr. Daniel Jamu (WorldFish), Saskia Husken (WorldFish), Simon Heck (WorldFish), Malcolm Beveridge (WorldFish), Sebastian Gampe (Nurtingen University), Cuthbert Mutakwa (Department of Fisheries, Zambia), Habeenzu Simamba (Department of Fisheries, Zambia), James Simwinga (Concern Worldwide), Jeremy Simon (Forge), Corey Thomas (Peace Corps), Sieglind Wallner (University of Stockholm, Sweden).

Illustrations by: Richard Mwale for the Fish Farmers Handbook, Malawi Gold Standard Project, Community Partnerships for Sustainable Resource Management in Malawi (COMPASS II), implemented by Development Alternatives Inc. and funded by USAID

Photo credits: S. Gampe, S. Renn, S. Wallner

Line drawings credits: USAID/Malawi's COMPASS II Project implemented by DAI.

Design & layout by: Vizual Solution

Printed by: Practical Printers Sdn Bhd

Produced by: The WorldFish Centre

Table of Contents

Introduction	4
PART A Aquaculture in Refugee Environments.....	6
Features of Aquaculture in Refugee Environments	7
Potential Benefits of Aquaculture in Refugee Settings	8
When to Build the Ponds	10
Pond Types.....	11
Commercial Fish Farming in Refugee Camps	12
Exclusion and Inequity	13
Women and Fish Farming	14
After the Refugees Have Gone	16
Part B Criteria for Aquaculture in Refugee Camps and Settlements	17
Aquaculture Criteria Checklist	18
Legal Issues.....	19
Environmental Conditions	21
Market	26
Location of the Ponds.....	28
Pond Inputs and Maintenance	30
Who should be a Fish Farmer.....	35
Local Hosts.....	37
Project Inputs and Costs.....	38
PART C Collaboration between Civil, Public and Private Sectors	40
Collaboration Between Civil, Public and Private Sector	41

Introduction

These guidelines provide general advice on potential benefits and implications of promoting aquaculture in refugee settlements and local host communities, specifically in Africa. In particular, they seek to highlight issues critical for translating aquaculture support in refugee situations into sustainable benefits for target populations. Aquaculture can help improve food and nutrition security and contribute to household incomes among refugees and neighbouring communities in sites with viable supplies of inputs (seed and feed) and service provisioning (training and technical extension).

These guidelines present options and approaches for fish production, exploring opportunities in fish production for home consumption and for generating income. They focus on:

- providing refugees and local hosts with cost effective, sustainable solutions for production of food and income
- ensuring the needs and rights of refugees and the local hosts that live in proximity to the settlements
- including humanitarian agencies, local host government agencies and the private sector to ensure sustainability

Using this Handbook

The intended users of these guidelines are primarily humanitarian and development agencies, local host government agencies and the private sector. The guidelines are especially relevant for livelihood support project managers, planners and trainers who may not be specialists in aquaculture.

This handbook is best utilised before planning aquaculture activities in camps or settlements.

Part A gives detailed information about aquaculture procedures and components in refugee camp and settlement environments. *Part B* provides a step-by-step checklist of the processes required to develop pond-based aquaculture in refugee settings. *Part C* addresses how public/private partnerships can finance and develop aquaculture projects in refugee settings.

Definitions

Aquaculture: The general term given to the controlled cultivation of any aquatic (fresh and marine) species (plant or animal)¹ and is often called 'fish farming'. In the context of these guidelines, aquaculture refers to the controlled breeding and growing of freshwater species (mainly tilapia) in ponds, eventually in cages using feed from plants and other sources. Any form of aquaculture can be subsistence (food production for the owner's household only) or commercial (all or part of the harvest is sold).²

Camps/Settlements: The terms 'camp' and 'settlement' are often used interchangeably. For this report the term 'camp' will refer to short term (under ten years) refugee establishments and 'settlement' will refer to long term (over ten years) refugee settlements.

Fish Farm: A workplace (usually a pond) where fish are raised for food.

Fish Farming Clusters: Fish farming clusters or fish farming groups are informal or formal collaborations of horizontally organized small scale farmers that collectively purchase inputs such as seed, feed or other input supplies and manage production facilities or marketing of products. The cluster may include a vertical formal collaboration within the value chain, e.g. between the hatchery and the farmers or between farmers and wholesalers. Ideally, the collaboration should represent more than a supplier-buyer relationship and should include sharing of workload and knowledge.

Group Owned Pond: For the purposes of this study, a Group Owned Pond (GOP) is defined as a pond owned by two or more individuals who join their resources to perform all activities of fish farming. This is not the same as group work where farmers jointly work on an individual's farm but the farm and the produce are owned privately. In a GOP, all activities are carried out collectively and ownership of the pond and the produce belongs to group members.

Local Hosts: Citizens of a country that hosts refugees.

Protracted Refugee Settlements/Camps: The term applies to both organized settlements and camps as long as they are organized (as opposed to spontaneous or self-settled) and exist for more than five years without clear prospects of finding a durable solution, such as voluntary repatriation, local integration, or resettlement.

Refugee/Camp Environment: A radius of up to 20km around the refugee camp, including local host villages and communities.

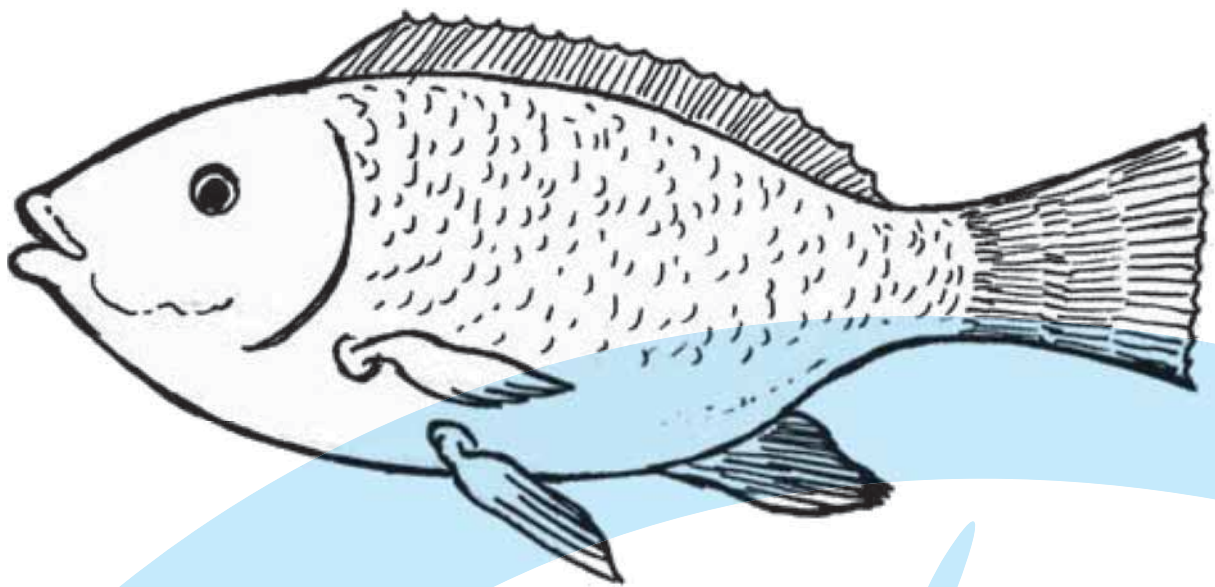
Small Scale Aquaculture: Aquaculture with limited fish production facilities and capacity. Some definitions refer to a pond size of under 2 ha. In a development context, small scale aquaculture often refers to 'backyard pond culture', meaning that there is a pond located within the enclosed land around a house or other building. The size of the backyard ponds may differ. Common understanding is that they usually range from 200 to 2000 m².

1 www.fishonline.org/information/glossary/

2 simple methods for aquaculture version 2 FAO2006 ftp://ftp.fao.org/FI/CDrom/FAO_Training/Start.htm

PART A

Aquaculture in Refugee Environments



Features of Aquaculture in Refugee Environments

Aquaculture programs exist in various forms in refugee settings. Many factors influence the form and productivity of aquaculture in this environment, leading to different priorities and methods of production. Aquaculture practiced by refugees to ensure food self-sufficiency and income generation can be pursued in various settings

- inside or outside settlements on land provided by government and/or local authorities, or
- outside the camps or settlements on land informally provided by local individuals or communities, and based on informal or illegal agreements.

In many cases, aquaculture in camp and settlement areas is

- externally introduced, organised and funded/supported by aid and development agencies
- highly associated with aid instead of sustainable livelihood options
- small-scale pond farming with low investments in seed and feed and low outputs
- not effectively connected to the aquaculture sector in the host country

Small scale aquaculture can be economically, socially and environmentally sustainable if it is well-connected to input and output markets and supported by capacity development for farmers and other stakeholders in the value chain.



Potential Benefits of Aquaculture in Refugee Settings

Aquaculture can strengthen health and nutrition security

- Nutritionally, fish is an important source of protein, fats and micronutrients for millions of people in Africa. There is a range of fish species available for aquaculture that have wide market acceptance. The nutritional quality of different fish and fish products differs significantly between species and also as a result of the type of aquaculture management and preparation for consumption.
- Nutrition support is widely used in treatment (Anti Retroviral Treatment) of HIV/AIDS as good nutrition slows the progression of HIV into AIDS and improves the effectiveness of treatment once started. In areas where fish is expensive or unavailable, aquaculture can potentially fill this gap at the local level.
- Where nutrition benefits are prioritised over other benefits and small fish are accepted by consumers, aquaculture can effectively and profitably target production of small fish. These may occasionally be eaten whole and therefore provide a more comprehensive set of nutrients, especially micronutrients, which can be particularly important for women and children. Small fish also require a shorter production cycle and, in principle, allow more frequent harvests and higher incomes with lower production costs. To realise these benefits, however, input and output markets must be efficient.
- Refugees often lack access to fresh foods. Fresh fish from fish ponds are a welcome enrichment of the food basket and contribute to household income.

Aquaculture can increase social benefits

- Gifts of fish can be used to strengthen social relations with neighbours and friends. In social environments where tensions and potential for conflict are high, this is a significant benefit.
- Ponds are often regarded as a status symbol. Well-connected households are more likely to engage in aquaculture and a fish pond may symbolize their status.
- Labour requirements of fish farming are fairly low beyond the initial construction of the pond. Female-headed or orphaned households are well able to carry out fish farming and are often amongst the best performing fish farmers.
- Fish farming can help reduce boredom and frustration. In many environments, fish farming tends to attract youth rather than older sections of the populations due to its novel appeal. If supported through training and access to productive inputs and markets, youth can engage in fish farming as a way of building a future for themselves.

Aquaculture can help ensure environmental sustainability

- In many environments with adequate water resources, fish farming at a small scale can be compatible with crop and livestock production.
- Fish ponds are a relatively intensive land use system and where land is scarce, fish farming is often a viable option for producing animal protein. Under small holder conditions, productivity may range between 1 mt and 4 mt per ha if production is continuous, inputs are available and the pond is well managed.
- Ponds can be used to prevent soil erosion, provide a perennial source of water and rehabilitate land.

Aquaculture can enhance farm production

- Fish farming can be integrated with crop and livestock production. Manure from livestock and by-products from crops can be used to fertilise ponds and stimulate higher productivity.
- Ponds can be built on land that is less productive for other types of agricultural farming.
- Organic waste from gardening can be used as fertiliser and feed to enhance productivity.
- Refugees who own livestock can use manure as fertiliser for their fish ponds or trade it to people who are fish farming.
- Fishponds can provide a year-round water reservoir to irrigate fields and gardens. This is particularly important in areas of pronounced dry seasons where farmers with ponds have continuous crop production.
- Small scale irrigation from ponds and inlet and outlet channels allows farmers to diversify their crops and include crops of higher nutrition and/or market value.
- Sludge from the pond bottom can be used as a fertiliser for crops and vegetables and therefore increase the productivity of farmland.
- Vegetable and other plant production is possible on fish pond dykes.

Aquaculture can increase household Income

- Fish is a 'high value crop' and most aquaculture products find wide acceptance in local markets as fresh and desirable food. Given the small quantities produced in refugee contexts, marketing of fish is likely to be either within the settlements and/or in neighbouring communities. Prices of fish from aquaculture depend on a number of factors, including local purchasing power, supplies from natural fisheries and alternative sources of animal foods.
- Aquaculture can target demand for smaller fish that is often found among poor communities. Where the supply of fish seed is reliable, farmers can adjust their production cycles to yield several harvests of small fish per year, provided this increases incomes and profits.
- Local (host) aquaculture farmers can sell their fish in the camp market or to aid agencies, thus providing food to the refugees.
- Services such as the digging or maintenance of fish ponds, supplying fish feed and equipment and tools or trading fish within the camp or to local communities outside the camp can provide a source of income for refugees.

When to Build Ponds

Aquaculture integration can be planned prior to camp opening

Plots with space for a fish pond should be planned for suitable locations within the camp. Temporary camps often turn into long term settlements (e.g. two camps in Zambia have been open since the early 1960s). Depending on the type of pond, plan for 100 m² to 1 ha per household for the pond and 100 m² to 2 ha for farming feed and or producing organic fertilisers. Including livelihood activities before a camp is established can be problematic when the political situation in the country of conflict is unclear. Also, the government of the refuge country may not be open to refugee livelihood support until it is clear that the camp may be long term.

Aquaculture integration can be planned after a camp or settlement is active

There is usually a large influx of refugees during the initial establishment of a camp and the camps are often overcrowded due to high birth rates and a steady in-flow from crisis zones. While most refugees are in camps for at least 5 years, aquaculture should not be initiated until the camp meets the following criteria:

- refugees are not expected to repatriate or resettle within the next two years
- the government of the host country permits the refugees to conduct livelihood activities
- international agencies are willing to promote and support livelihood activities if insufficient start-up capital is available
- the refugee population has stabilised and is not likely to expand and enough land is available
- the refugee population is decreasing and enough space is available
- the crisis in the home country or region is expected to be prolonged
- refugees have been in the settlement/camp for many years and are no longer accepted in their home country and are not likely to be granted citizenship by the hosts
- there are existing ponds that can be revived

For short term refugees, a training pond can be established as part of a program to teach aquaculture technology and to prepare the refugees to become farmer entrepreneurs.



Pond Types

Small scale, training or commercial ponds can be in the form of either pond clusters or homestead ponds.

Large community ponds and pond clusters

Typically, ponds are located in valleys or along natural streams, often creating clusters of different sized small ponds. These ponds can be individually managed and collectively controlled by the refugees. Clustered ponds can also be used as brood stock and nursery ponds for more specialised production, with operators of these ponds selling fingerlings to other fish farmers within or outside the cluster.

Pond clusters should be located such that they are visible to at least one of the pond farmers to minimise theft, and they should be established close to a road to ensure year round access. If the ponds are not visible to any of the farmers, a security guard can be hired.

Several fish farmers may sometimes unite to maintain one large pond, which is referred to as a group owned pond. These ponds tend to be much less successful and are not recommended.

Small scale homestead ponds

Because refugees face mobility, business and land restrictions, small scale ponds near the home are recommended for refugee camps. Placement of ponds near the homestead helps to

- avoid the theft of fish
- avoid attacks on the refugees themselves
- lessen travel time to the pond and thus lessen work for the fish farmer
- more easily utilize the manure of livestock kept near the homestead as a source of pond fertilisation
- more easily re-cycle leftover foods and wastes from vegetable gardens near the home as fish feed
- more easily irrigate vegetable gardens near the home
- take advantage of the manure from livestock housed nearby and other wastes that fall into the pond

Caution: Pond soils need to hold water. Ponds close to the homestead, which are often located in more upland areas, can suffer from excess seepage due to soil loams or loamy clay.



Commercial Fish Farming in Refugee Camps

It is much more difficult for refugees to operate commercial fishponds within the refugee camp. Problems may include

- jealousy and turmoil in the (often poorer) host communities
- inability of refugees to obtain permission to earn an income
- inability of the refugees to secure permission to sell produce outside the camp
- uncertainty regarding the refugees' length of stay in the settlement
- informal arrangements that may compromise the legal rights of refugees

Solutions to the above mentioned problems include

- establishment of commercial fish production outside of the camps with locals employing refugees as labourers and/or locals selling the fish to refugees or aid organisations as food
- obtaining permission from the host government for the refugees to sell their farmed fish
- selling fish from commercial fish ponds inside the camps to other refugees or aid organisations with fingerlings purchased from local hosts involved in fingerling production
- limiting commercial fish farming only to camps where refugees have good relations with the local hosts or where hosts understand why the refugees are involved in commercial fish farming

In addition, refugees may more effectively operate commercial fish ponds by

- commercial farming of fish and fingerlings as small, medium, or large businesses in which refugees form a cluster or a formal business entity and produce commercially using more intensive methods, e.g. locally produced fish feed and manure
- coordination of production cycles with stocking and harvesting according to the market demand, and organization of bulk purchases and collective marketing



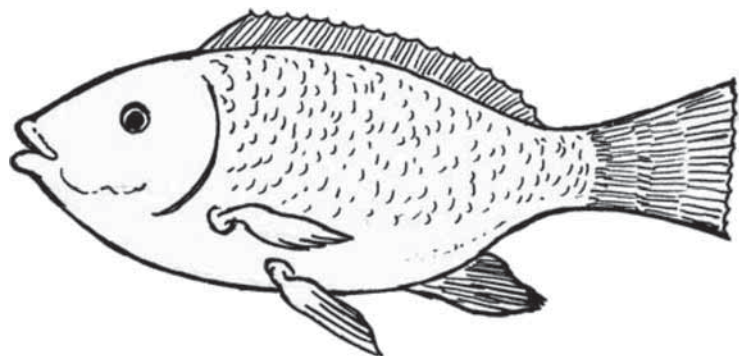
Exclusion and Inequity

Selective support to fish farmers can have negative effects on social coherence and peace in refugee settlements or in the local communities. In many cases, this only becomes apparent when ponds are damaged or fish are stolen. To prevent fish farming from becoming a source of conflict, communities must be included in the design and planning of the aquaculture project and in the selection of fish farmers. Participation of different types of farmers, especially women and youth, should be encouraged to avoid reinforcing existing inequities along gender and socio-economic divisions.

At the same time, competition between farmers should be encouraged to stimulate progress and create openness. Incentives may be provided for successful fish farmers, along with mechanisms to understand and share reasons for their success. Fish farmer clubs or associations can play an important role in ensuring transparency of project operations, disseminating information and recruiting further community members to fish farming. Where clubs get involved in procurement, production or marketing, they can also reduce costs and improve access to quality inputs and services.

Farmers must participate in

- selecting pond sites in appropriate areas with optimal soil and water conditions.
- ensuring that all fish farmers are provided with equal access to tools (or tool sharing agreements), fingerlings and other inputs.
- developing and using best fish farming practices and improving their capacity to manage fish ponds.
- forming agreements concerning the consequences of their actions. These agreements should be legal and can include the loss of a pond or further support. The camp should have an agreement regarding punishable offences and penalties, ideally enshrined in local by-laws, that constitutes a means for conflict resolution by a camp committee.
- building awareness (possibly in story/legend form) of the dangers of unfettered jealousy and the damage that can ensue.

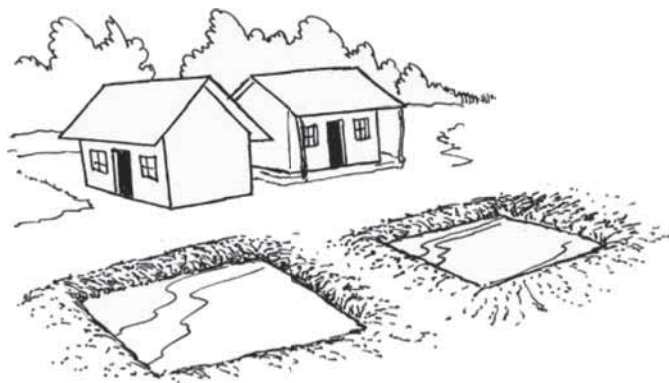


Women and Fish Farming

Women have proven themselves to be successful fish farmers, providing food and income for their families. Fish farming can be both a safe and accepted way for women to secure food and monetary income.

The potential of fish farming for women

- If ponds are close to the homestead, women do not have to walk far to maintain the pond. In many refugee situations, (single) women and girls are vulnerable and can be subjected to sexual harassment or attacks if they move around in isolated places. Fish farming can be a practical and secure way for women to produce food or income for the family, particularly in cultures where women are not allowed to leave the house without the company of a male relative.
- Hard labour is not involved in maintaining a fish pond, so women are able to produce fish even if there is no adult male to help maintain the pond.
- When girls reach adolescence, they are generally expected to spend more time on household activities such as cooking, cleaning, collecting fuel and water and caring for children. Ponds that are placed near the home are therefore more easily managed by young females.
- In many traditional settings, producing and preparing delicious food is an important achievement for women. Food aid that reaches refugee camps is often not the preferred or traditional food of the refugees. When coming from a fish consuming country of origin, women in refugee camps can overcome this by providing and preparing fish to add to the daily diet of the family, thus making meals more nutritious and lending a more traditional flavour to the meals.
- In many refugee camps, women use illegal methods (including prostitution) to generate income or other needed items. Fish farming can be a legal and safe way for a woman to generate income and/or food.
- In many cultures, women's main assets are human and social. Gifting of fish can greatly strengthen a woman's social capital.



Possible challenges to women that require discussion prior to their participation in fish farming

- In male headed households, women may not control how much fish is kept for home consumption and how much is sold.
- While women are usually responsible for preparing the food, men are customarily responsible for providing the food. In refugee situations where tradition is broken and fish farming is mainly practiced by women, men may be faced with identity issues if they are no longer providing food for the family. This situation may put stress on the household, resulting in family conflict that causes the man to leave the family.
- Digging fish ponds can be too difficult for sick or very old women.
- Where men are head of household, women might not benefit from the income that they have generated due to unequal intra-household distribution of income.

Solutions to inequalities in distribution

Distribution of fish and the income that they generate must be defined using participatory methods. This responsibility can be assigned to the wife, the husband or both. In some cases a third party can fill this role. The allocated responsibility should not undermine deeply rooted traditions of intra-household distribution as this will most likely not work. Honest opinions from potential fish farmers must be solicited in order to determine intra-household distribution. These opinions should address:

- who should be responsible for what is kept and what is sold and what is given away
- how the inclusion of women in the decision making process can be ensured
- what steps are needed to ensure adequate food consumption and/or income for women



After the Refugees Have Gone

Subsequent to the departure of refugee inhabitants, a reasonable use of camp structures should be promoted to strengthen the (often very rural) surrounding regions. This will help to compensate for the lack of demand and supply once created by the refugees.

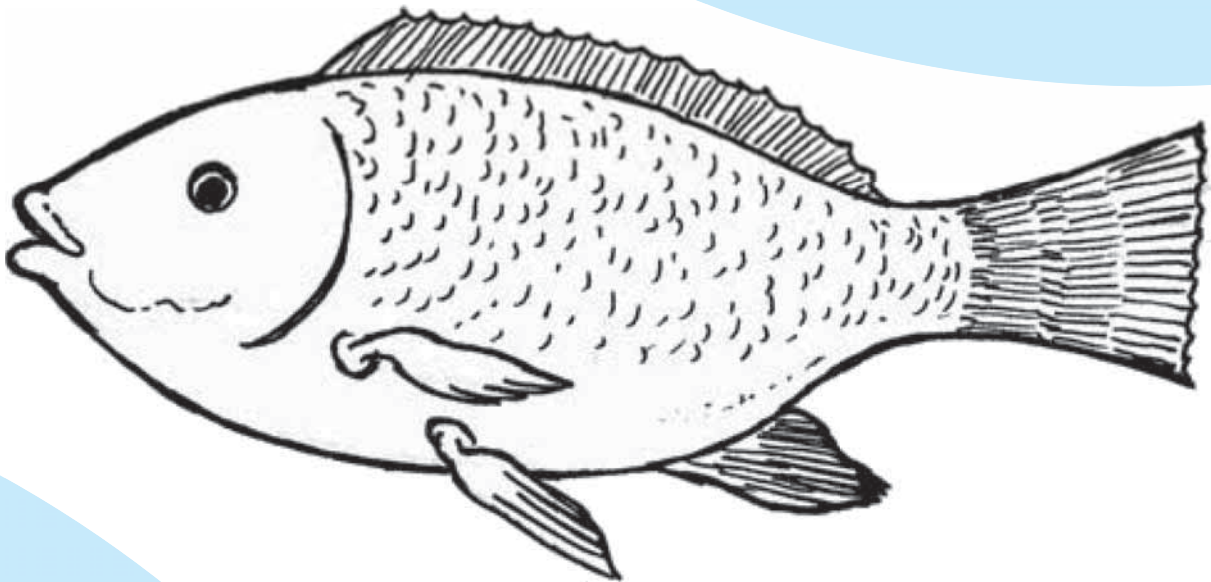
To ensure the sustainability of the ponds, provision must be made for

- resettlement schemes by the host government for locals who wish to receive land and infrastructure
- training activities for the host population
- private sector purchase of fish, ponds or fingerlings if commercial use is sought



PART B

Criteria for Aquaculture in Refugee Camps and Settlements



Aquaculture Criteria Checklist

Strategies for introducing aquaculture into refugee settlement environments can be planned before or after the settlements are established. In either case, the ability of aquaculture to generate food security and income benefits will depend on a set of physical and institutional criteria.

The checklist below will assist in understanding the physical, institutional, and socio-economic factors that must be in place to implement a sustainable aquaculture project within a refugee environment. As shown in the example below, questions are asked that can be answered YES or NO. An explanation is given on the right along with **Action** points. Additional information can be found on the left. *Examples* are real experiences by extension agents working in refugee settings. Even if a question is not answered with a YES, aquaculture may still be advisable. Prospective fish farmers and extension agents should discuss the bottlenecks with the local fishery department and/or other experts to avoid problems.



Is aquaculture appropriate in your environment?

Information: For more hands on information about how to build and maintain a fish pond please visit the following FAO Better Farming Series sites³:

Fish Farming: How to Begin
http://www.fao.org/sd/erp/toolkit/Books/BFfisheries/Freshwater_files/INDEX.HTM

Fish Farming: The Pond
http://www.cd3wd.com/cd3wd_40/cd3wd/fish/fb29fe/en/b94.htm

Fish Farming: The Fish
http://www.cd3wd.com/cd3wd_40/cd3wd/fish/fb30be/en/b95.htm

Fish Farming: Further Improvement
http://www.cd3wd.com/cd3wd_40/cd3wd/agric/fb35be/en/b100.htm

Fish Farming: Raising Fish in Pens and Cages
http://www.cd3wd.com/cd3wd_40/cd3wd/fish/fb38be/en/b103.htm

Fish farming may be appropriate in some camps or settlements, but not in all. To avoid wasting money, the conditions for successful fish farming must be investigated. Aquaculture should not be forced where it is not appropriate. If it is applied in an environment not suitable for aquaculture, farmers will become discouraged, resulting in possible loss of income.

Action: Answer the questions below.

³ Better Farming Series, FAO Economic and Social Development Series No. 3, Food and Agriculture Organization of the United Nations, Rome, Institut africain de developpement economique et social (INADES), Abidjan, Ivory Coast, 1976 to 1995

Legal Issues



Remember: There are several ways aquaculture can be incorporated into camp or settlement environments. The ponds can be for training purposes, for household consumption or for commercial purposes. Training ponds or ponds for consumption can be integrated into camps or settlements even if refugees are not allowed to conduct a business.

For more information about commercial fish farming, see *Commercial Fish Farming in Refugee Camps*, page 12.

Are livelihood activities allowed within the refugee setting?

Livelihood strategies refer to the range of activities undertaken by refugees to access and mobilise needed resources such as food and money. Some host governments may not allow refugees to be self-sufficient.

If refugees are conducting aquaculture on a commercial basis, they will need to be allowed to buy and sell and to leave the camp or settlement if no transport infrastructure is in place and the market is outside the camp. In some cases, however, the markets inside camps/settlements may be the largest markets in the area and refugees can sell their produce there.

Action: Check local government regulations and assess market scope.



Do Refugees have legal access to natural resources?

Refugees will need access to water and land and (possibly) plants in the area.

Action: Check local government regulations. Licenses or fishing rights may need to be obtained.



Can refugee rights be protected?

Rights of the refugees to harvest and sell fish must be protected.

Example: According to regulations, a refugee fish farmer has the right to sell her fish. A local buyer takes the fish on credit but subsequently refuses to pay her. The farmer goes to a local court but, because she is a foreigner, the judge sides with the man from his village and the local buyer does not have to pay her. She can no longer afford to buy new fingerlings and her pond is unproductive.

Action: Ensure that a proper judicial system is in place that can protect the rights of the refugees.



Will the camp/settlement be running for at least another 2 years?

Caution: Promoting any livelihood activities within a refugee camp can be interpreted by the refugees as an indication of a prolonged (long-term) stay. Clear communication concerning this issue is key to avoiding false expectations.

For more information read *When to Build the Ponds*, page 10.

It is not recommended to embark on self-sufficiency activities if refugees are to be repatriated within the next 12 months. Refugees growing crops or farming fish are highly unlikely to voluntarily leave the settlement, at least not until after the harvest.

Action: Ensure that the camp/settlement will stay open for at least another 2 years.



Has permission been granted to use the land for building ponds?

Land ownership rights within the camp/settlement and (if applicable) outside the camp/settlement need to be clear.

Example: The host government has decided to give refugees land that is situated outside the camp so that they can build ponds. However, the local chief does not agree with this decision and after the ponds are built, production is low because fish are stolen on a regular basis by former owners of the land.

Example: Refugees have unofficially started selling and buying plots within the camp due to some repatriation. The refugee officer allocates to selected refugees land which has unofficially been sold to someone else. The prospective fish farmers do not build ponds in order to avoid social exclusion.

Action: Understand all land ownership rights, include all formal and informal owners in the land allocation process, and compensate for loss of land when necessary.

Environmental Conditions



Is enough water available to serve the ponds?

Remember: The settlement must be able to expand. Because families can grow rapidly, it is essential that an annual population growth with typically 3 to 4% births over deaths is included when considering the availability of water and the integration of ponds. Also for consideration are potential alternative and better uses of water for food and income generating activities.

Information: The amount of water that fish need depends on the climate, pond soils, the type of fish being farmed, and the method of aquaculture. Ask local extension agents or the fishery department for more details.

The amount of water needed will vary according to the size of the ponds and the species of fish grown. Perennial streams and natural springs are good sources of water.

Daily management of ponds requires a topping-up rate of the water supply in order to combat evaporation and loss through seepage. However, a large supply of water should be available to flush ponds if needed or to refill them after draining. Future needs should also be considered to allow for possible pond expansion.

Action: Check water availability with local government agencies or camp/settlement plans, and on pond soils. Environmental impact assessments may be needed. Asking local people about droughts or flooding in the area is also helpful. Ask the local fisheries office to assess if water is sufficient.



Will fish farming negatively affect other refugees or local host communities in terms of natural resource use?

Drawing water for the ponds could negatively affect refugees within the camp or local populations living outside the camp. Both local hosts and refugees are often very poor and live on subsistence agriculture.

Example: A number of refugees have become successful fish farmers. When they harvest their ponds they do not use the pond mud on their fields as they are too far away. Also, they have no vegetable gardens near the pond where they can put the sludge. They drain the water and sludge into a built channel which drains into the ground water source. The sludge has slowly built up and blocked the water source. They can no longer refill their ponds without a great deal of work to clear the source.

Example: A group of local host fish farmers is very successful. They are selling their harvested fish to an organisation providing food aid to the refugees. While the refugees are enjoying their meals of fresh fish, they have noticed that water in the river which they use for washing clothes is scarce as the local fish farmers have diverted the river in order to supply their ponds and fields.

Action: Ensure that natural resources are available and pond locations do not hinder water flow further downstream. Verify that ecosystem services are sustained and that the development of ponds does not compromise the livelihoods of downstream users.



Caution: The soil may need to be tested for pesticide residues if the land was previously used for agriculture.

Is the soil suitable for pond construction?

Soil for ponds needs a good clay content. Ideally it should be greater than 20%.

Action:

1. Squeeze a handful of moist soil into a ball
2. Throw the ball about 50 cm up into the air, and then catch it
3. If the ball holds together, it probably has enough clay to support a fishpond
4. If the ball falls apart in your hand, the soil is not good for building ponds.



Is the elevation suitable for pond construction?

The site should have a slope of less than 6% and ideally a slope of between 1 and 2%.



Are the species of fish you are farming endemic?

Information: To check which fish are endemic and successful in a given country, refer to the FAO Aquaculture Country Fact Sheets available in English, French and Spanish. <http://www.fao.org/fishery/naso/search/en>

For more information on fish species, check FishBase: <http://www.fishbase.org/search.php>

If ponds start to leak, fish may escape into rivers and lakes. If the species of farmed fish does not occur in local waters, it should not be farmed.

If ponds start to leak, fish may escape into rivers and lakes. If the species of farmed fish does not occur in local waters, it should not be farmed.

Action: Consult the local fisheries department for advice and information.



Does land need to be cleared?

Remember: Using wetlands or forests can destroy valuable environmental services delivered by these landscapes (e.g. carbon sequestration). Environmental impact assessments should be carried out.

Clearing land for fish ponds may mean cutting down vegetation that is important to residents in the area. Local vegetation may be used by the residents for food, feed or medicinal purposes. In some countries, it may be necessary to obtain permission to clear from a government office.

Action: Consult with people living in the area about the importance of the plants and about government regulations.



Is a plan concerning subsequent use of the camp/settlement available?

Information: While refugees receive international support, host communities are often forgotten although they may be even poorer than the refugees living in the camps.

See *After the Refugees Have Gone*, page 16 for more details.

To make a fish farming project sustainable, the ponds can be taken over by the local hosts after the refugees leave. Planning for this from the outset can ensure that the pond location and the project approach are suitable for the local hosts as well as the refugees.

Action: Check if post-camp plans are available. Liaise with local fisheries or agriculture departments to assess if and how local host communities can benefit from the project after the refugees have gone.



Can aquaculture be linked to agriculture to increase land productivity?

Information: For more information on supporting IAA, see

*Integrated Agriculture-Aquaculture: A Primer.*⁴

<http://www.fao.org/DOCREP/005/Y1187E/y1187e04.htm#TopOfPage>

*Aquaponics—Integration of Hydroponics with Aquaculture*⁵

<http://www.attra.org/attra-pub/PDF/aquaponic.pdf>

*Integrated Fish Farming in China: A Manual*⁶

<http://www.fao.org/docrep/field/003/AC233E/AC233E00.htm>

Integrated Agriculture and Aquaculture (IAA) is an approach that uses organic wastes (such as manure or plants) and farm by-products as nutrient inputs to the pond as well as to the farm. This approach is proven to enhance both agriculture and aquaculture productivity.

After the organic wastes and by-products are put in the pond, the pond mud and nutrient-rich water can be applied to fields or vegetable gardens near the pond. The most common pond inputs are plant-based residues and processing wastes such as leaves, straw, peels, husks, bran and pulp. Other on-farm wastes are kitchen scraps and slaughter wastes. Livestock manures can also be used to fertilise the pond.

Example: A refugee fish farmer builds his chicken coop directly above the pond so that the chicken droppings fall into the pond. He has built a vegetable garden next to the pond and uses the nutrient rich water to irrigate his garden.

Example: A fish farming project has been set up in a local village directly outside of the refugee camp. Selected refugees have been provided with chickens and goats. The local fish farmers collect the manure and use it to fertilise their fish ponds. When they harvest their ponds, they allocate a share of the fish to the refugee families as payment for the manure.

Action: Inform prospective fish farmers about integrated agriculture and aquaculture and encourage them to plant vegetables around their ponds and to use other farm inputs to enhance production.

4 **Integrated Agriculture-Aquaculture: A Primer**, FAO Fisheries Technical Paper, 2001

5 Diver, S. (2006) **Aquaponics—Integration of Hydroponics with Aquaculture**, Updated by Lee Rinehart, 2010.

6 Regional Lead Centre in China Asian-Pacific Regional Research and Training Centre for Integrated Fish Farming Wuxi, China, NETWORK OF AQUACULTURE CENTRES IN ASIA Bangkok, Thailand, September 1985



Are existing ponds available already?

Information: For more information on how to build a pond, see

*Pond Construction, Earthen Fishponds*⁷
<http://www.researchintouse.com/resources/riu11-factsheet-1-pond-construction.pdf>

*Pond Construction, Estimating the Cost*⁸
<http://www.researchintouse.com/resources/riu11-factsheet-2-cost-estimation.pdf>

Digging a pond is a lot of work and existing ponds may be available already. However, reasons need to be determined why a pond is no longer in production. There may be insufficient or excess water in the area, seepage rates may be too high or the ponds may be too far away from the fish farmers' houses. If these reasons persist, it will be reasonable to dig new ponds at better locations.

Action: Ask the camp refugee officers, local agriculture or fisheries officers and/or people who have lived in the area about the history of existing ponds and the reason for their success or failure.

7 Research Into Use. 2011. Pond Construction, Earthen Fishponds. Research Into Use. pp. 2.

8 Research Into Use. 2011. Pond Construction, Estimating the Cost. Research Into Use. pp. 2.

Market



Do you know what type of fish is preferred?

Market demand for fish must exist or be developed before aquaculture can be promoted. The main question is whether aquaculture can deliver what the market requires in terms of species, quantities, reliability of supply, products, size and price.

Consider: What products do the fish farmers themselves and the market demand? When do they want it supplied? What price is the market willing to pay?

Farming the right fish is crucial to a successful fish farming project. Fish farmers should actually like to eat the fish that they farm, especially if the pond produces primarily for household consumption. If fish is to be sold at the camp market or outside the camp, verification should be made as to which fish are in demand and when. Selling fish during fishing bans, for example, can maximize profits.

For more information on commercial fish farming in refugee camps, see *Commercial Fish Farming in Refugee Camps*, page 12.

Example: An NGO has heard that some of the refugees in the camp really enjoy eating catfish and decides that this species should be used for the aquaculture project. When the fish are harvested, several fish farmers do not eat the fish. Catfish are bottom feeders and eating them is not accepted in their religion.

Action: Conduct a market and consumer preference analysis.



Is the pond location accessible for sales?

Consider: Setting up a campsite close to local towns or villages is an advantage for refugee livelihood activities and encourages trade. The hosts might also benefit from access to new markets or to other facilities such as hospitals or schools that have been established in the refugee camps.

The ponds should be less than 1 km from a road that is accessible all year around. The fish may need to be transported by cars or bikes.

Example: One successful fish farmer whose pond is next to his house and far away from a road has harvested his fish. However, fish is in demand and the other refugees and some locals come to his house to buy the fish. He has made a big profit and builds another pond. Getting enough fingerlings to the pond is a problem as they cannot be brought by truck. Some of the fingerlings die on the way while being biked in. At harvest time a nearby mining company offers a good price for the fish but the path to the farm is not accessible due to rains and the fish cannot be transported in time.

Action: Build fish ponds near accessible roads.



Is a market available?

Markets must be available for commercial fish farming to be successful. The markets can be inside or outside the camps. If the markets are outside, permission to sell fish outside the camp may have to be secured for the refugee fish farmers.

Caution: Food aid organisations are not a sustainable market as they might be around for only a short time or their budgets or thematic focus can change. Alternative buyers should be sought when aid organisations are the primary buyers of fish.

Example: An NGO helps a local village to farm fingerlings. The same NGO then buys the fingerlings from the farmers above the market price and gives these fingerlings to the refugees inside the camps for fish farming. Three years later the NGO runs out of money and leaves the area. The fingerling farmers are unable to find another buyer as they set the price for their fingerlings too high. Their main source of income is lost.

Action: Locate multiple buyers and be sure to charge according to regular market prices.



Location of the Ponds



Are the ponds accessible all year around?

The ponds should be accessible all year around. Fingerlings must be available, extension agents need to access the ponds to give technical advice, and buyers should be able to reach the ponds after harvests.

Action: Place fish ponds near accessible roads.



Are the ponds within a short walking distance from the dwelling?

Information: Ponds can be placed on a prospective fish farmer's plot if it is big enough or they can be in the form of pond clusters at a convenient location. See *Pond Types*, page 11 for more details.

Fish farmers are unlikely to have a car or even a bike. Pond maintenance is a lot of work and most small scale fish farmers will be conducting other livelihood activities. If the pond is too far from the house, the farmers may not have time to look after their ponds on a daily basis.

Action: Ensure that ponds are located no more than 15 minutes walking distance from the home or the field.



Are the ponds guarded?

Predatory animals and humans can decimate fish stocks. Ideally, ponds can be placed near the home of one of the fish farmers involved in the project. Placing ponds near village headmen/women or road/section leaders' houses can be an effective way to ensure that intruders stay away from the ponds.

Action: Discuss location with the prospective fish farmers in terms of theft protection. If the ponds cannot be located near a house, a pond cluster can be created and all fish farmers can contribute to hire a guard.



Is it safe for the fish farmer to access the ponds?

Refugee environments can be dangerous, especially for women and girls. Fish farmers should be able to access their ponds safely. This may require that the ponds be located near the house.

Example: A female refugee fish farmer has a pond located outside the camp in a local village. Her husband has been killed in her home country. Several widowed women have been attacked within and outside the camp. She is afraid to visit her pond without a male escort and can no longer maintain the pond on a regular basis.

Example: A long term settlement is home to refugees coming from three different countries A, B and C. People of country A have in the past slaughtered the people of country B and C and have fled their country due to equally brutal retaliation by residents of the countries B and C. A religious organisation plans an aquaculture project including people from all three countries in an attempt to reconcile the groups. However, the ponds are located in an area where mainly people from country B are housed. Fish farmers of country A are reluctant to access their ponds without extension agent supervision as they still fear retaliation.

Action: Assess the safety situation within and outside the camp or settlement. Consult with the prospective fish farmers about the safety of potential locations for ponds.



Is the location culturally and socially appropriate?

The location of the pond should be socially and culturally appropriate. If ponds are placed in taboo areas farmers will not access them.

Example: A group of ponds is to be located in an area with optimal soil, slope and water access, but the prospective fish farmers are reluctant when asked to clear the land for the ponds. The area was once a burial ground and farming activities are not allowed there.

Example: A husband and wife have a pond located 10 walking minutes away from their house. The husband has found piece work outside the camp and leaves for several weeks at a time. The wife is traditionally not allowed to leave the house without a male escort and can no longer maintain the pond.

Action: Ensure that the prospective pond area is culturally appropriate and accessible by all family members. Encourage farmers to identify a pond site and then consult an expert to verify the suitability of the site.

Pond Inputs and Maintenance



Have you decided on the most efficient pond type?

Remember: To avoid discouragement and keep fish farmers motivated, the impact of the fish farming activities within the camp needs to be clearly defined such that the refugees and extension agents have realistic expectations.

For training purposes only: Refugees can learn the skill but may not profit from labour put into the pond or from harvests.

Small scale ponds may yield a small income, but they are mainly for food production.

Commercial fish farming ponds can be used as a business opportunity, but pond management requires a lot of training and work.

Three pond types are recommended for refugee camp environments:

Demonstration ponds (1-3 ponds, each between 200 and 400 m² surface area, plus one pond for brood stock production and one nursery pond)

In camps with little or no access to land, a demonstration pond can be set up to train refugees and locals in aquaculture. This training can be valuable to refugees who are repatriating and wish to upgrade their skill sets or who have permission to work as labourers on ponds in nearby villages. Ponds can be established in camps that will be active for at least one year.

Ponds that produce for home consumption (minimum area of 10x10 m) These ponds can provide the family with fish throughout the year, but they are unlikely to produce surplus for sale.

Commercial ponds (size is typically greater than 200 m² and there is usually more than a single pond)

Fish and fingerlings can be accommodated on a commercial basis, with the business being run as either a small, medium, or large enterprise.

Action: Determine the amount of resources (e.g. workforce, seed material, fertiliser, feed) that fish farmers are able and willing to put into the ponds. Also, business restrictions for refugees may mean that only demonstration and small scale ponds are legal.



Settlement population decreases can open up extra space for livelihood activities such as aquaculture if ponds are planned for initially.



Is the land sufficient for production?

Ensure that the ponds are large enough to produce the desired amount of fish. As a rule of thumb, 1 m² of pond can produce about five fish per harvest (if tilapia is being farmed).

Example: A well managed 200 m² pond can supplement the diets of a household of six persons with 6 kg of fish per person per year.

Action: Plan the size of the pond according to the desired harvest.



For more information on fingerling farming, see the *Training Course on Tilapia Seed Production*⁹

<http://www.scribd.com/doc/16363463/Tilapia-Seed-ProductionFish-2004>



Is access to fingerlings assured?

High quality fingerlings (healthy and of good genetic quality) must be available and accessible both financially and in terms of transport. Restocking fingerlings from the same pond for more than two harvests will promote inbreeding and unproductive aquaculture.

Example: An NGO has started a large aquaculture project. The refugees farm fish and sell them at the local camp market. A local village has been selected to produce high quality fingerlings. These fingerlings are sold to the refugees and will later be sold to other local fish farmers in the region.



Information: A simple protein feed can be made by mixing 30% ground soya and 70% ground maize bran measured by weight.

For further information on feed, read *Review of Feeds and Fertilizers for Sustainable Aquaculture Development in Sub-Saharan Africa*¹⁰ <ftp://ftp.fao.org/docrep/fao/010/a1444e/a1444e04.pdf>



Is enough feed available and accessible?

Fish will not grow if they are not fed on a regular basis. Ensure that enough feed is available. Feed can be farm scraps, leftover foods and even some local plants. For best results, however, pre-formulated fish feed may need to be produced or feed supplements bought.

Example: A motivated young fish farmer has stocked her pond. However, she does not have access to enough feed and the pond is very unproductive. Because the fish are stunted and few in number, she decides not to restock the pond because the harvest is not worth the effort.

Action: Ensure that enough feed is available and accessible.

9 Geer, T, Singh, K. 2005. Training Course on Tilapia Seed Production

10 Hecht, T. 2007. Review of feeds and fertilizers for sustainable aquaculture development in sub-Saharan Africa. In M.R. Hasan, T. Hecht, S.S. De Silva and A.G.J. Tacon (eds). Study and analysis of feeds and fertilizers for sustainable aquaculture development. *FAO Fisheries Technical Paper. No. 497*. Rome, FAO. pp. 77–109.



Is fertiliser available and accessible?

Information:

Chicken manure:

2-3 kg per week for every 100 m²

Pig manure:

8-10 kg per week for every 100 m²

Cow manure:

10-15 kg per week for every 100 m²

For further information on feed see *Review of Feeds and Fertilizers for Sustainable Aquaculture Development in Sub-Saharan Africa*¹¹ <ftp://ftp.fao.org/docrep/fao/010/a1444e/a1444e04.pdf>

*Pond Management: Pond Liming*¹² <http://www.researchintouse.com/resources/riu11-factsheet-5-pond-liming.pdf>

*Pond Management: Pond Fertilization*¹³ <http://www.researchintouse.com/resources/riu11-factsheet-6-pond-fertilization.pdf>

The amount of fertiliser needed depends on the type used and on the size of the pond. Ponds need to be fertilised each week in order to stay productive.

Action: Ensure that enough fertiliser is available and accessible to the prospective fish farmers.

11 **Hecht, T.** 2007. Review of feeds and fertilizers for sustainable aquaculture development in sub-Saharan Africa. In M.R. Hasan, T. Hecht, S.S. De Silva and A.G.J. Tacon (eds). Study and analysis of feeds and fertilizers for sustainable aquaculture development. FAO Fisheries Technical Paper. No. 497. Rome, FAO. pp. 77–109.

12 Research Into Use. 2011. *Pond Management: Pond Liming. Research Into Use. pp. 2*

13 Research Into Use. 2011. *Pond Management: Pond Fertilization. Research Into Use. pp. 2.*



Is labour available and affordable?

Information: Fish eat mosquito larvae and can be valuable for keeping mosquito numbers low. However, if the pond area is not slashed on a regular basis, the mosquito numbers will increase as the high grass allows them to develop without being eaten

Digging and maintaining a pond requires a lot of labour input. To construct one pond of 100 m2 in 8 days requires about 15 people working 8 hours per day.

Fish should be fed twice per day and fertiliser added to the pond weekly. The grass around the pond must be cut if it grows too high. Juvenile fish that are the product of in-pond breeding should be removed from the pond every two weeks or so and transferred to a nursery pond.

The fish farmer should have enough time available (around 2 hours per day) to maintain the fish pond.

Action: Discuss anticipated labour inputs with the fish farmer.



Are training and capacity building institutions available and affordable?

Caution: Refugees may at times move away from the camp, leaving their family members behind. If the family members are not trained properly, the ponds may become less productive.

Being a successful fish farmer requires a lot of knowledge, not only about the maintenance of the pond but also about business.

Also, when refugees repatriate and other refugees or locals take over the ponds, the new fishers will require training.

Unforeseeable problems may arise and the fish farmers may need to seek advice from an expert. These experts can be other fish farmers or local government agencies.

Action: Ensure that prospective fish farmers are trained before they engage in aquaculture and that they have access to experts even after the training is complete. Cultivate strong relationships with ministry of agriculture and extension officers to help facilitate this process.



Can the fish farming project link with other projects?

In addition to fish production, fish farming generates additional benefits or employment for refugees and other farmers that include:

- income opportunities in pond construction and management
- provision of livestock manure as fertilisers in fish ponds
- small business opportunities in procurement and transport of productive inputs
- purchase by fish farmers of leftovers or unused plant material
- land rentals from neighbours to build or expand ponds
- employment in processing of fish, such as drying

Action: Assess which other projects or businesses are available in the area and how collaborations might work.

Who should be a Fish Farmer?



Is fish farming culturally and socio-economically appropriate?

Fish farming must be socially and culturally acceptable. There may be cultural or socio-economic barriers that can lead to the failure of a fish farming project.

Example: An NGO has decided that farmers should produce Red Breasted Tilapia. The ponds are primarily for generating income. When the fish are harvested, the farmers refuse to sell them as fish is traditionally given away and not sold.

Example: A very poor group of refugees has been selected to receive fingerlings for fish farming. The fingerlings are delivered. When the extension agent returns, all fingerlings are gone. They have been eaten by the prospective fish farmers because their maize dried up and they were hungry.

Remember: In cases of extreme hunger or malnourishment, food aid will be necessary. Farmed fish require feed. If the prospective fish farmers cannot feed themselves, they cannot maintain a pond.

Action: Discuss social and economic suitability with camp officers and prospective fish farmers.



Have the right people been selected to be fish farmers?

Caution: People not chosen to be fish farmers may need to be informed of the reasons for their exclusion to avoid jealousy. See *Exclusion and Inequity*, page 13 for more details.

With thousands of refugees in camps, not everyone can farm fish. To be successful, fish farmers must:

- be willing to put effort into the pond and not be solely dependent on external aid
- have access to sufficient food to feed themselves and their dependents so that any fingerlings intended for pond stocking are not eaten
- have time to maintain and fertilize the pond and to feed the fish daily
- have access to feed (farm/vegetable garden wastes, etc.) and fertiliser (access to manure from own or neighbours' livestock)
- be able to read and write in order to keep the books and to understand the training
- remain in the camp for at least 6 months if the pond is already dug and stocked; if not, remain at least one year

Action: Individuals must be allowed to apply for inclusion in the fish farming program. Fish farming should not be forced



Have social status hierarchies been considered?

Remember: Social status and hierarchies are very important in many parts of Africa. This cultural bias should not be underestimated.

Social status should be acknowledged to avoid jealousy and theft. In some cases, it may be necessary to provide at least the section/road/area leader with a pond. He/she may also be consulted in the selection of other beneficiaries.

Example: A group of people is selected to farm fish. However, the section leader is not included. Extreme social pressure forces one of the fish farmers to hand his pond over to the section leader. Because the leader was not initially trained in fish farming, his pond is unproductive. Ashamed of not being included by the NGO and of the failure of his pond, the leader develops a negative attitude towards the project and accuses productive fish farmers of witchcraft. The farmers are forced to give up their ponds, as being accused of witchcraft is a serious threat to social status and well-being.

Action: Consult with local leaders (these can also be religious leaders) and selected fish farmers about pond allocations.



Are gender issues understood and addressed?

Information: For more information, read *Women and Fish Farming*, page 14.

Women can be very successful fish farmers even with no male family member to support them. However, the ponds need to be located in a safe environment so that women are not attacked while working on or commuting to the ponds.

Women who are farming together with men must be ensured of involvement in the decision making process about how much of the fish is eaten and how much is sold. They also should have access to at least a part of the income.

Action: Include both women and men in the selection process of where to locate the ponds and discuss how the money earned from the ponds is to be distributed within the household. Encourage women to form groups to overcome safety and labour issues if the ponds are far away from the home.

Local Hosts



Information: In some cases the local hosts may be of the same religion or tribe as the refugees. This can greatly enhance the relationship between the two groups.

Can local hosts benefit from the fish farming project?

When promoting aquaculture in refugee settlements, support to neighbouring host communities is important as it can reduce theft and rivalry. This can include support for providing productive inputs or services and marketing. Since the success of aquaculture will depend on commercial transactions between refugee settlements and their neighbours and hosts, investing in these relations can help create a more conducive environment for aquaculture.

Local host communities are often poorer than the refugees in the camps. Local hosts can be involved in the fish farming project as fish farmers or suppliers of fingerlings. Refugees may also be able to rent land from local farmers.

Action: Assess in which ways the local hosts might be involved.



Can the local government be involved?

The host government will ultimately reclaim responsibility for the camp or settlement area once the refugees repatriate. Often these camps or settlements have valuable new infrastructure that can be useful to the host population.

Local governments are often underfunded. Including local government offices in the provision of extension services can be invaluable because of their local knowledge. The additional funding provided can also help strengthen local government support services.

Example: Local government officials were trained as aquaculture trainers and they are now able to train both refugee and local fish farmers.

Action: Contact the local government fisheries and agriculture department. In many countries, central government officials should be contacted first in order to respect the political hierarchy.



Successful bankers or other local business persons can be approached to offer business advice to prospective fish producers.

For more information about including the private sector, read *Part C*, page 40.

Can local businesses be involved?

Including local businesses in the aquaculture project can strengthen the local economy and contribute to creating and ensuring sustainable partnerships. Local businesses can be farmers, fingerling suppliers, local labourers, transporters, fish dryers, or larger companies (such as mines) who seek to buy a large portion of the harvest.

Action: Identify appropriate local businesses that can add value and might be included in the aquaculture project.

Project Inputs and Costs



Are the costs fully calculated and are the funds available?

Ensure ahead of time that the aquaculture project can be fully funded.

For more information on costing a project, see *Aquaculture project formulation – Financial Analysis*¹⁴ <http://www.fao.org/DOCREP/003/T0403E/T0403E04.htm#ch2.3.3.1>

For more information about including the private sector, read *Part C*, page 40.

Example: An NGO has selected 15 persons to be fish farmers, and will receive initial support through provision of fingerlings and training. However, 5 other farmers have also dug ponds and want support too. The NGO concludes that they can cut costs by giving fewer fingerlings to all pond farmers so that more farmers can participate. Understocking the ponds leads to less productivity and most of the fish farmers cease farming after two harvests. The project fails.

Action: Develop a realistic budget and be sure that funds are available before the project starts.



Is the fish farming project structure sustainable?

There are multiple ways to establish an aquaculture project. It is important to identify what is likely to work best on a case by case basis.

Information: For more information regarding the planning of an aquaculture project, see *Aquaculture Project Formulation*¹⁵ <http://www.fao.org/DOCREP/003/T0403E/T0403E00.HTM>

Remember: Fingerlings produced in farmers' own ponds are likely to quickly become inbred, resulting in poor growth and production. Incorporating a fingerling production component and costs for purchasing fingerlings from a hatchery should be included in the project model.

Example: An NGO supports a number of fish farmers by supplying fingerlings. However, the fingerlings represent a loan and the farmers must return the same number of fingerlings to the NGO in order that it can facilitate the stocking of new ponds. While the fish farmers think this a good idea, they are unmotivated to care for the fingerlings. Most die, with the result that neither their own ponds nor the ponds of others can be restocked.

Example: An NGO consulted with prospective fish farmers and has devised a scheme whereby some of the fingerlings (a few from each farmer) are to be placed in a large community pond that will be used to feed vulnerable people in their section, including orphans and the elderly. Since this was decided upon by all members of the scheme and the quantities of fingerlings used is not excessive, the project is successful.

Action: Discuss with prospective fish farmers realistic strategies for improving aquaculture sustainability in the area.

14 Insull, D. Nash, C. 1990. Aquaculture project formulation, FAO Fisheries Technical Paper 316, **Food and Agriculture Organization of the United Nations Rome, 1990**

15 Insull, D. Nash, C. 1990. Aquaculture project formulation, FAO Fisheries Technical Paper 316, **Food and Agriculture Organization of the United Nations Rome, 1990**



Has an exit strategy been developed?

The aid agency or NGO will not always be present to assist the fish farmers. Fish farmers need help to understand how their enterprise can be sustainable and where they can seek technical advice if production is low. They should also be involved in fingerling procurement so that they are able to restock their ponds if necessary.

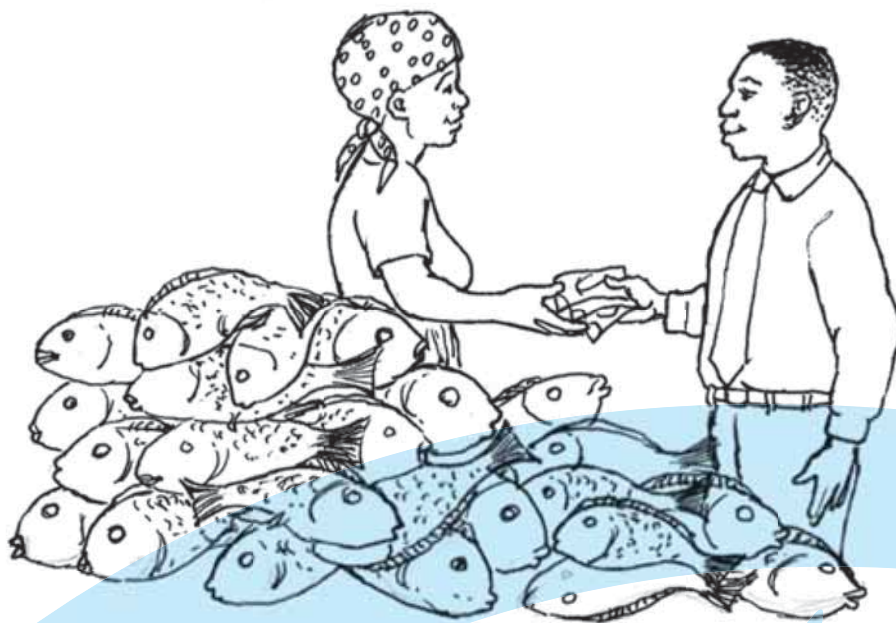
Example: An NGO supports a large aquaculture project inside the camp. They have a fish sharing scheme, where half of the fish are to be passed on to another farmer. Due to dishonest counting, the farmers are not allowed to harvest their ponds without NGO supervision. However, the NGO has encountered problems with a local refugee official and it is no longer allowed to work in the camp or in the country. The fish farmers quickly learn what has happened, so they harvest and sell all their fish. However, they do not know where to obtain new fingerlings or who to contact for technical support. Within a year the fish ponds are empty.

Action: Develop an exit strategy with the farmers that ensures their continued success on their own. Inform them from the beginning when support will stop.



PART C

Public-Private Partnerships



Collaboration Between Civil, Public and Private Sectors

Refugee camps are mostly created through close collaboration between civil organizations such as the United Nations High Commissioner for Refugees (UNHCR) and government and local authorities. Additionally, civil organisations often initiate special interventions aimed at increasing food security and livelihoods for refugees. Such interventions may include aquaculture activities and facilities. Camps are not isolated from the general economic situation in their area or from the private sector. There are communities and businesses which serve as suppliers or as potential markets for products to and from refugee-driven aquaculture. Refugee camps can also provide a venue for corporate social responsibility activities of larger private sector stakeholders.

The establishment of Public-Private-Civil Partnerships (PPCP) or Public Private Partnerships (PPP) can contribute to a balanced development of aquaculture production and the regional fish marketing value chain. Such partnerships are defined as “a voluntary alliance between various equal actors from different sectors, whereby they agree to work together to reach a common goal or fulfill a specific need that involves shared risks, responsibilities, means and competencies”¹⁶.

PPP¹⁶ are generally seen to be a means of delivering civil/public services and infrastructure by combining the public and private sector needs and aims and delivering quality public services within a partnership construct.

Aquaculture services in refugee camps are largely input related, such as the supply of fingerlings, feed, finance and extension advice, as well as the improvement of production infrastructures, transport, processing, and access to markets and marketing support.

The character of the intervention within a PPP strongly depends on the local conditions. A PPP might be established to meet the following objectives:

- To strengthen fingerling quality and supply by establishment of or facilitating connection to a hatchery or a nursery
- To organise a business-oriented advisory and collective purchase/sales services in collaboration with governmental extension services
- To strengthen market access by establishing professional transport
- To increase productivity of aquaculture facilities through introduction of new species, multi-trophic or integrated production technologies and/or combination with agriculture

Such partnerships may sometimes emerge ad hoc, resulting from a given situation or interest. Nevertheless, collaboration between sectors with different social and economic contexts and backgrounds requires adherence to agreed principles and stages of development. PPP are usually developed in the same manner as a private enterprise or a project, using the following logical steps:

1. Idea formulation and inception period

- Evaluation of the political and economic environment
- Assessments of desired and possible impacts and risks

16 CCPPP (2011) About PPP Definition. Retrieved and adapted 07.04.2011, from Canadian Council PPP: www.pppcouncil.ca (<http://www.pppcouncil.ca/resources/about-ppp/definitions.html>)

- Selection and assessment of the stakeholders
- Partnership project proposal, evaluation and appraisal
- Feasibility study with contractual finance and remuneration models

2. PPP project development

- Defining contractual obligations between partners
- Establishing a special purpose entity or project management structure
- Establishing PPP risk mitigation and safety planning
- Contracting civil organisations, companies, suppliers and experts

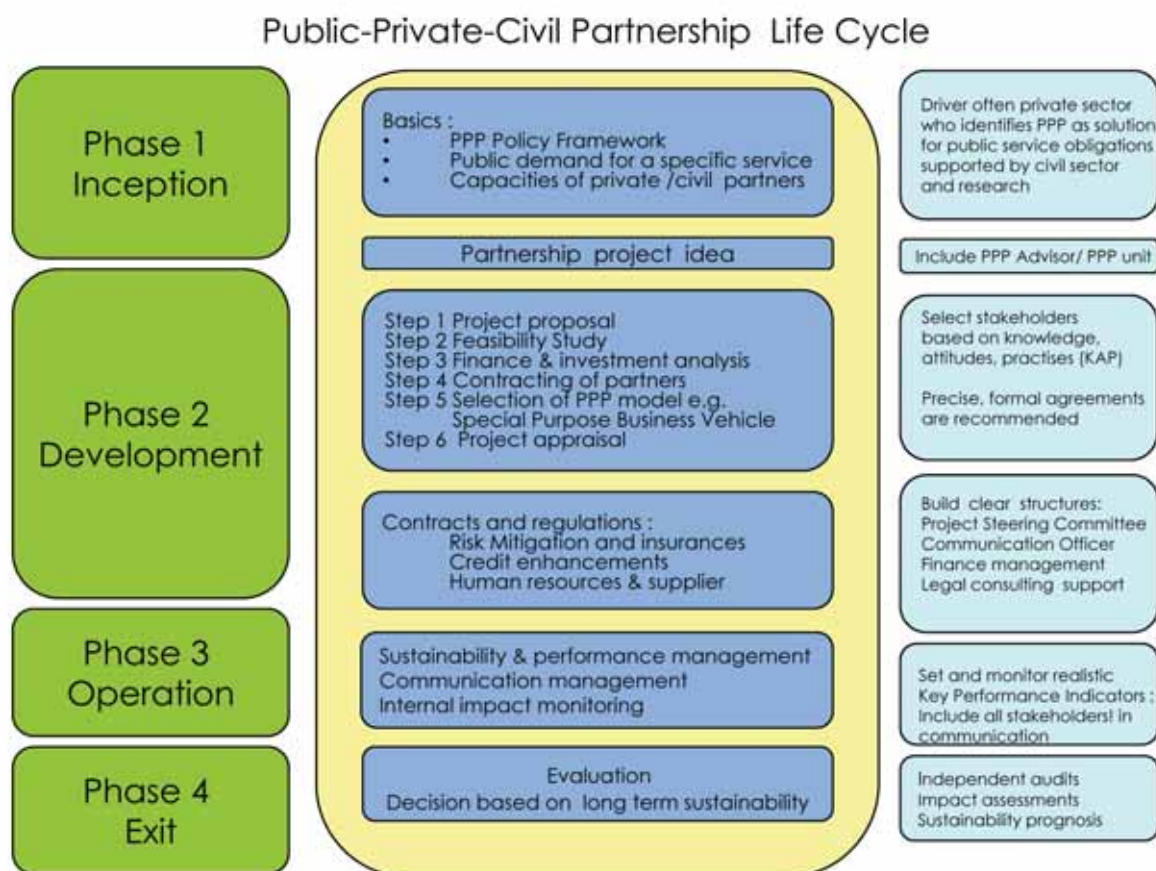
3. Project and contract management, delivery and exit

- Operational partnership management with clear responsibilities and administration of contractual obligations, service delivery management, economic and financial regulation
- Communication between partners
- Monitoring, evaluation and auditing
- Exit strategies ensuring sustainability of the interventions

Within the specific context of aquaculture in refugee camps there are some critical factors to consider in establishing a PPP:

- A **balance of power** is important within such partnerships to avoid a top-down approach. Refugees involved in aquaculture production should be considered private sector stakeholders and their limited economic power should be balanced against other interests.
- The inception period needs a clear and **realistic vision** how the **livelihoods** of the refugees will be supported in a sustainable manner. The private sector may have its own agenda, such as securing resources for local markets or fish supplies for bigger companies. It should be clear how these goals will affect the food security of the refugees in the long term.
- **Holistic interventions** are desired to create a balanced development of the entire value chain that encompasses input supply for fingerlings, feed and fertiliser, transport logistics and access to markets.
- **Financial interventions** are particularly sensitive in refugee camps. There could be a demand for financial aid to increase the production area, to buy more fingerlings or feed, or to organise processing and marketing. The highly vulnerable and insecure status of refugees is a major obstacle and any intervention should avoid new and risky dependencies.
- Aquaculture involves production of living animals and as such is exposed to many risks. A conservative **risk management approach** is essential. At minimum, a risk management plan should identify the risks, the action and strategy to mitigate risks, the mitigation costs, key or critical data and responsibilities for particular risks.

Picture 1: Life Cycle Model of a PPP, stages of development tasks and responsibilities.¹⁷



- **Communication** is critical to the success of any PPP. During the operational stages the partnership management has to organise and communicate how each party is to deliver services. Trust is the main element of partnership and building trust requires organised communication between the parties and with other stakeholders. A combination of vertical communication between the different levels in each organisation and horizontal communication between the organisations is recommended.
- An **exit strategy** should be discussed from the onset of the collaboration. In general, there are two options: continuation or closure. In the case of continuation, the partners can carry the project forward with the same or newly negotiated partners or contracts, the scope can be expanded, or a new focus can be added if the evaluation showed gaps in the service delivery. Responsibilities may shift over time and services may need to be redefined to address emerging issues. Any partnership contract must also include termination clauses that consider the likely effects of termination and regulations on the return of assets.

17 Weirowski, F. & Hall, S. 2007. Public-private Partnerships for Fisheries and Aquaculture: Getting Started. WorldFish Center Policy Brief 2008. Penang, The WorldFish Center.



For further details contact:

Silvia Renn

s.renn@cgiar.org or **silvia.renn@gmail.com**

The WorldFish Center

PO Box 500 GPO, 10670 Penang, Malaysia.

or email: **woldfishcenter@cgiar.org**

This publication should be cited as:

Renn, S. and Weirowski, F. 2011. Guidelines for fish production in long term refugee situations. Manual 2011-30. The WorldFish Center, Penang, Malaysia. 44 pp

© July 2011 The WorldFish Center. All rights reserved. This Manual may be reproduced without the permission of, but with acknowledgment to, The WorldFish Center.

Photo credits: S. Gampe, S. Renn, S. Wallner

Line drawings credits: USAID/Malawi's COMPASS II Project implemented by DAI.

Funded by the Federal Ministry for Economic Cooperation and Development (BMZ)
and the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

Funded by

