Fish production systems in Africa

Fish farming:
› is suitable for smallholder farmers.
› is complementary to other farm enterprises.
› requires moderate effort and provides a healthy food source.
Aquaculture has great potential for synergies with other farm activities.
Choosing the right site for the pond

Ideal conditions:
› Easily accessible and secure
› Near a water source
› Soil with high content of clay
› Impermeable to water and stable

A slight slope saves a lot of work for digging the pond.
Will the soil hold the water?

1. Dig a hole as deep as your waist

2. Early next morning fill the hole with water to the top

3. In the evening some water will have trickled away

4. Fill the hole again to the top

5. Cover the hole

6. Check next morning: Does the soil hold the water?
Will the soil be stable when wet?

Stability test

1. Take some soil and moisten it
2. Squeeze the soil by closing the fingers firmly
3. Open your hand again

If the soil holds the shape, it will be stable when wet. If the soil falls apart, it won’t be stable.

Clay or silt?

1. Rub some soil between your hands
2. After rubbing: Is there some soil in the folds of your hand?

No: The soil consists of clay.
Yes: The soil consists of silt.
How to peg a pond

1. Peg the outer edges of the dyke crest

2. Peg the inner edges of the dyke crest

The above ground length of the pegs marks the height of the dyke.

3. Peg the inner and outer corners at the bottom of the slope

4. Mark the inlet and outlet furrow
Construction of outlets

A) Simple elbow-pipe for small ponds

- Easy to make from tubes
- Elbow inside the pond
- Elbow outside the pond

B) More sophisticated monk for large ponds

- Placed inside the pond
- Screen
- Removable wooden planks
How to build a pond in successive steps (1)

1. Clear the ground and remove the topsoil
2. Dig the inlet ditch
3. Dig a core trench and fill it with clay, if necessary
4. Dig the soil out by layers and use it to build up the banks
How to build a pond in successive steps (2)

5. Form the inside and outside slopes of the banks

6. Cover the top and the outside slopes of the banks with topsoil

7. Dig a draining ditch inside the pond

8. Stamp the bottom of the pond and the slopes of the banks

Example of dyke dimensions in the case of pure clay material
How a completed pond should look like

- **Core trench**
- **Sloping pond bottom**
- **Draining ditch**
- **Outlet pipe**
- **Elbow joint outlet**
- **Grass**
- **Outlet pipe**

- **Original soil surface**
- **Shallow end inner bottom edge of the dyke**
- **Deep end inner bottom edge of the dyke**
- **Outside bottom edge of the dyke**
Most common Tilapia species in Africa

Blue tilapia
(Oreochromis aureus)

Mozambique tilapia
(Oreochromis mossambicus)

Green headed perch
(Oreochromis machrochir)

Red breast tilapia
(Tilapia rendalli)

Nile tilapia
(Oreochromis niloticus)
Sorting the fish by sex

Sort the fish by distinguishing the genitals

Nile tilapia

♀
10 cm
30 - 50 g

♂

Hormonal treatment to produce female fish only is not allowed in organic agriculture!

Pond A

Pond B

African Organic Agriculture Training Manual

M10 Animals: U9 Aquaculture
The production cycle of fish

10'000-5'000 fry

Breeding pond (5 x 10 m)

5 ♂ x 20 ♀

20’000-30’000 eggs per months

3'000-6'000 fingerlings

Nursery ponds (2 x 5 m)

3000 fry

3000 fry

3000 fry

Start 4 weeks 15 weeks 30 to 35 weeks

1000-2000 fingerlings

Grow-out ponds (10 x 50 m)

Stock: maximum 6000 fish

2400-4800 market-sized fish

300 g each = 0.75-1.5 t

20’000-6’000 eggs per month

3’000-6’000 fingerlings

1000-2000 fingerlings

1000-2000 fingerlings

20’000-30’000 eggs per months

1000-2000 fingerlings

1000-2000 fingerlings

2400-4800 market-sized fish

300 g each = 0.75-1.5 t
How to fertilize the pond

1. Build a crib from bamboo or wood at the shallow side of the pond to hold the fertilizer

2. Apply the recommended rates per 100 m² of pond area and week

- 10 kg of ripe compost
- 2 to 3 kg of chicken manure
- 8 to 10 kg of pig manure
- 10 to 15 kg of cow manure
Calculating feed ingredients: The square method

1. Note the desired protein level in the center.
2. Place the two ingredients with their protein levels at each corner on the left.
3. Note the differences between the number in the center and each feed ingredient on the right side in the diagonally opposite corner.

Ingredient 1 (50 %)
Ingredient 2 (8 %)

Difference: 42

The portions of both ingredients can be expressed as:
ingredient 1 : ingredient 2 = 17:25
or as percentage: 17/42 x 100 = 40.5 % and 25/42 x 100 = 59.5 %
How to use the Secchi disc

1. Immerse the disk slowly into the water
2. Measure the depth at which the disk disappears

- 40 cm
- 30 cm
- 25 cm
- 20 cm
- 15 cm
- 10 cm
- 5 cm

- Poor algae growth: Add manure!
- Ideal fertilization: ✔
- Algae growth too strong: Stop fertilization!
How to monitor fish behaviour

This is an alarming signal!

When fish hover at the surface gasping for air, this means the oxygen content of the water is too low! You must now add oxygen to the water!
How to monitor fish health

- Eye role reflex when taken out of the water?
- No damage to the scales and fins?
- Red gills without parasitic worms?
- No ecto-parasites on the body surface?
- Good shape, well-balanced corpulence?
Grading the fish using a seine net

To grade the fish, use a seine net with a mesh size of about 1 cm.

The small fish will escape through the mesh and the bigger fish will be caught.
How to harvest the fish using a seine net

1. Use a net with a mesh size of 3 to 3.5 cm
2. Start at the deep end of the pond and move slowly to the shallow end
3. Pull the net along between two or more persons
4. Remove and replace all young fish