MODULE 2

System Selection

CARIBBEAN WaterNet

Cap-Net

UWI
ST. AUGUSTINE CAMPUS
FACULTY OF FOOD AND AGRICULTURE

Global Water Partnership Caribbean

Goals

To provide trainees with the knowledge of:

- Multiple system options.
- The criteria used for choosing the system that is best suited for their situation.

Learning Objectives

- Know the different types of production systems.
- Be able to determine the best system for their environment, based on the criteria provided.

Introduction

- Simple, low -cost, low -technology systems (as for tilapia culture) are easier to transfer to the end users.

- These have greater chances of success as compared to more sophisticated/complicated and relatively high -technology systems like those involved in penaeid hatchery and farming.

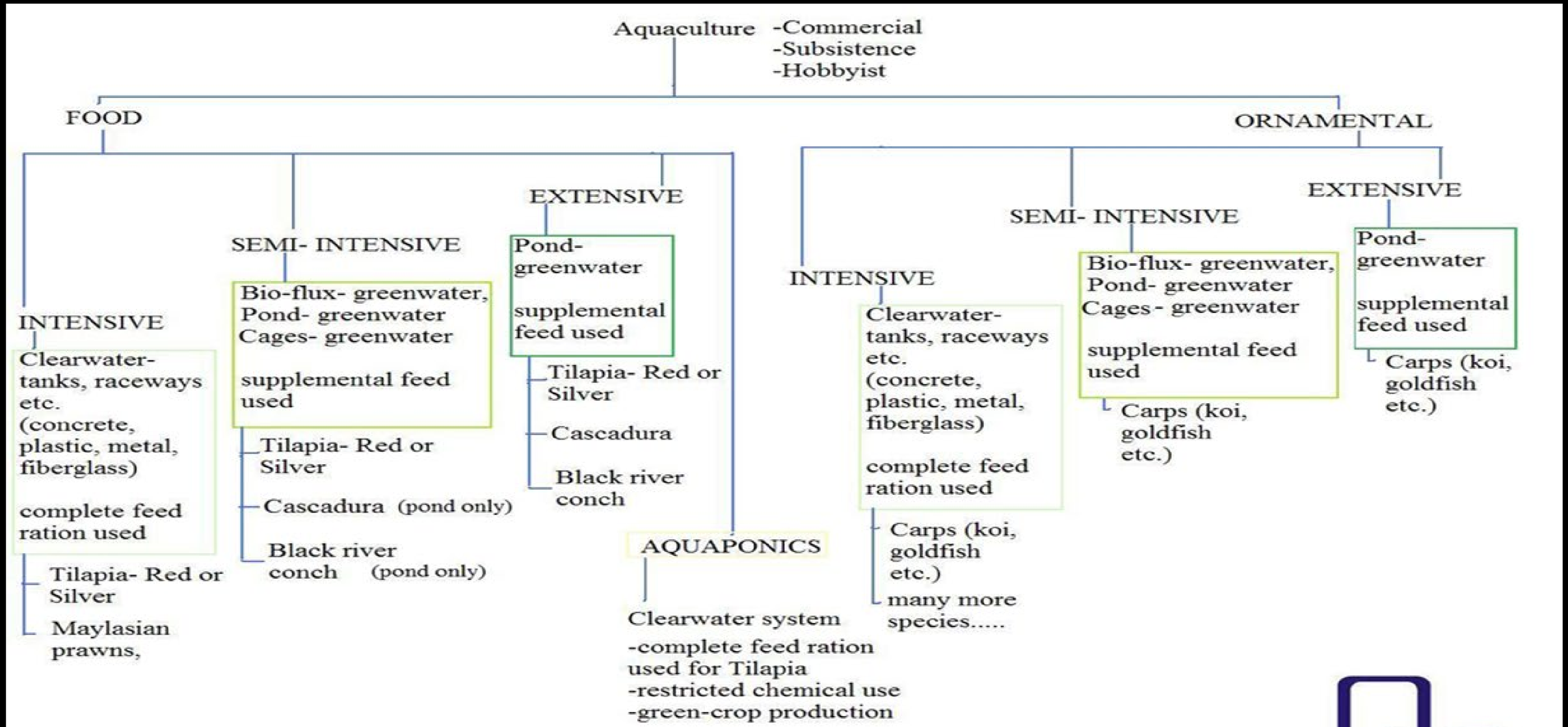
- Alternative livelihood for displaced coastal fishing families; the preferred system is one that will require:

- The use of simple techniques and low -cost production facilities.
- Construction and operation may involve entire families or communities, e.g. seaweed and mollusc farming.

- On the other hand, more complex technologies which require higher capital and other inputs and which promise better profits, are usually adopted by medium to large -scale entrepreneurs who have the capability to engage the services of technical specialists in running their operations.

Criteria for Farming System Types

Parameter	Extensive	Semi-Intensive	Intensive
Species Used	Monoculture or Polyculture	Monoculture	Monoculture
Stocking Rate	Moderate	Higher than extensive culture	Maximum
Engineering Design and Layout	May or may not be well laid-out	With provisions for effective water management	Very well engineered system with pumps and aerators to control water quality and quantity
	Very big ponds	Manageable-sized units (up to 2 ha each)	Small ponds, usually 0.5-1 ha each
	Ponds may or may not be fully cleaned	Fully cleaned ponds	Fully cleaned ponds
Fertilizer	Used to enhance natural productivity	Used regularly with lime	Not used
Pesticides	Not used	Used regularly for prohylaxis	Used regularly for prophylaxis
Food and Feeding Regimen	None	Regular feeding of high quality feeds	Full feeding of high-quality feeds
		Depending on stocking density used, formulated feeds may be used partially or totally	
Cropping Frequency (crops/y)	2	2.5	2.5
Quality of Product	Good quality	Good quality	Good quality
	Culture species dominant but extraneous species may occur	Confined to culture species	Confined to culture species
	Variable sizes	Uniform sizes	Uniform sizes



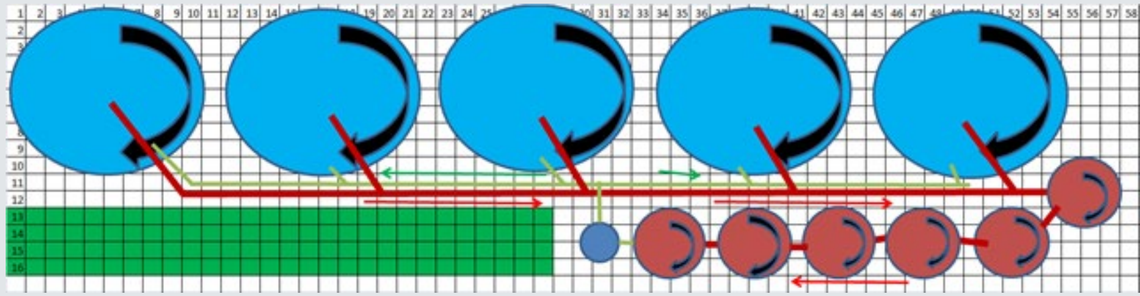
Aquaculture Production System Choice Map

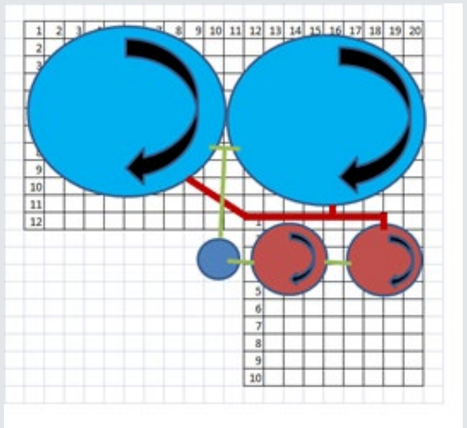
aQua-TT
aquatt1@gmail.com

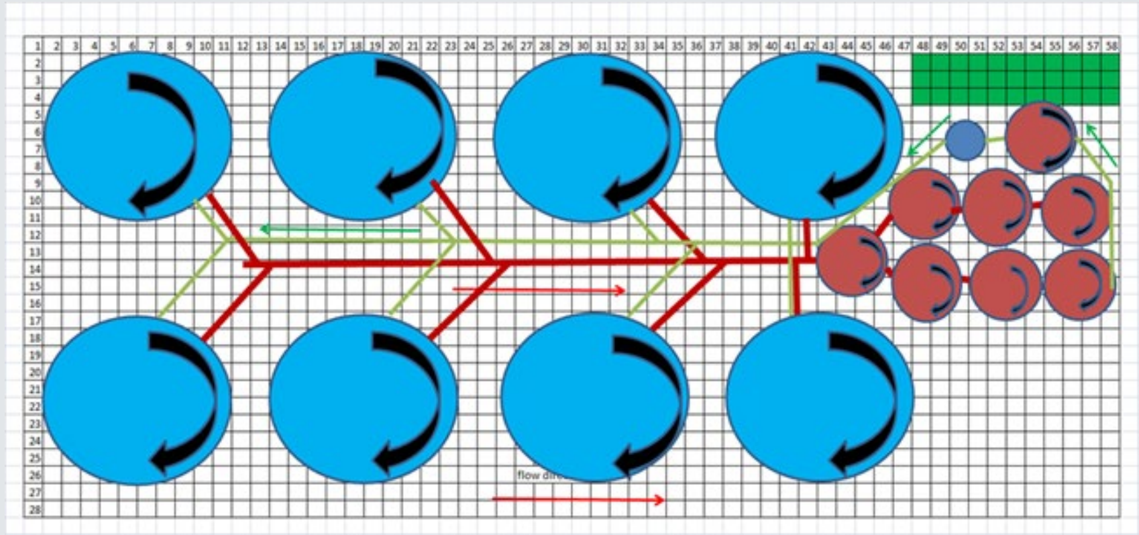
RSM July 2011

Tank Systems

- Could be green water or clear water.
- Requires recirculating water pump.
- Aeration system
- External filtration
- Could be series of tanks in linear or parallel attached to main filter system with single recirculating water pump
- Modular system

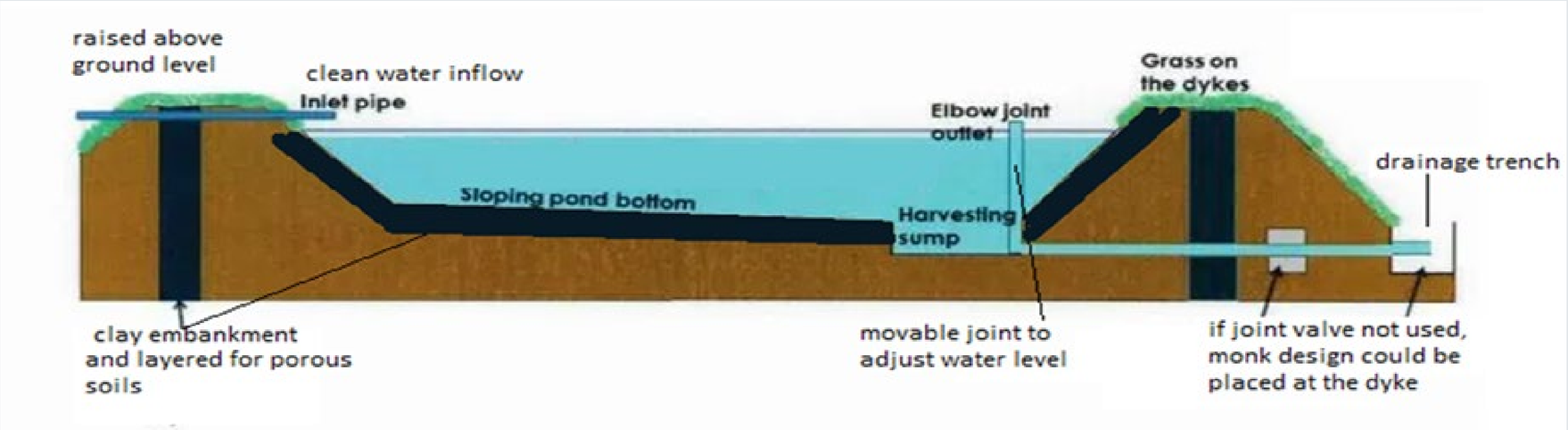






Pond Systems

- Ponds are typically no more than 1m within the ground.
- Dugout spoils used to create an additional embankment.
- Green water due to the algal content.
- Sandy, rocky substrate within low water tables give rise to water peculation and therefore water loss to the environment.
- In this scenario ,ponds can be lined with clay to seal the base or a polyvinylchloride (PVC) pond liner is then deployed.




HP
#1

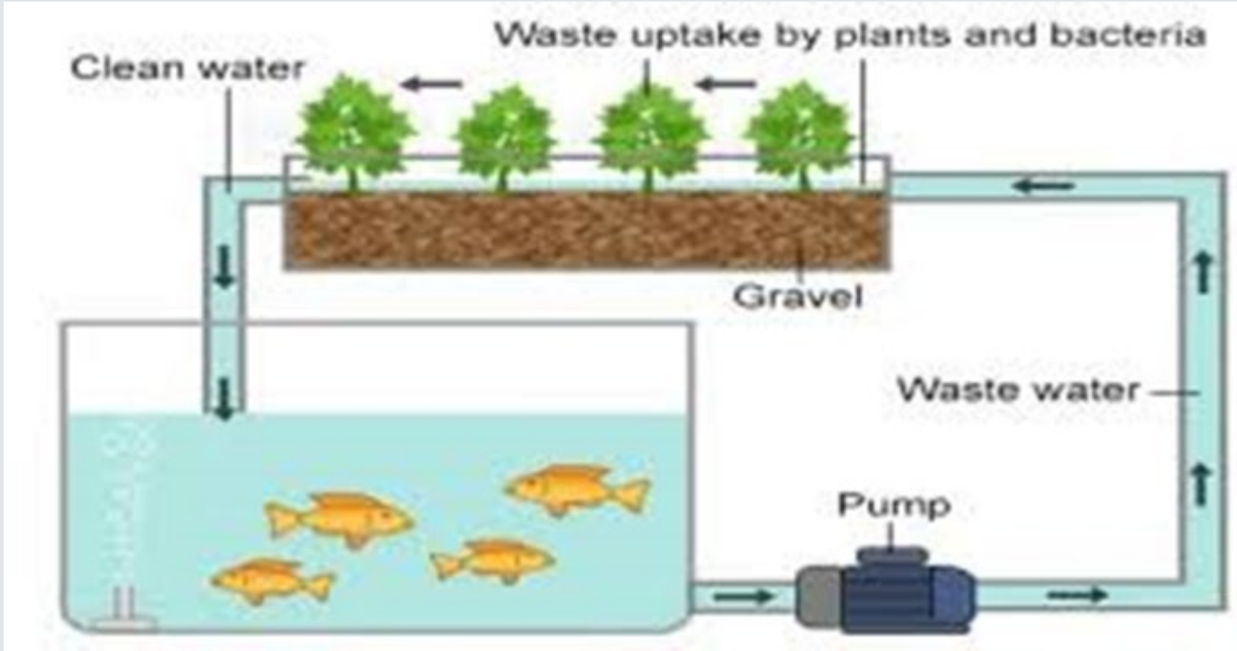
Aquaponic Systems

Aquaculture in which the waste produced by farmed fish or other aquatic creatures supply the nutrients for plants grown hydroponically, which in turn purify the water. Three main types include:

- Media Filled Beds (MFB)
- Nutrient Film Technique (NFT)
- Deep-Water Culture (DWC).

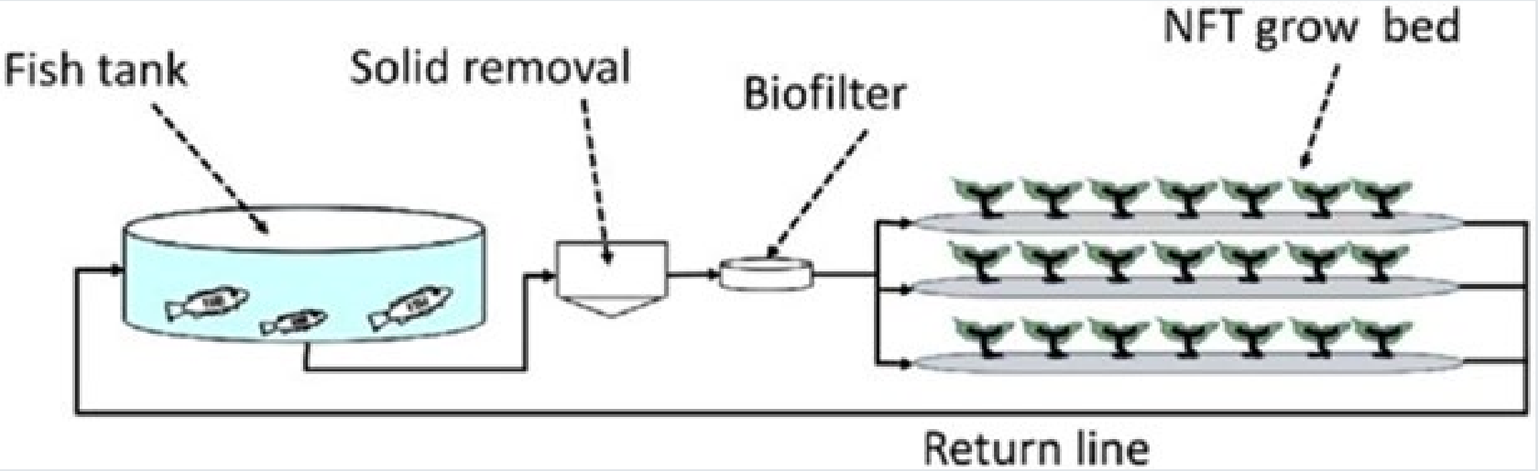
Media Filled Bed (MFB)

- It consists of garden beds filled with small porous rocks such as clay pellets.
- The vegetables are planted within this media.
- Water from the fish tank is either pumped or drained via gravity, depending on the specifics of your site, into the beds so that the plants can access the nutrients.
- Requires a recirculating water pump.



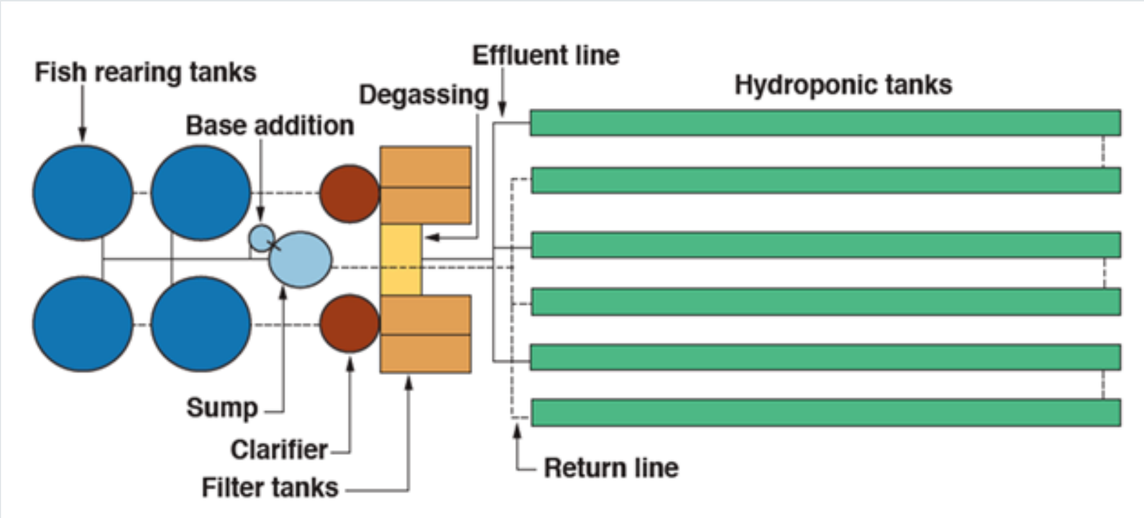
Nutrient Film Technique (NFT)

- A series of pipes adjacent to the fish tank and pumping water through them as a very thin film.
- The water moves slowly allowing plants which have been placed in holes in the pipe, to access the nutrients within.
- When the water reaches the end of the pipes, it is pumped back to the fish tank.
- There is no solid material or surface of the water open to the air; extra filtration equipment is needed to clear the water of solid and biological waste before it is returned.
- The system is very efficient in its water use.



Deep Water Culture (DWC)

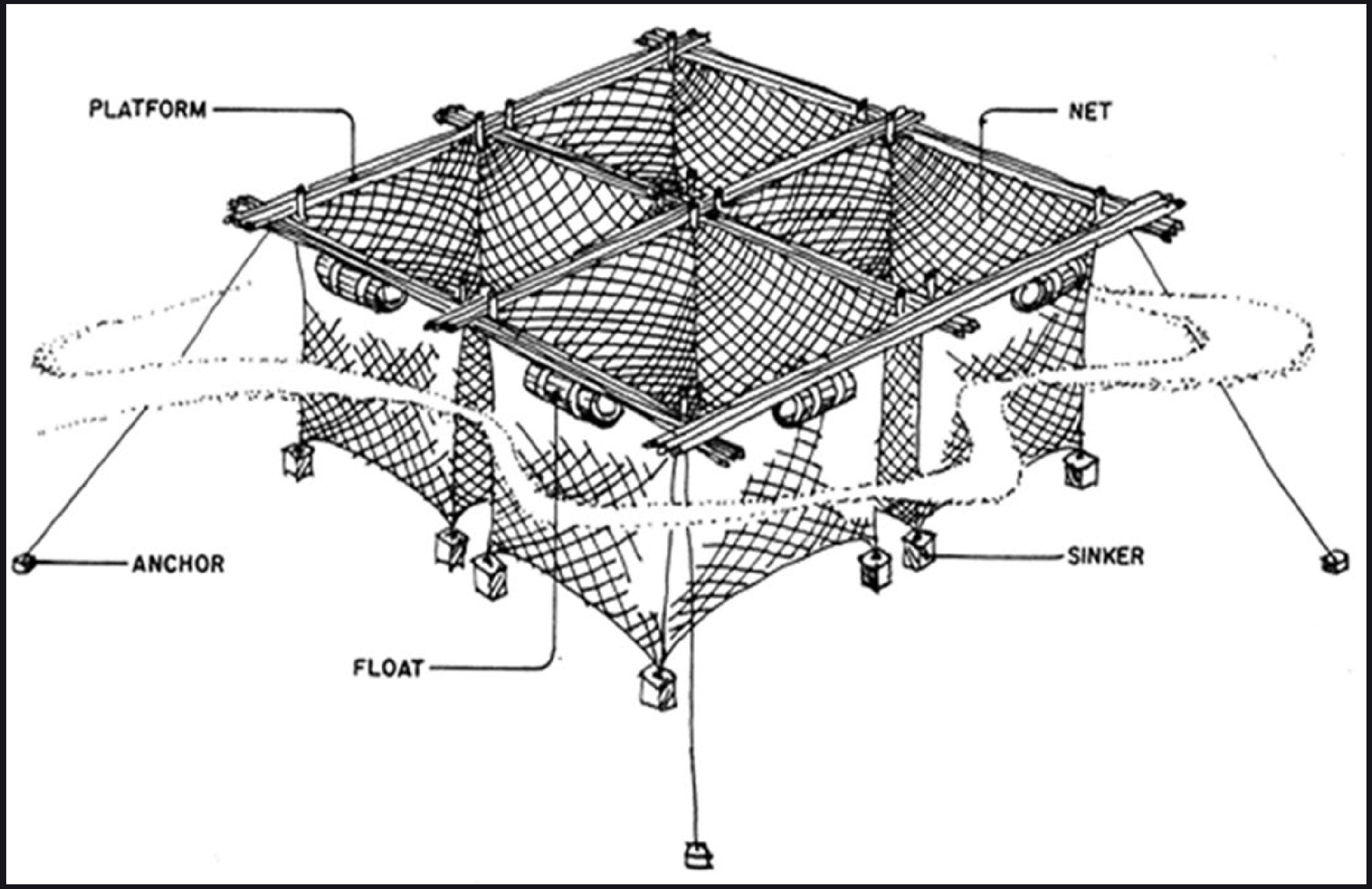
- Also called the deep flow system.
- Involves siting the plants on rafts through which their roots protrude and hang in the nutrient -rich water from the fish tank.
- The water must be filtered of any solid waste before reaching the plants to avoid roots becoming clogged by suspended particles.
- The equipment required is minimal and can be sourced cheaply.
- Commercial models such as the UVI systems have been developed for the Caribbean.



Cage Culture (marine and freshwater)

- Fish are held in floating net pens.
- Utilizes existing water resources.
- Encloses the fish in a cage or basket which allows water to pass freely between the fish and the pond.
- Permitting water and gaseous exchange as well as fecal waste.
- Mesh of cage is dependent on size of fish.

Size of Fish	Mesh Size
0.5 cm	1–2 cm
1 cm	5–10 cm
2 cm	20–30 cm
4 cm	> 30 cm


PLATFORM
NET
ANCHOR
SINKER
FLOAT

Cage Culture

Advantages	Disadvantages
Many water resources can potentially be used, including ponds, lakes, strip pits, rivers, and streams.	The fish are crowded in cages, and there is a relatively high incidence of disease that can spread rapidly.
Cage culture requires a relatively small financial investment.	There can be localized poor water quality, such as low dissolved oxygen, in and around cages.
Feeding, sampling, observation, and harvesting are all comparatively simple.	Caged fish do not have access to natural food, so a nutritionally complete diet is required.
The pond or water resource can still be used for other activities like stock watering or recreational fishing.	Cages can be attractive to predators, vandals, and poachers