Training course packages targeting food operators on the adoption and management of the technological innovations

AQUACULTURE SYSTEMS

Pond construction

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Table of Contents

1. FoodLAND technical innovation for local food supply chains: concepts and approaches

The FoodLAND project has the ambition to impact on a large number of supply chains and communities, hence the process of food operators' capacity development has to be tailored and as much participative as possible. Accordingly, one of the assumptions of FoodLAND is that sustainable and nutrition-responsive farming systems can be achieved basically by strengthening the capacity development, and specifically by **a)** empowering farmers and processors through the implementation of capacity building processes and concrete opportunities; **b)** creating or consolidating cooperation and shared knowledge to overcome the lack of coordination among food operators; **c)** addressing the inefficient use of resources; **d)** trying to address and build resiliency to the high vulnerability of food systems to climate change; **e)** enhancing the integration of supply chains by creating commercial and stakeholders' networks; **f)** improving the responsiveness of the production sector to the market demand.

To implement these elements of capacity development, FoodLAND proposed the adoption of specific innovations, among which the organizational ones, to create strong and responsive links between producers and encompassing all the intermediate actors along the food value chain, such as researchers, SMEs, NGOs, local and national authorities. In order to ease the creation of those links and guarantee the sustainability over time of the results, 14 Food Hubs will be created in 6 countries as part of the organizational innovations. Food Hubs are conceived as multi-actors centers of innovation where to develop or enhance the organizational and operational conditions enabling local food supply chains (D3.6).

Functional to the implementation of the Food Hubs and of the innovations, the training courses were designed – in form of capacity development activities – as a two-phase process. Firstly, a training session focused on general, preparatory topics was provided to farmers as described and reported in D3.5 ("Group Introductory Training", GIT). According to the project GA, GIT broad set of goals were: to enhance the knowledge of consumers' nutritional needs and market opportunities, and to boost the notions about climate change, sustainability, resilience, and food culture. Secondly, a specific training session were organized to provide food operators with practical information on the adoption and management of the innovations tested at lab / small scale level and to contribute to validating them at appropriate scale.

However, as the whole approach has been designed by FoodLAND to ensure the inclusion of the local actors from the first moment, both the training sessions were set up accordingly. Indeed, yet in the inception phase of the project, an assessment on participatory methods has been run and Participatory Learning and Action (PLA) approach has been eventually assessed as the best one to ensure the inclusion of multiple perspectives. The main purpose of PLA is to support people within communities to analyze their own situation, rather than have it analyzed by outsiders, and to ensure that any learning is then translated into action (Gosling and Edwards 2003). In addition, a gender-sensitive approach has been applied to the trainings that have been designed considering gender roles and power relations; they have provided equal opportunities to participate in the process by caring to times, venues and use of local languages.

The GITs have been conceived as the first step towards the innovation validation and aim at involving the producers, yet from the inception phase. They are just the first step in a sequence of 6, summed up in **Table 1**. After the GITs, where farmers and processors meet and share their vision and goals for the Food Hubs and exchange information about specific topics, the Food Hubs were created and the innovation tested (first in pre-test, then in pilot phase). The constant iteration between researchers and local actors is a key feature of the project: specifically, the practical trainings focused the single innovations (step 5) are aimed at validating the innovations at adequate scale and planned to trigger feedback loops of control and improvement involving developers and adopters.

Table 1. Activities with farmers and food processors (SMEs) and participatory approach

Step	1	2	3	4	5	6
Task	T3.3	T3.3	T3.4	T4.1¸T4.5	T5.1¸T5.5	T5.1¸T5.5
Activity	Group introductory training	Food Hubs creation	Innovation undertaking	Innovation tests	Individual and group practical training	Innovation pilot and validation

2. FoodLAND practical training: aims and scope

According to the project bottom-up and participatory approaches, following the courses on introductory topics GIT organized in the early project phase (T3.3), and as component creating / strengthening the Food Hubs as local innovation centres, FoodLAND has organized a second set of training activities with food operators based on active learning methods and gender equality principle (Task 5.1-5.9). In this regard, specific mechanisms (being aware of the gender roles and power relations; providing equal opportunities to participate in the process by putting attention to the times, venues, use of local languages, etc.) will be lifted to ensure women's participation. These training packages are aimed at providing the local farmers and food processors with operational instructions on the adoption and management of the validated innovations.

This second set of training activities has been organised – triggering PLA approach – as individual and group practical (demonstration/capacity building) activities to be conducted in parallel to the implementation of the technological research (where relevant) and of the innovation pilots and validation. These technology-centred trainings aim at strengthening the participants' understanding of novel production and post-harvest techniques, innovative tools and systems (e.g., climate smart/precision agriculture, hydroponics, and integrated aquaculture), new technologies for primary and secondary processing, and supply chain management. Thus they aim at fostering knowledge and operational capacity to deploy, manage, and maintain the validated technological innovations – documented by the released guidelines D4.1 ÷ D4.11 (e.g., training pamphlets, user manuals, flow diagrams, and operational recommendations) and practice abstracts D6.5 – validated jointly at appropriate scale.

3. Second training packages on the adoption and management of the tested innovations: an overview

The second training course aimed at consolidating the food operators' knowledge and practical skills to adopt, manage and validate the project innovations and complement the related guidelines. Specifically, the realized training materials provide local farmers and food operators with a set of notions and concrete information on a series of innovative tools and systems as per the following **Table 2**. It is clear that both the contents and formats of the learning packages widely differ across technologies as well as Food Hubs (when the same type of innovation must be validated in different contexts). The diversity that emerges from the proposed solutions reflects the different needs highlighted by farmers and stakeholders as well as the conditions and opportunities characterizing the local communities. Nevertheless, in order to take into due account the existing heterogeneity inside the local communities, the developed learning materials have been let available on the project intranet so as to be used for further training initiatives across the network of Food Hubs.

4. Second training packages on practical information on the adoption and management of the tested innovations

Aquaculture systems

Pond construction

INTRODUCTION
What is a fish pond? A fish pond is just a man-made structure or habitat that fits the requirements for rearing fish. A good fish pond is required for greater fish production

This training manual, provide necessary information about fish pond construction

CHARACTERISTICS OF A FISH POND
The main features of the fish pond (Figure 1):
Inlet/outlet pipes or channels; which carry water into/away from the ponds.
Pond walls or dykes; hold the water in the pond.
Water controls; control the level of water in the pond, the flow of water through the pond, or both.

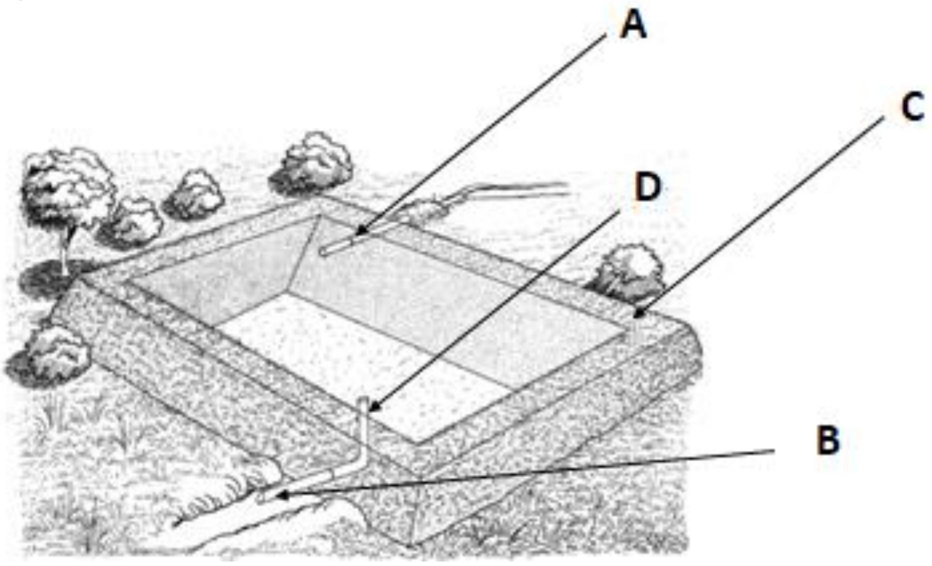


Figure 1. Components that are likely to be found in a model fish pond: (A) Inlet, (B) Outlet (C) Dyke and (D) Overflow control pipe

EARTHEN FISH POND CONSTRUCTION
An ideal pond size for a small-scale fish farmer should be around 300 m^2. Despite the fact that ponds can be much larger than 300 m^2, having several smaller ponds rather than one large one will ensure more frequent harvest.

Factor to consider before constructing a fish pond:

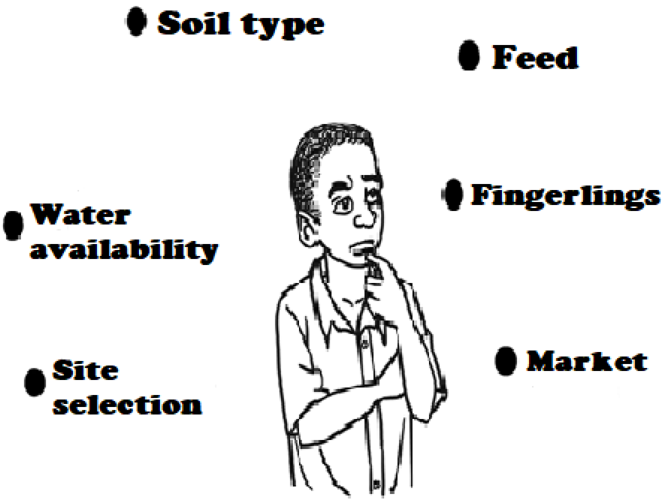


Figure 2: Considerations for pond construction

STEPS FOR EARTHEN POND CONSTRUCTION

1. Site selection. Farm should be located in an area with enough space for the planned pond and future expansion. Therefore, there are several factors to consider when selecting the best site to allocate the pond

Topography: Central approximately slope 2%
Avoid flooded areas
Avoid lands where there are user conflicts.
Ponds should be located in areas safe and free from theft.
Away from pollution

2. Soil analysis

You need to carry out a simple test to determine the suitability of the soil for pond construction (Figure 3):

To begin, dampen a pinch of dirt from the pond site area with water. Make sure that you only use enough water to dampen the sample (do not saturate it).

After wetting the soil, tightly squeeze the sample in your hand to make a ball, then throw the ball upward at least 1 m, then capture the falling ball and reopen your hand to observe the result.

If the falling ball retains its shape, then the assessed soil is suitable for constructing a pond (sufficient clay is present).

If the falling ball collapses/ fragments and loses its ball shape, then the soil is not suitable for constructing a pond (too much sand is present). In this case, you may consider importing clay soil for compacting the pond bottom, sides, and core trench to minimize the seepage.

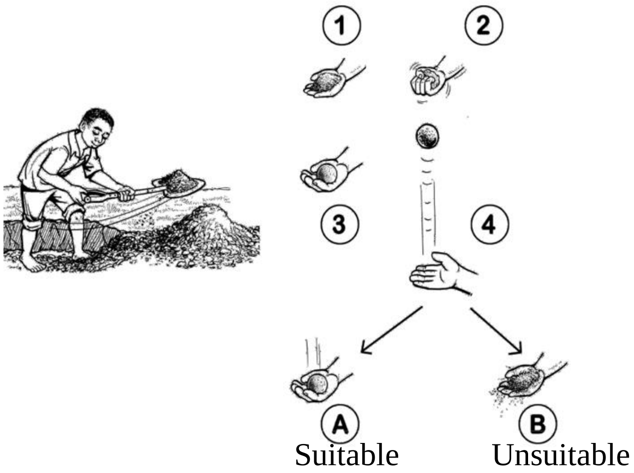


Figure 3: Simple method to assess the suitability of the soil for pond construction

3. Water availability

In fish culture, water is essential. One of the initial actions a potential fish farmer should do is to test the quantity and quality of the water supply that is available. The chemical and physical character of water is determined by its sources. Water should not be acidic or alkaline and if found to be so, suitable correction is to be done by applying lime or organic manure respectively.

SOURCES OF WATER

1. Groundwater:

Ground water obtained from deep wells or springs is the best source of water for fish culture. Generally, it is free of pollutants and has relatively high hardness levels, which are beneficial under some circumstances.

Spring-water**:** This water supply may vary throughout the year but the quality of the water is usually constant.

Seepage water**:** Supplied from the water-table by seepage into the pond. The water level in the pond will vary with the level of the water-table

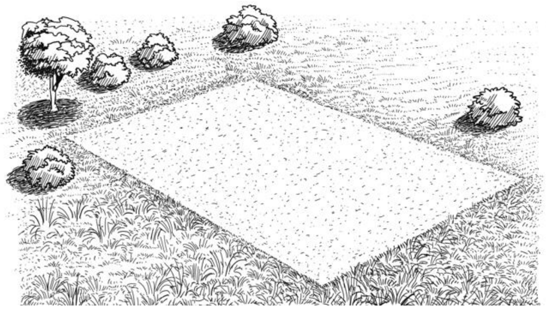
2. Surface water from streams, rivers, ponds and lakes – Because surface water quality and availability vary from location to location and over time as a result of factors like geology, climate, and nearby land use, it is possible that some surface water may contain pesticides, parasites, diseases, or other pollutants that can harm or stunt the growth of fish. Thus, it is advised that certain measures be taken in order for a farmer to obtain clean water, such as covering the water input pipes with nets to stop undesirable trash (Figure 4) and other creatures from entering the pond.

3. Rain-fed water: Rainwater can be a good source of water supply for fish culture. The storage of rainwater is particularly important in areas with a long dry season, or where groundwater or surface water is difficult to obtain or polluted.
Advantages of using rain water:
It is free, relatively clean and usually reliable, and a rainwater harvesting system can be easily constructed and maintained at low cost.

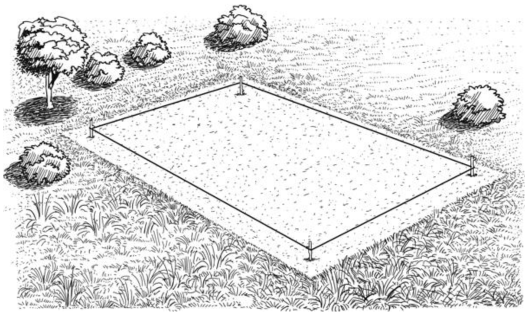
4. Tap water: Most fish ponds are fed with regular tap water, however, municipal (tap) water requires regular conditioning to remove any chlorine and other chemicals that are added to the water. To remove the chlorine, and make it safe for fish, municipal water should be stored in a tank or reservoir between 2 and 3 days.

PROCEDURES FOR CONSTRUCTING AN EARTHEN FISH POND CONSTRUCTION

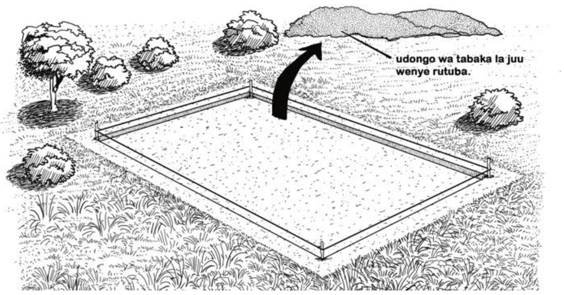
There are five simple steps to be followed to achieve the construction of earthen pond



Step 1: Site clearance: Prepare the site by removing unwanted things such as the trees, bushes, and rock.



Step 2: Peg out the pond area to measure and stake out the exactly length and width of the pond,



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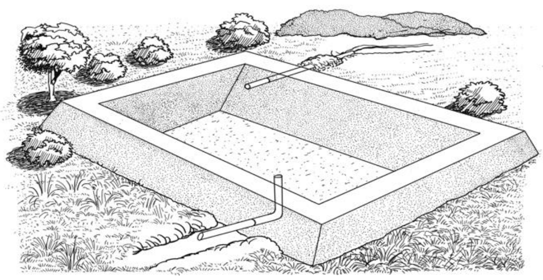
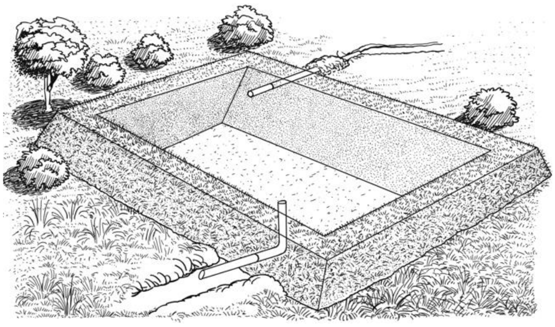


Step 4: Digging the pond and construction of dyke over the clay core,
Step 5: Inlet and outlet construction.

Step 3: Then remove the top soil about 30 cm and put it far away from the construction site.



Step 5: Cover the pond dyke with the former removed soil and plant grass species

FILLING OF THE POND

It is advised to put the pond under water as soon as possible and before it is finished in order to:

ensure that all of the structures, including the water intake, canals, and the inlet and outlet of the pond, function properly;

ensure that the new dikes are sturdy and impervious enough and strengthen the pond dikes.

Steps to follow if you want to achieve the highest levels of security and effectiveness during filling the pond:

Slowly pour water into the pond until it reaches a maximum depth of 0.40 m at the outlet.

Cut off the water supply and leave the pond partially filled. During this time, thoroughly inspect the dikes. Fill up cracks and collapsed areas while firmly compacting.

Completely drain the pond of all water and let it sit dry for a few days. Keep inspecting the dikes and making any necessary repairs.

Refill the pond gradually and as high as possible—about 0.40 m higher than the last time and close the water supply

Examine the dikes and make any necessary repairs. After a few days, thoroughly drain the pond.

Continue filling and drying the pond until the water level reaches the maximum level intended.

Inspect the dikes and make any necessary repairs.

PRACTICAL SESSION

Site selection

Site cleaning, marking, removing the top soil and dyke construction

Assessment of soil for pond contraction

Placing a sieve net in the inlet and outlet

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