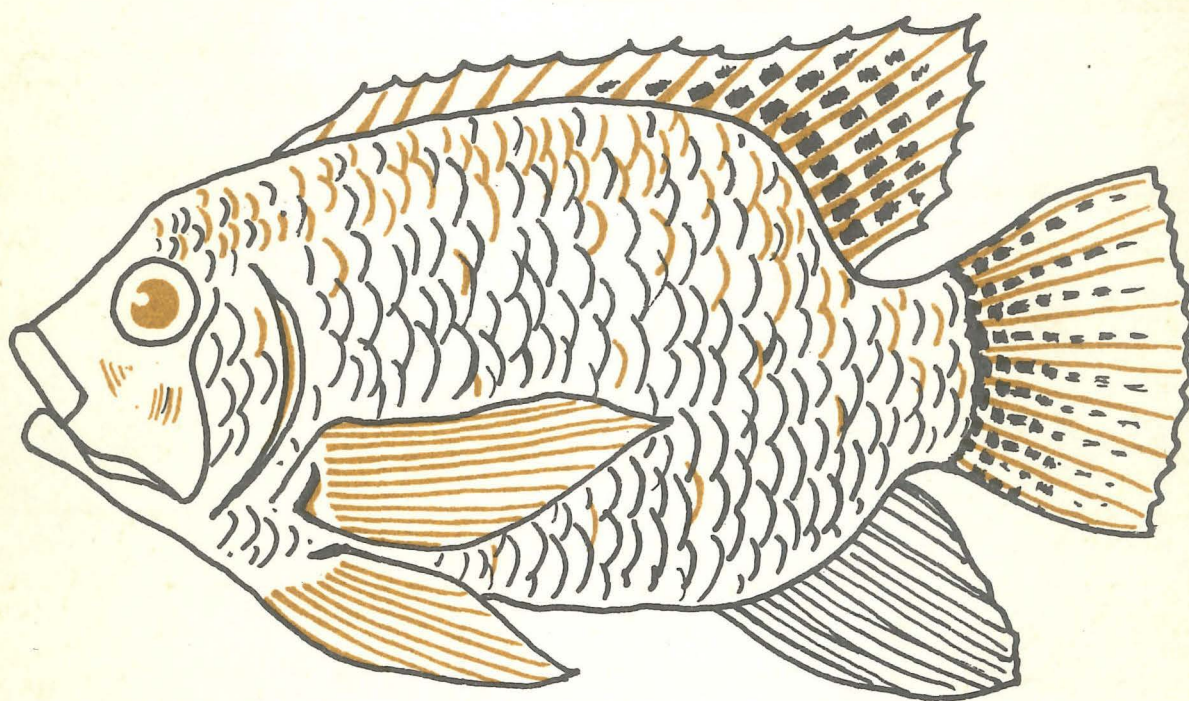


1978 edition

freshwater fish farming

how to begin



BETTER FARMING SERIES

Twenty-seven titles have been published in this series, designed as handbooks for a two-year intermediate-level agricultural education and training course. They may be purchased as a set or as individual documents.

FIRST YEAR

1. The plant: the living plant; the root
2. The plant: the stem; the buds; the leaves
3. The plant: the flower
4. The soil: how the soil is made up
5. The soil: how to conserve the soil
6. The soil: how to improve the soil
7. Crop farming
8. Animal husbandry: feeding and care of animals
9. Animal husbandry: animal diseases; how animals reproduce

SECOND YEAR

10. The farm business survey
11. Cattle breeding
12. Sheep and goat breeding
13. Keeping chickens
14. Farming with animal power
15. Cereals
16. Roots and tubers
17. Groundnuts
18. Bananas
19. Market gardening
20. Upland rice
21. Wet paddy or swamp rice
22. Cocoa
23. Coffee
24. The oil palm
25. The rubber tree
26. The modern farm business
27. Freshwater fish farming: how to begin

Freshwater fish farming

How to begin

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

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PREFACE

This manual is an adaptation of the extension booklet "Simon Raises Fish", based on a technical concept of J.W. Miller, FAO Fish Culture Extension Adviser (original graphic interpretation by Jerry Stafford, U.S. Peace Corps). It is one of a series that is finding widespread use at the intermediate level of agricultural education and training.

The original extension booklet was studied and tested in the following projects in the Central African Empire:

- UNDP/FAO Fish Culture Extension Project
- OTS Community Development Project
- U.S. Peace Corps Fish Culture Programme

This version has been prepared by the Inland Water Resources and Aquaculture Service, Fishery Resources and Environment Division (FIRI), of the Food and Agriculture Organization of the United Nations. Further adaptation can be made to the text according to local climatic and ecological conditions.

Requests for permission to issue this manual in other languages are welcomed. Such applications should be addressed to: Director, Publications Division, Food and Agriculture Organization of the United Nations, Via delle Terme di Caracalla, 00100 Rome, Italy.

OUTLINE OF COURSE

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PLAN OF WORK

FIRST WEEK

Introduction

Read paragraphs 1 to 15.

By raising fish

you can get better food and more money
for yourself and your family.

But to do this

you will have to take good care
of your pond and your fish.

Building your pond

Read paragraphs 16 to 45.

Your success in fish farming

depends on where you put your pond
and how you build it.

Ask your extension agent

to visit your land
and give you advice.

He can also advise you

about building your compost pile.

SECOND WEEK

The water

Read paragraphs 46 to 66.

You need rich land

to have a good crop.

You need rich water
to have a good harvest of fish.

To make your water rich,
make good compost
and put some of it in your pond
every week.

Putting the fish into your pond

Read paragraphs 67 to 76.

To know the best kind of fish
to put into your pond,
ask your extension agent
or other farmers who are raising fish.

Do not put too many fish in your pond.

Handle baby fish carefully
to keep them strong.

THIRD WEEK

Feeding your fish

Read paragraphs 77 to 83.

Feed your fish every day,
and watch them while they eat.

If they are healthy
they will eat very quickly.

Give them enough to eat,
but not too much.

Taking care of your pond

Read paragraphs 84 to 90.

It is not enough
to dig your pond
and put fish in it.

You must take care of your crops.

You must take care of your pond.

FOURTH WEEK

Harvesting your fish

Read paragraphs 91 to 112.

Harvesting your fish
will be a big feast
for your family and friends.

Be sure you have everything ready.

Do not forget to keep some baby fish alive
so that you can start again.

Be ready to use the big fish
or to preserve them
or to take them to the market.

Now you must begin again

Read paragraphs 113 to 119.

Paragraphs 69 to 71
will tell you how many baby fish you will need.

When you have begun,
try to do better
than the first time.

Help your friends
to begin fish farming.

Reread all the course

Answer the question paper.

INTRODUCTION

What is fish farming?

1. Fish farming is the raising of fish for personal use or profit.
It is sometimes called fish culture.

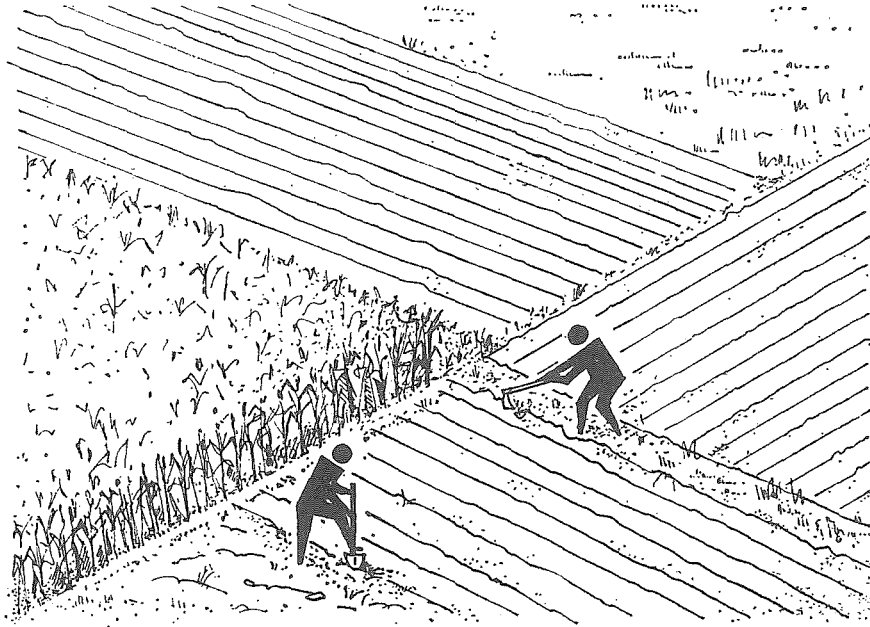
Why do we raise fish?

2. By raising fish we make better use of our land and our water.
3. By raising fish your family will have more to eat.
The protein in fish will keep your family strong and healthy.
Fish are tasty, like chicken, sheep and goat.
4. If your family is not too big you will have more fish than you need for food and you can sell them at the market.



5. If your family is not too big with more food and more money you and your family can live better.

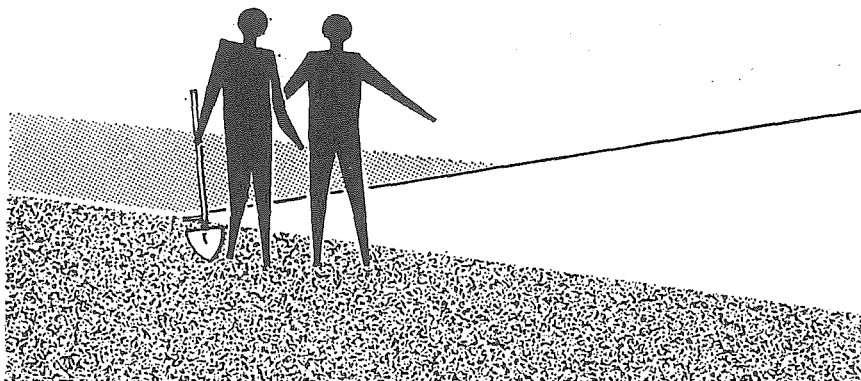
6. But fish farming is not easy.
To raise fish is as hard work
as to raise anything else,
such as maize, rice,
cassava or groundnuts.



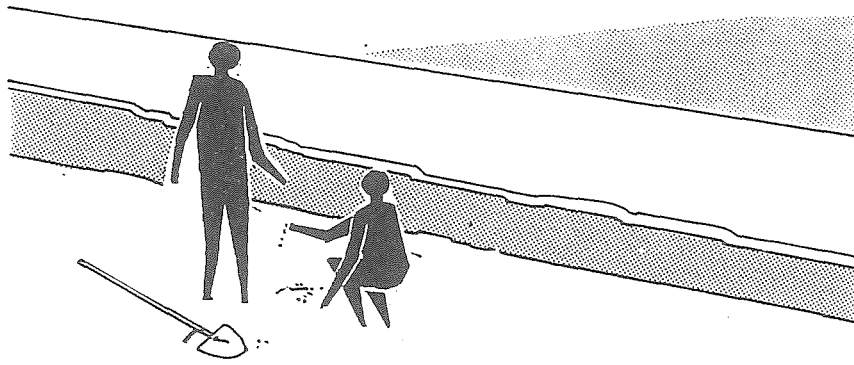
7. You will need to learn
to do many things.

What do you need to raise fish?

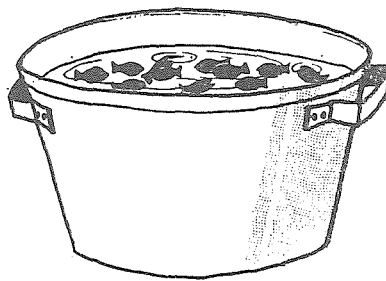
8. You will need a piece of land
where you can build a pond,



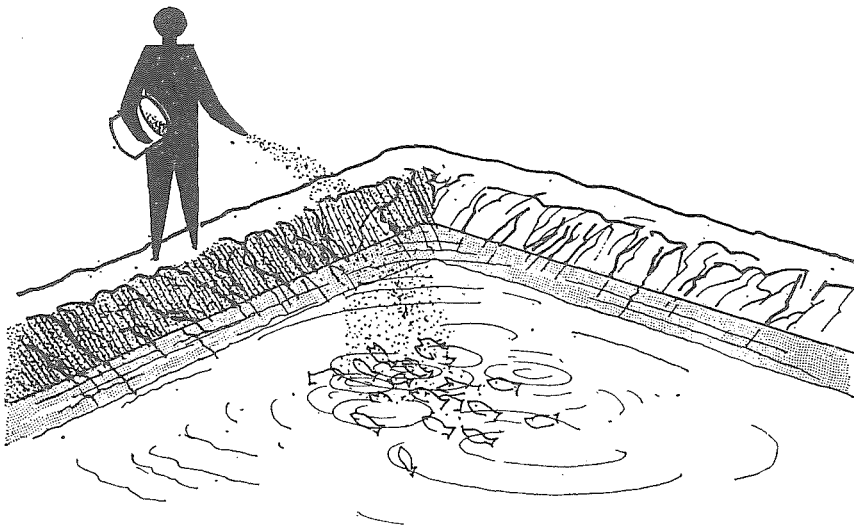
a supply of water,



baby fish to begin,



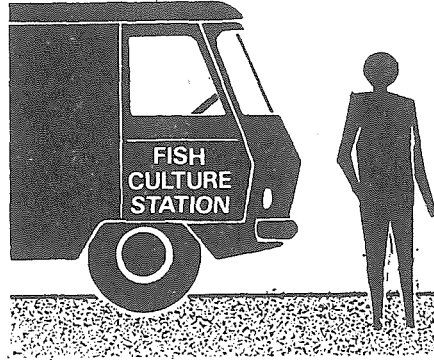
food for your fish.



9. You will need time to build a pond and to care for it regularly. Fish farming takes a lot of time.

How do we begin?

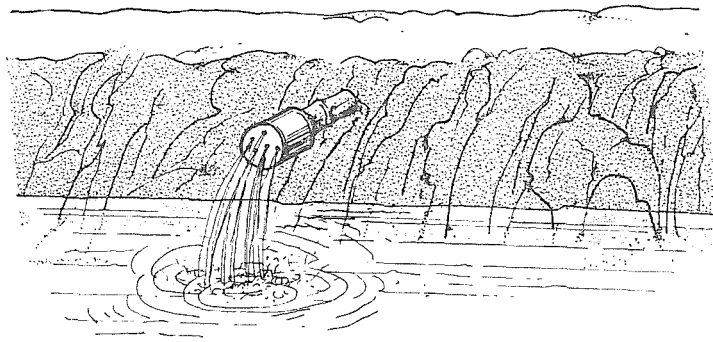
10. If there is a fish culture station near where you live you may be able to get help from an extension agent.



11. If there is no extension agent you will need to learn many things by yourself.
12. You will need to know the type of soil best for your pond, how to dig your pond,



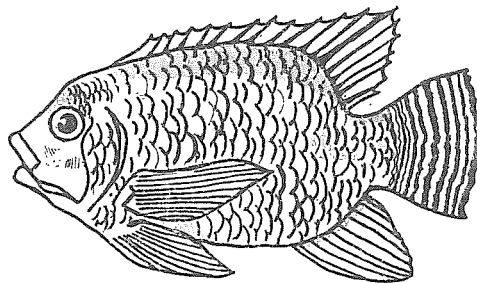
how to fill it with water,



how to fertilize it.

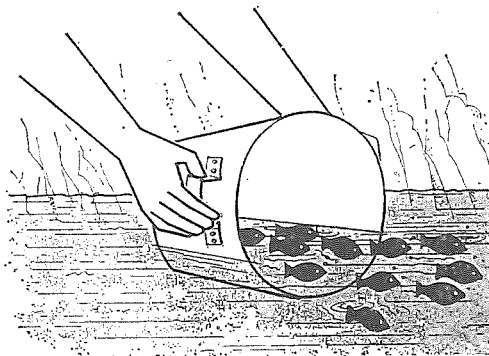


13. You will need to know
what kind of fish to raise,

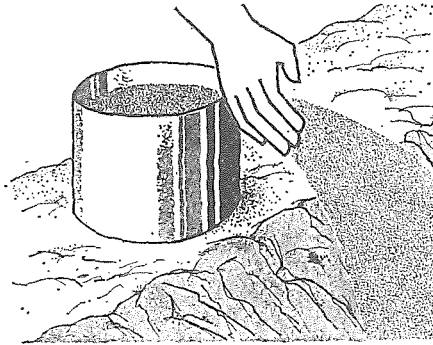


Tilapia nilotica

how to put the baby fish into your pond,



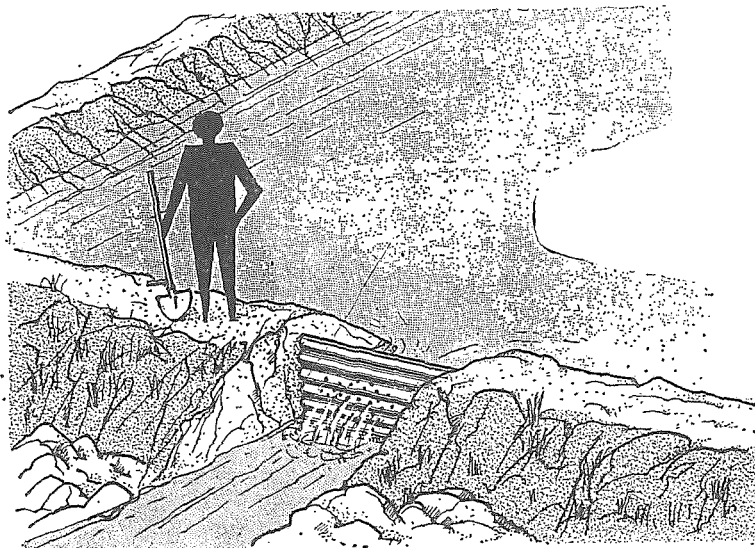
what to feed your fish,
how to feed them.



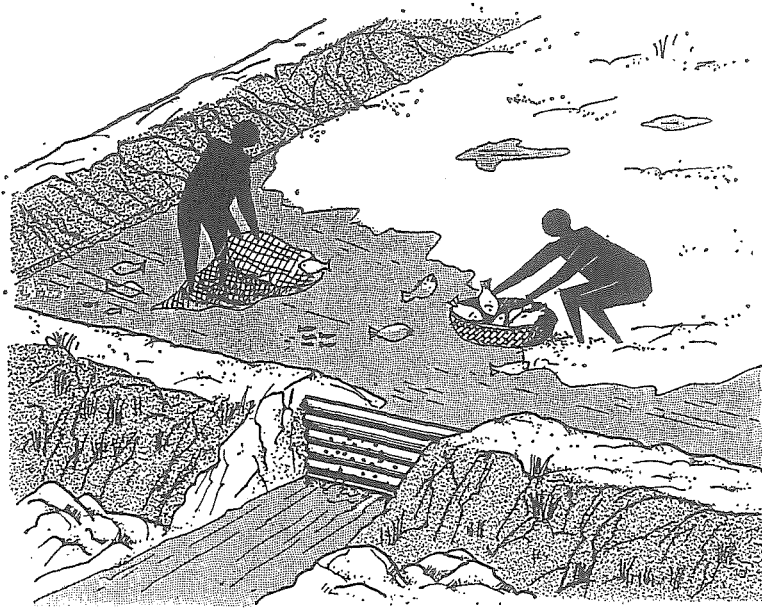
14. You will need to know
how to take care of the pond,



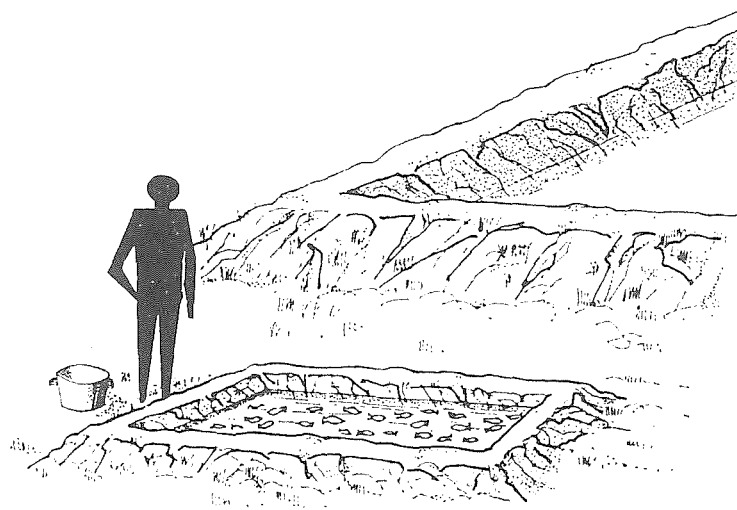
how to drain it,



how to harvest the fish,



how to use your own baby fish to start again.

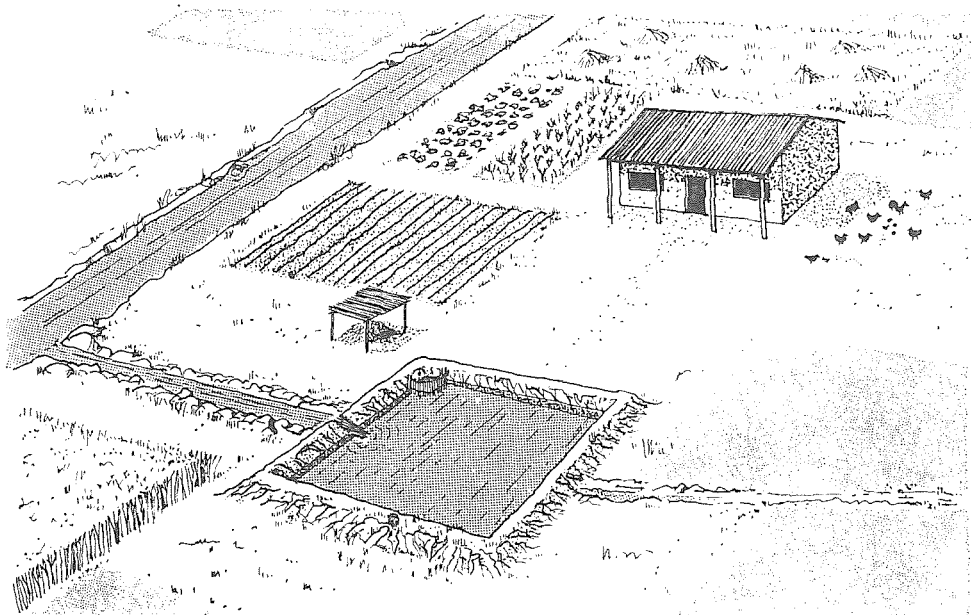


15. **This book will help you
to begin good fish farming.**

THE POND

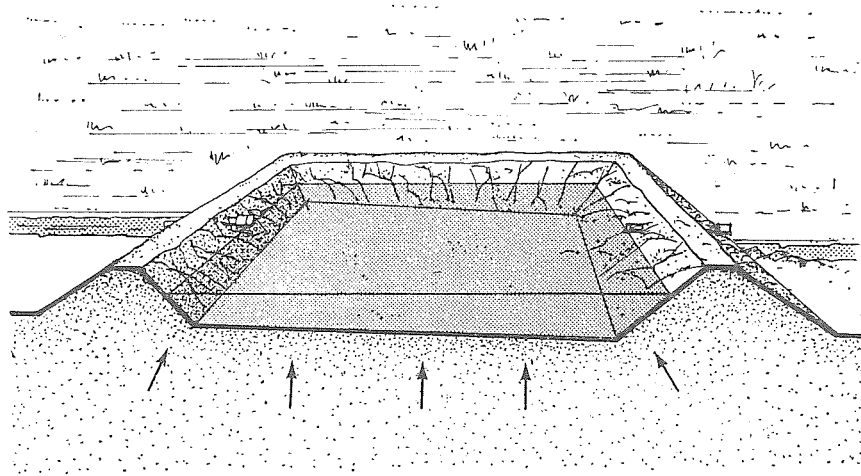
Where to put your fish pond

16. You must choose a good place to put your pond.
17. Remember that a pond for fish is only one use for your land. Be careful not to build a pond on land that could be better used for something else.
18. It is best to choose a piece of land that has a gentle slope.
19. Do not build your pond on a steep hill or where it can be flooded in the rainy season.
20. Choose a sunny place for your pond, close to your home so people will not come and take your fish away.

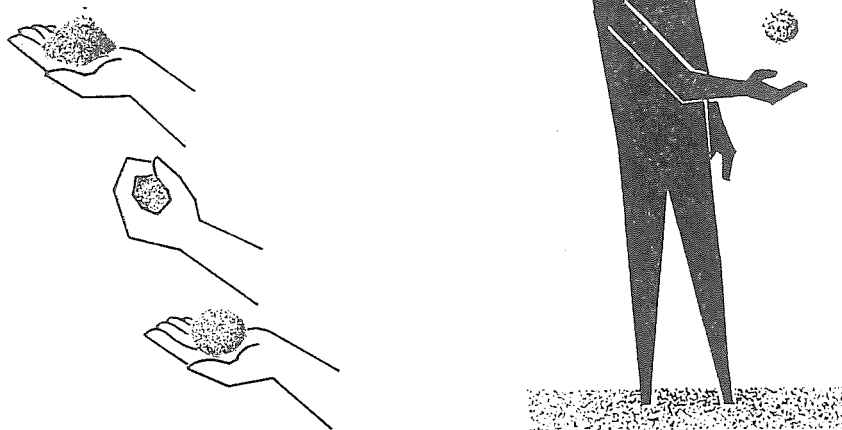


Near your home it is also easier to take care of the fish.

21. The pond should be near water such as a stream or a spring, or in marshy ground where the water in the soil will fill up your pond.

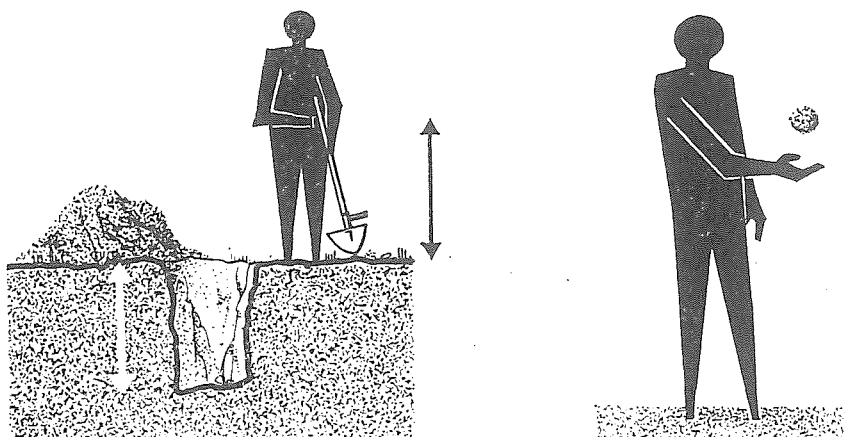


22. The soil in the place you choose must be good for a fish pond.
23. To test if you have good soil, take a handful of soil from the surface and squeeze it into a ball.
24. Throw the ball of soil into the air and catch it.



25. If it sticks together it is good soil and will hold water well.
26. Bad soil with sand or gravel in it will not stick together and will not hold water.

27. Now dig a hole as deep as your waist and test the soil from the bottom of the hole in the same way as before.



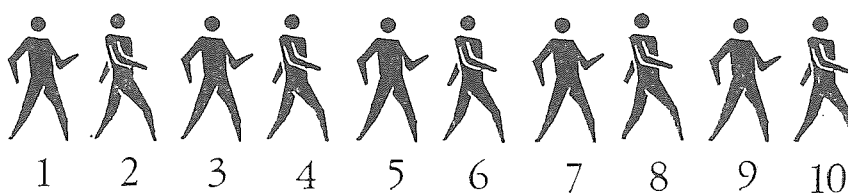
28. If the soil from the surface is good, and the soil from the bottom is good, this is a good place to dig your pond.

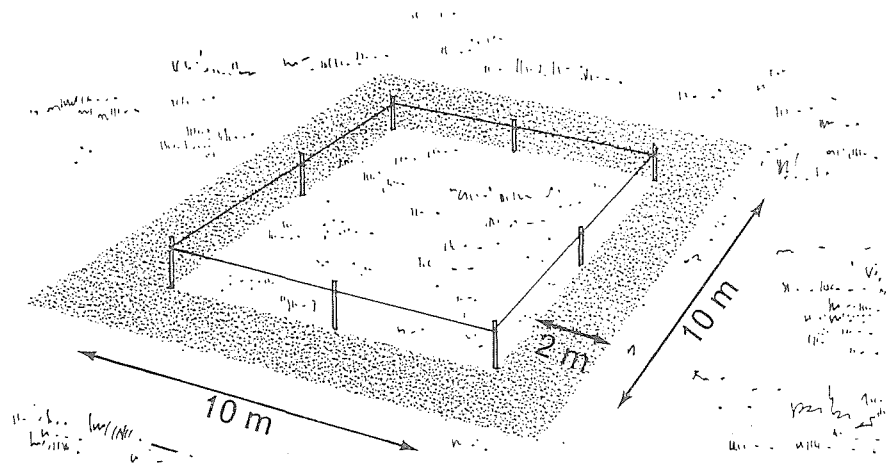
Compost to fertilize your pond

29. You will need compost to fertilize your pond.
To make a good compost pile will take one month, so you should start making it before you dig your pond.
Later this book will tell you how to make compost (see 56-66)

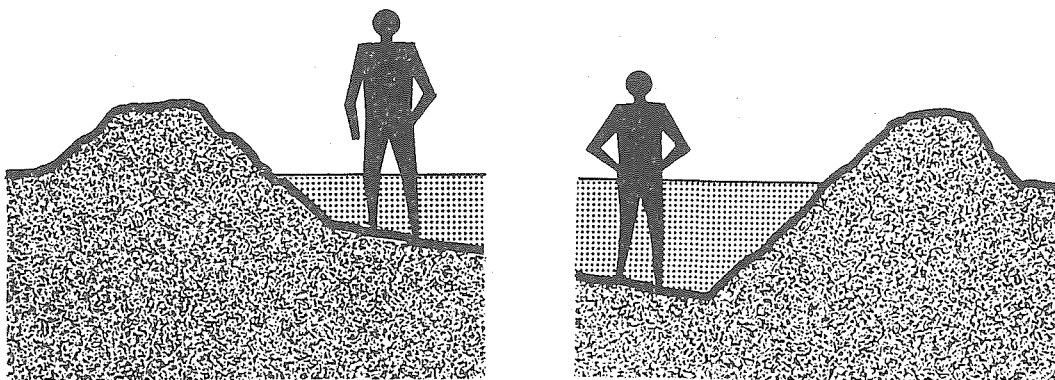
How to dig your pond

30. Mark out the size of the pond on the ground you have chosen.
Each side should be about 14 metres long, 10 metres for the pond and 2 metres for each bank of the pond.



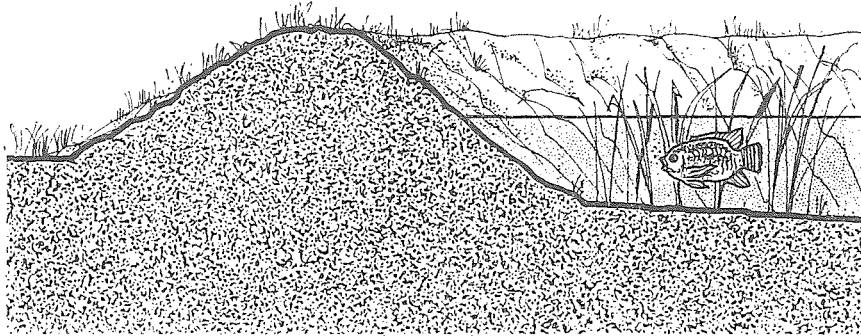


31. Clear this area
of all trees, bushes and grass
and take away all the roots.
32. Take away 20 centimetres of topsoil
from all the cleared area
and put it aside.
33. Now you can dig your pond.
34. The bottom of the pond should be even
and sloped toward the deep end.
35. In the shallow end,
the water in the pond will have to be about knee-deep.
36. In the deep end,
it will have to be waist-deep.

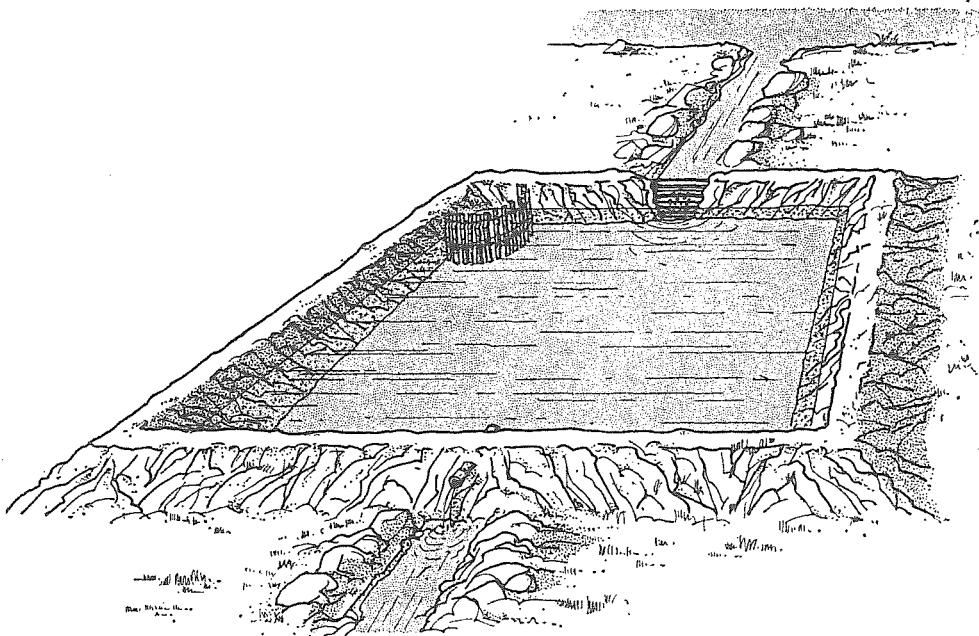


37. As you dig the soil out,
put it on the 2-metre strips
to be the banks of the pond.

38. Do not make the sides too steep, but slope them to make them stronger.

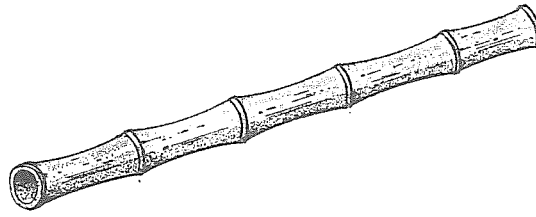


39. Compact the soil as you take it out, to make banks strong enough to stop the water from pushing them out. The banks must be watertight.
40. You will need to make an inlet at the shallow end above the water level to fill your pond.

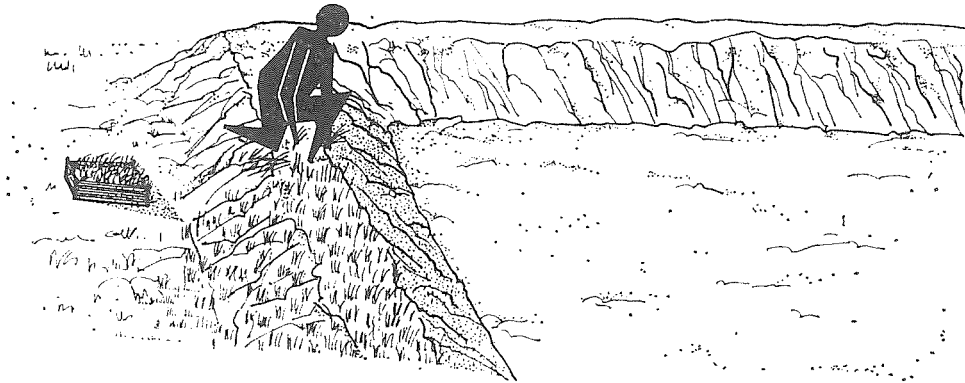


41. At the deep end you will need to make an outlet to keep the banks from overflowing if there is too much water in the pond.

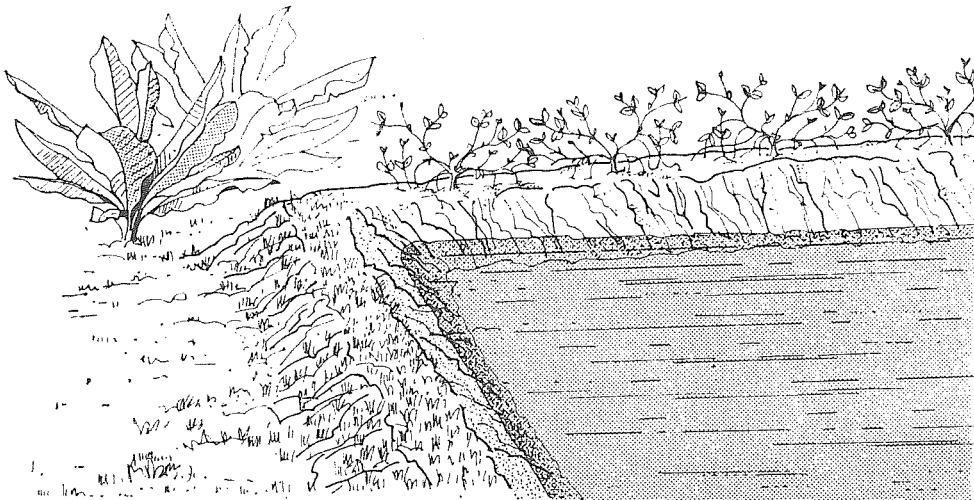
42. The inlet and outlet for your pond can be very simple.
Large bamboo pipes will work very well.



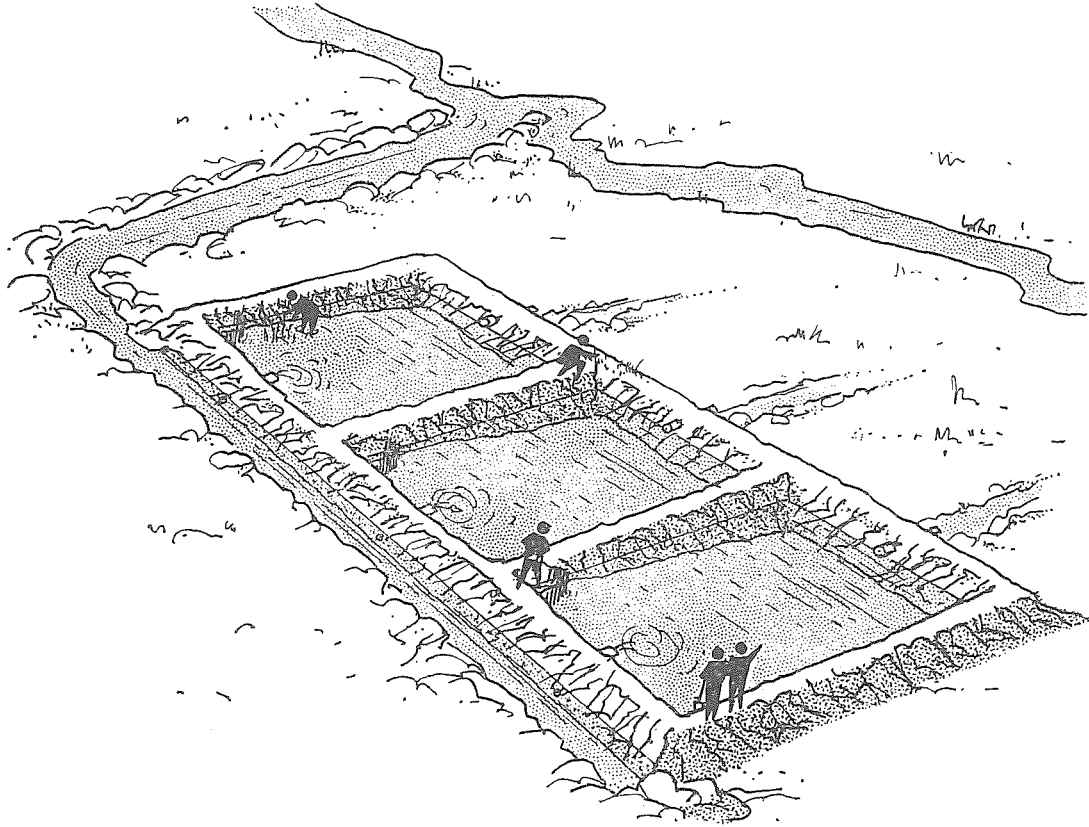
43. When you have finished digging your pond, put the topsoil you have set aside on the banks. Then plant grass on the banks to stop the soil from being washed away by the rain.



44. If you need more land for growing crops, instead of planting grass on the banks you may grow food crops such as rice, sweet potatoes or groundnuts.



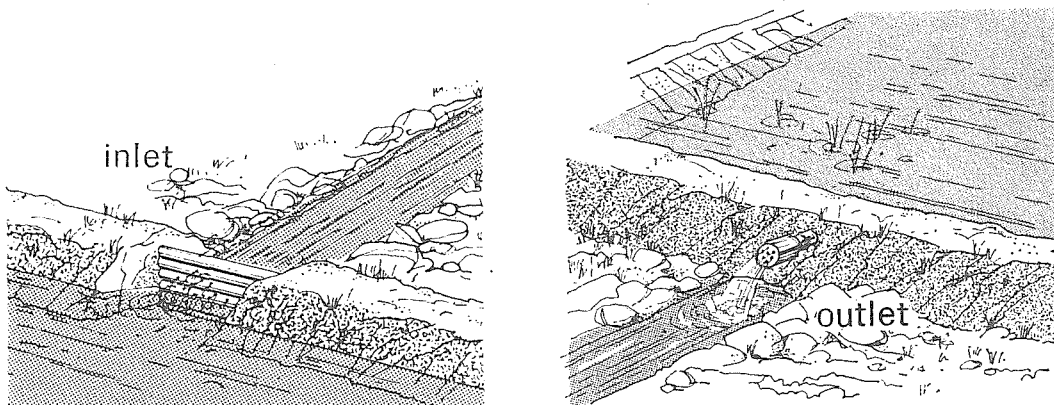
45. It is good if other farmers
build ponds beside yours.
It is easier if others help you
in fish farming,
and one bank can be used
between two ponds.



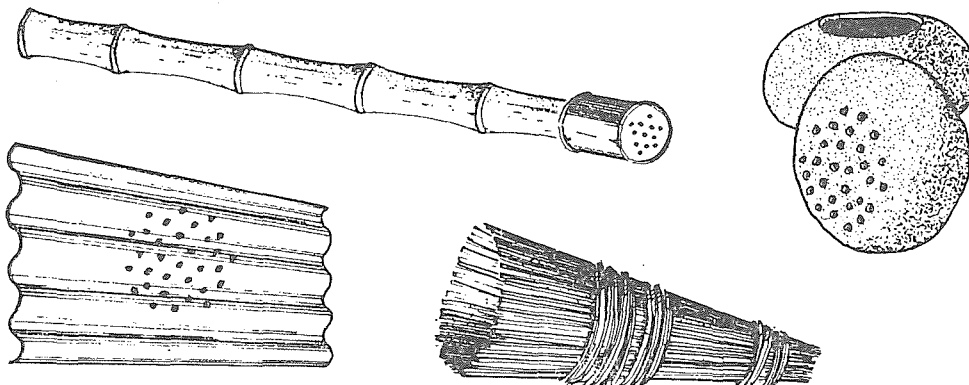
THE WATER

Filling your pond

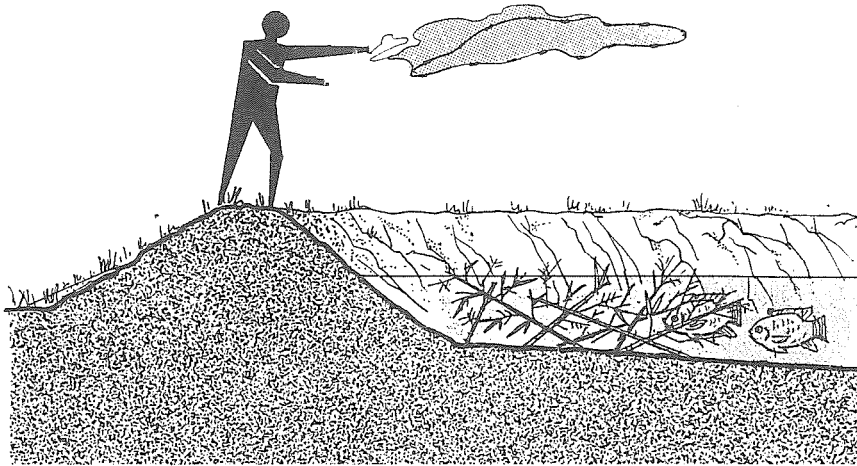
46. Using a small ditch is the easiest way to get water to the inlet and into the pond.
47. If the water comes from a stream, be careful to keep out bad fish. You can do this by using a screen on the inlet.
48. To stop fish from getting out of the pond, put another screen on the outlet.



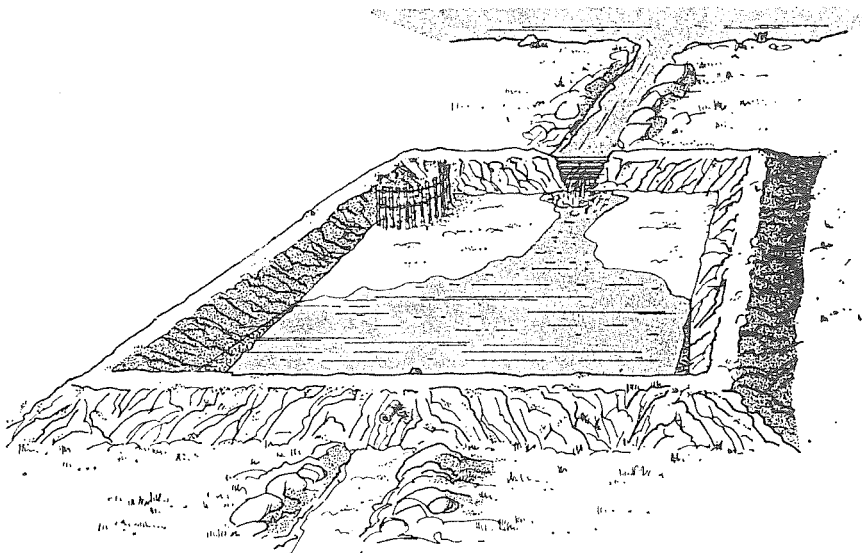
49. As a screen you can use:
 - a fish trap
 - split and woven bamboo
 - a clay pot with holes in the bottom
 - a piece of metal roofing with holes
 - a tin can with holes in the end.



50. To stop other people from taking fish from your pond, you can put some bamboo branches on the pond bottom. This will stop them from fishing or taking fish with a net.



51. Now you are ready to fill your pond with water.



Fertilizing the water in the pond

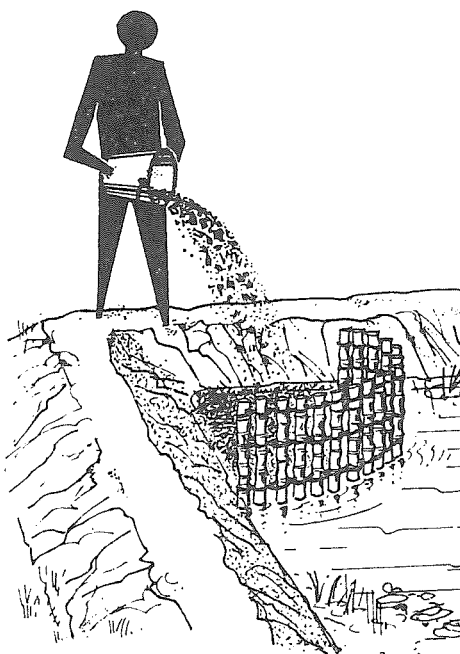
52. To make more food in the water for the fish you will need to fertilize the pond. You can do this by adding compost.

53. Build a crib
with bamboo or other wooden poles,
in the shallow part of the pond,
and fill it with compost.



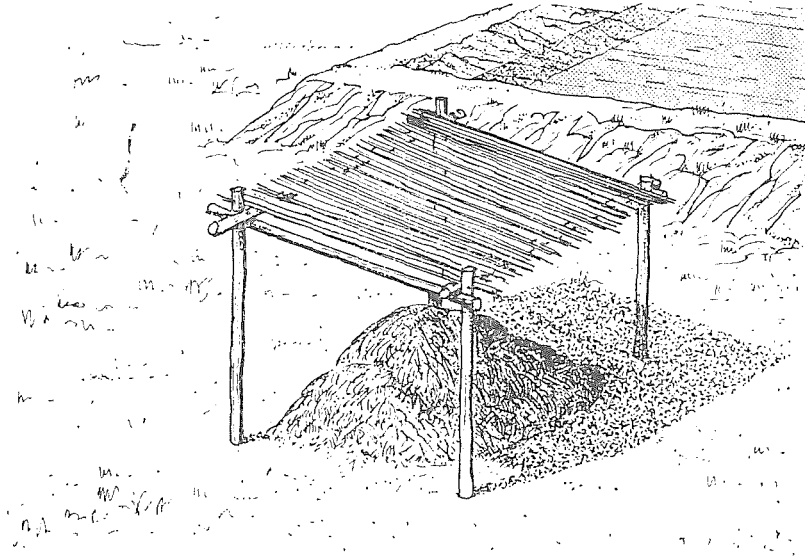
54. Several days later
the water will become green.
When the water is green,
there is more natural food in the pond
and the fish will grow faster.
55. To keep the water green,
put a bucket
of compost
in the crib
every week.

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

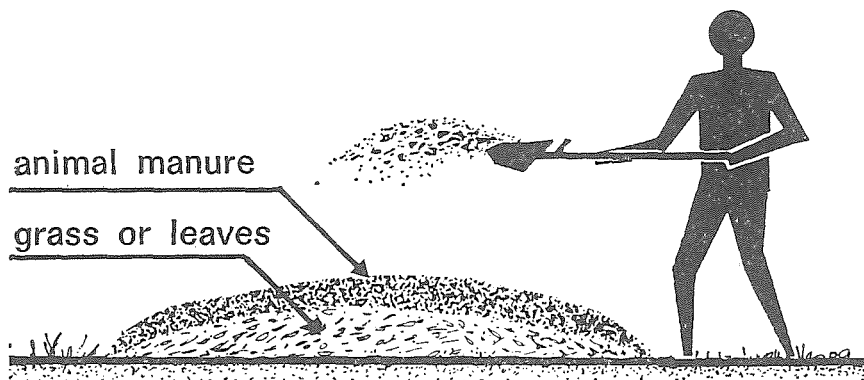


How to make compost

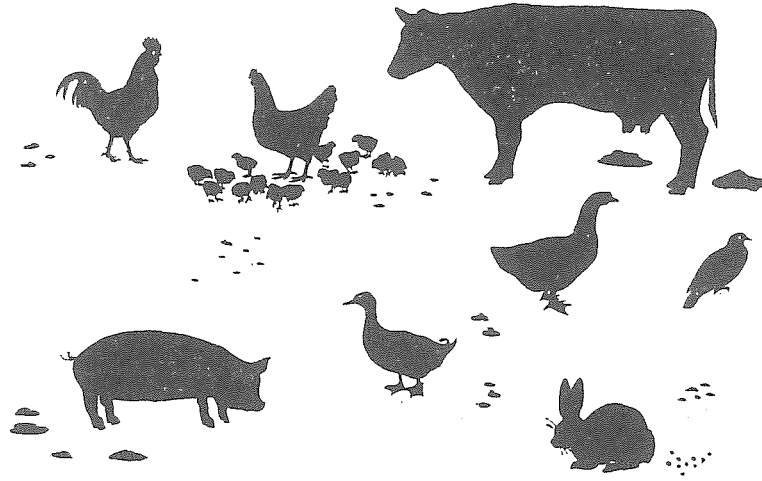
56. Make a compost pile near the pond.
Put it in a shady place
protected from rain.



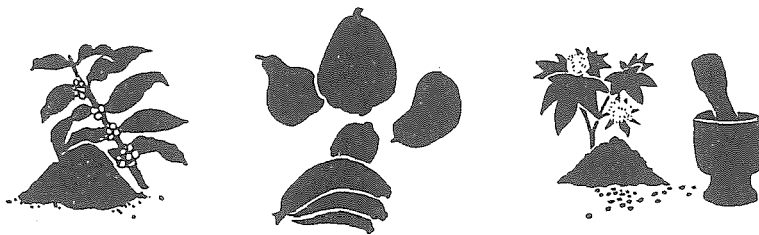
57. Make your pile in layers.
Make the first layer of grass or leaves
mixed with a spadeful of topsoil,
and damp it with water
to make it rot faster.
- 58 Then make a second layer of animal manure
mixed with a spadeful of topsoil
and some water.



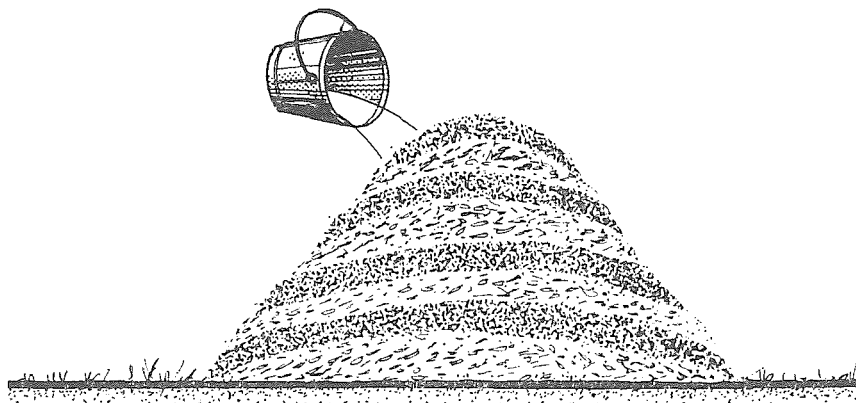
59. Use animal manure
from sheep, goats, cattle,
pigs, chickens or ducks.



60. In place of animal manure you can also use cotton seed, spoiled fruit, household garbage, ashes from the fireplace or night soil.

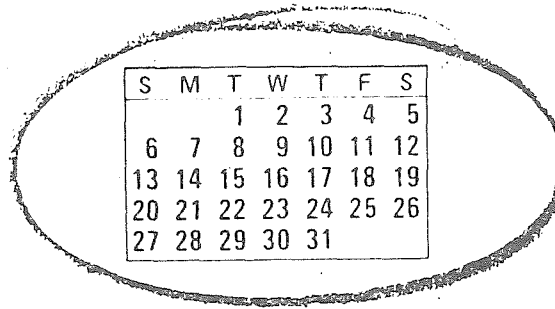


61. Then make another layer of grass or leaves, and another of manure, until you have a large pile.

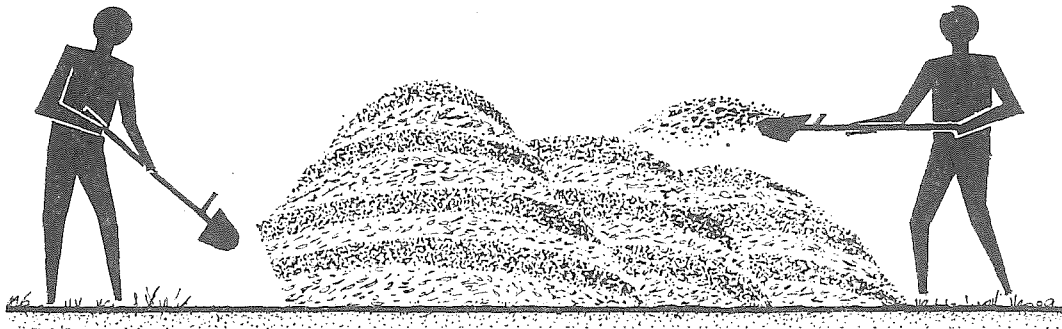


62. Keep your compost pile damp by watering it every few days.

63. Let the compost pile rot for about a month.



64. Take compost from the bottom of the pile, or the old part of the pile, where it is most rotten, to put in your pond.

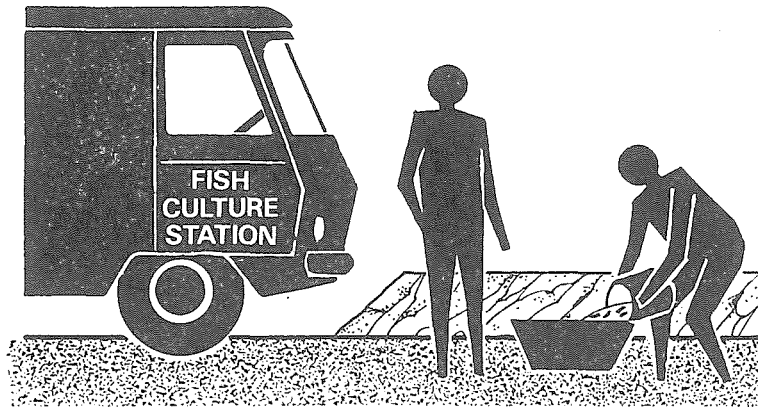


65. Add new layers to your pile every week so that you will always have compost.
66. If you have too much compost you can use some to fertilize your land.

PUTTING THE FISH INTO YOUR POND

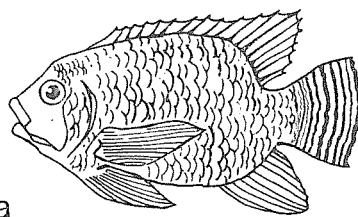
67. The first time you stock your pond you will need to find some baby fish.

68. You can get them from a fish-culture station

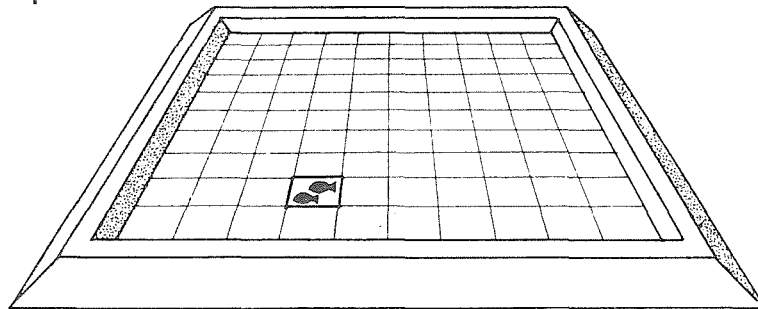


or from another fish farmer.

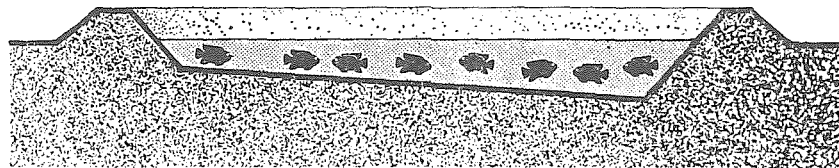
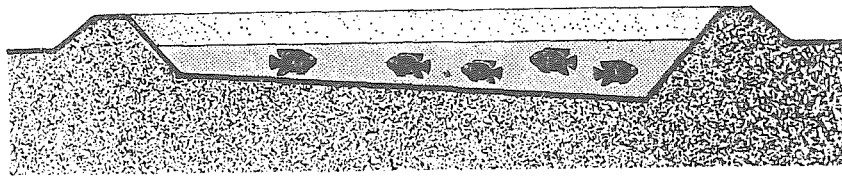
69. If you use *Tilapia nilotica* you will need two baby fish for each square metre. If each side of the pond is 10 metres long (100 square metres) you will need 200 fish (about 2 kilograms or 5 pounds).



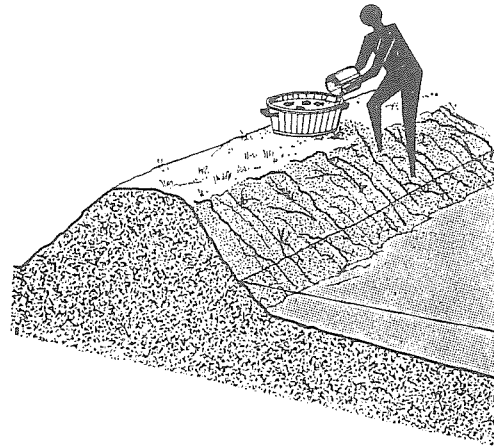
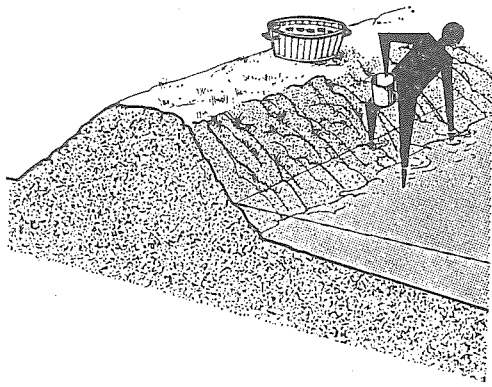
Tilapia nilotica



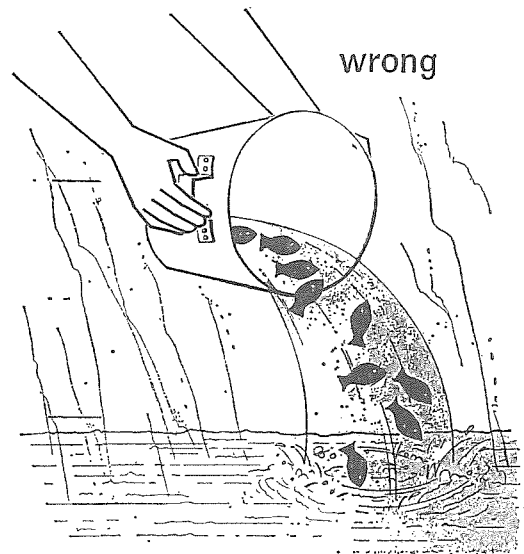
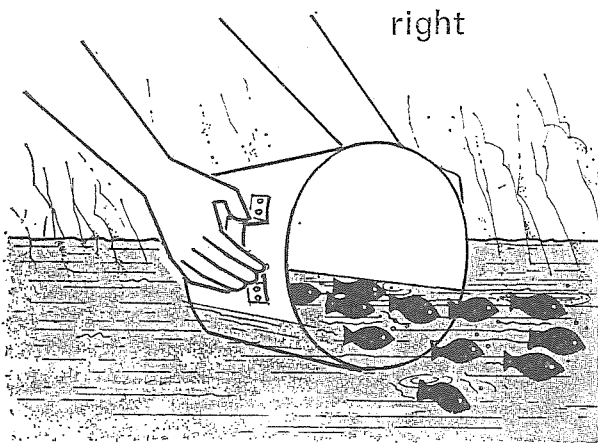
70. Be careful
not to put too many fish in your pond.
Stocking a fish pond
is like planting a field.
If plants are too close together
they grow badly.
If there there are too many fish
in your pond
they will grow badly, too,
and they will stay small.



71. If you want to use a different fish,
ask your extension agent for help.
72. Before you put the baby fish in the pond,
be sure that the water where they are
is not hotter or colder
than the water in the pond.
73. You can find this out
by putting one of your hands
in the water with the fish
and the other in the pond.
74. If one is hotter or colder
slowly put water from the pond
in the water with the fish
until they are both the same.

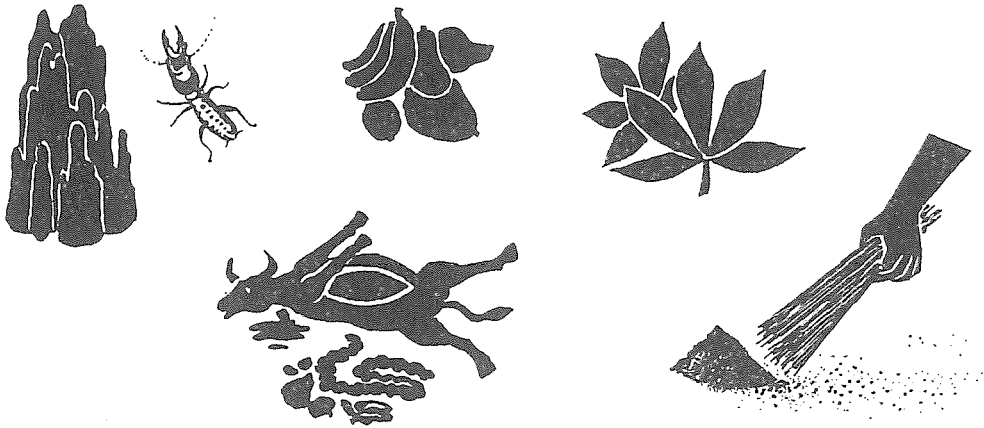


75. If you do not do this
the fish may die
when you put them in the pond.
76. **Do not pour the fish into the pond.**
Gently put the container into the water,
tip it a little,
and let the fish swim out by themselves.

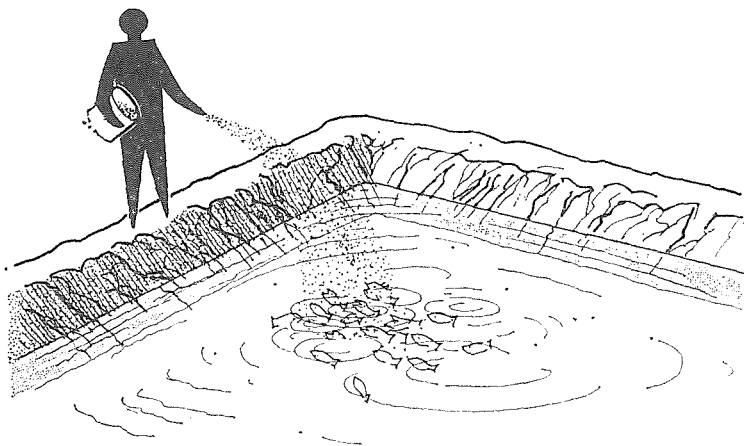


FEEDING YOUR FISH

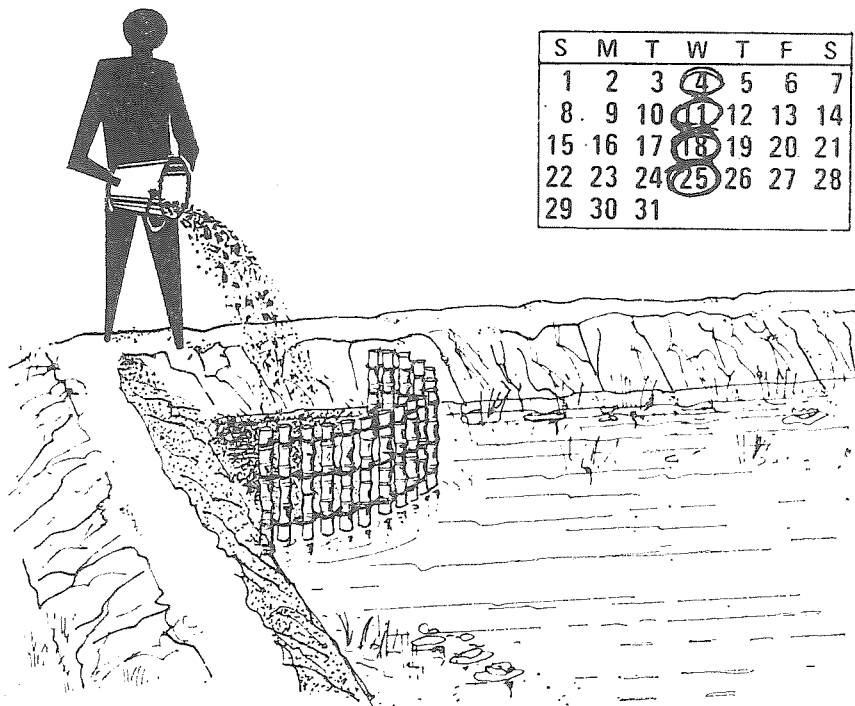
77. Feed your fish every day.
78. You can give them many things to eat.
You can give them
- termites
 - cassava leaves and cassava wastes
 - grain mill sweepings
 - rice bran
 - beer wastes
 - cotton seed pounded in a mortar
 - slaughterhouse wastes
 - spoiled fruit
 - kitchen waste



79. Feed your fish in the shallow part of the pond so that you can see them eat.

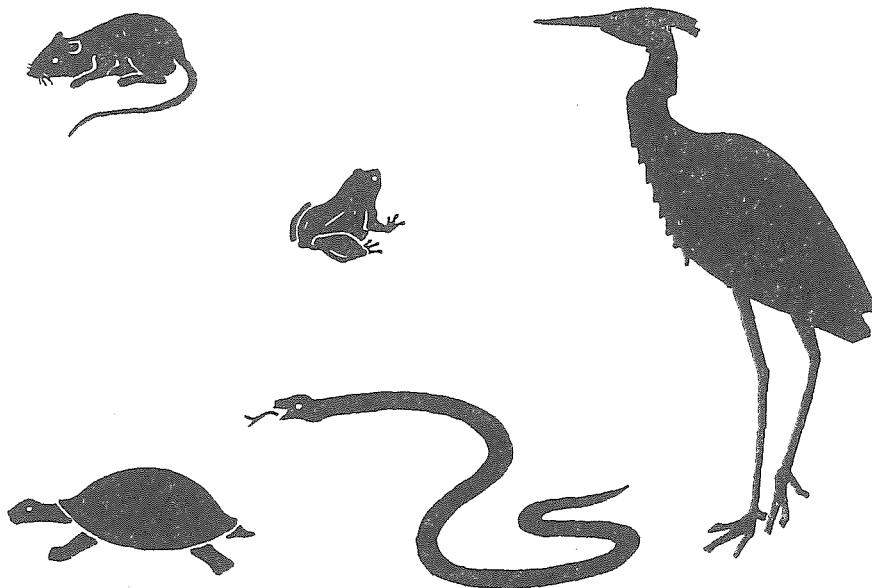


80. Feed your fish
only what they will eat each day.
Do not give them more than they can eat.
81. If your fish are healthy
they will eat quickly.
82. If they do not eat all their food
give them a little less the next day.
If they eat everything quickly
give them a little more the next day.
83. Do not forget
to add a bucket of compost every week
to the compost crib in the pond.



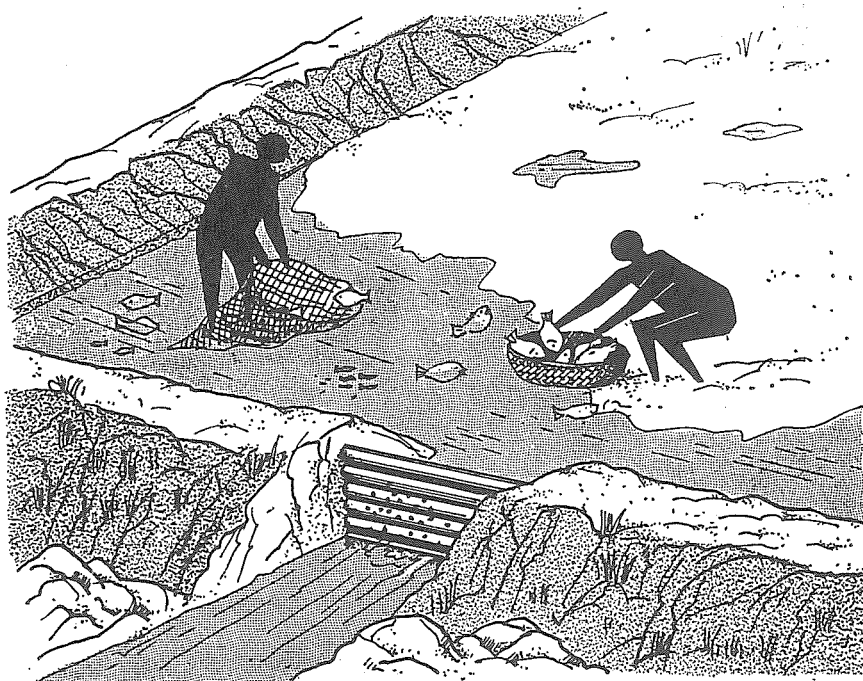
TAKING CARE OF YOUR POND

84. You must take care of your pond every day when you take food to your fish.
85. Be sure the pond is full of water.
86. Be sure the screens are in place so that your fish cannot get away.
87. Do not let weeds cover more than one quarter of the surface. If there are too many pull them up.
88. Cut the weeds and grass on the banks of the pond.
89. Be sure the water is not leaking through the banks. If you find leaks stop them up right away with good soil.
90. Get rid of birds, frogs, turtles, rats and snakes. They can hurt your fish.



HARVESTING YOUR FISH

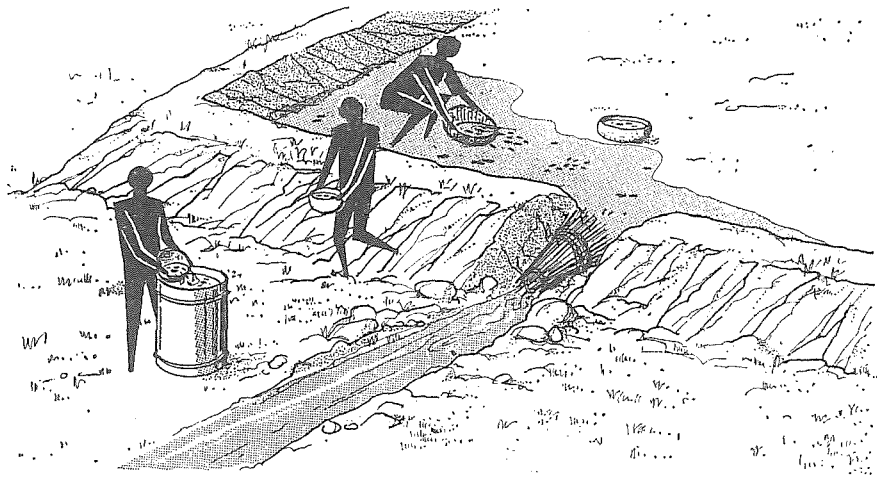
91. Do not take any fish out of your pond during the first five months.
After five months
you may catch
four or five big fish each week
to eat with your family.
92. When the fish are big enough,
it is time to harvest all of them.
Usually, they will be big enough to harvest
in about six months.
93. Harvest the fish early in the morning
when it is cool.
94. Have some watertight containers ready
to store live fish.
95. The easiest way to harvest
is by draining the water
out of the pond.



96. Drain the pond by opening the bank at the deep end.
97. Use a screen at the outlet while you are draining so that you will not lose any fish.
98. Use baskets or nets to take the fish out of the water while the pond is being drained.

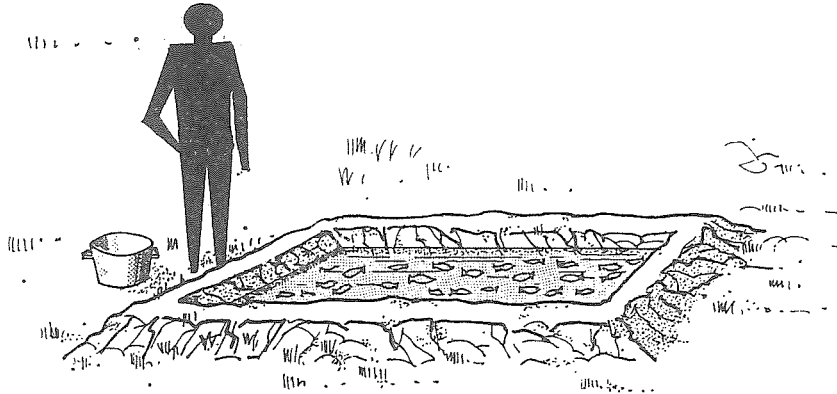
What to do with your baby fish

99. As soon as you find baby fish, put them gently into containers with clean water.



100. You will need these baby fish to put back into your pond to begin again.
Baby fish are the fish farmer's seed.
101. Keep them in clean water, out of the sun, and move the water around gently with your hand from time to time.

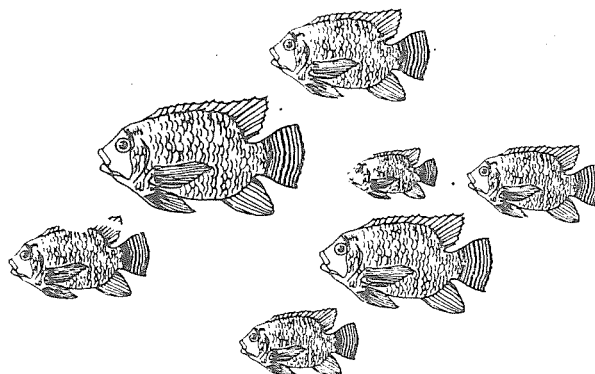
102. If it takes more than half a day to make your pond ready to put back the baby fish, you should keep them alive in a special small pond nearby.
103. The small pond can be a simple hole in the ground about two metres square. You should have it ready before you begin to harvest.



104. When moving your baby fish from one pond to the other, be very careful not to hurt them.

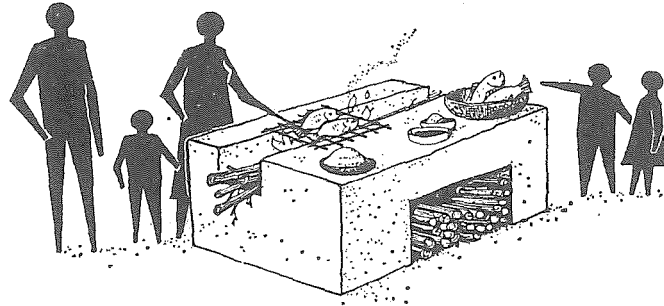
What to do with your big fish

105. You will harvest from your pond many big fish.



106. Fish spoil quickly after they die. Be ready to use them *fresh* the same day or to *preserve* them for later use.

107. Use fish to feed yourself and your family.
Fish is very good for you
and for your children.
The smaller your family is
the more fish
each of you will have to eat.



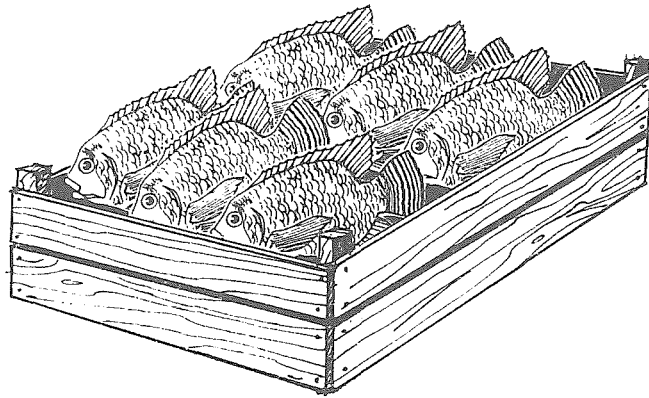
108. You can sell part of your harvest
to neighbours or at the market,
either fresh or preserved.

109. To transport fresh fish to market,
you should:

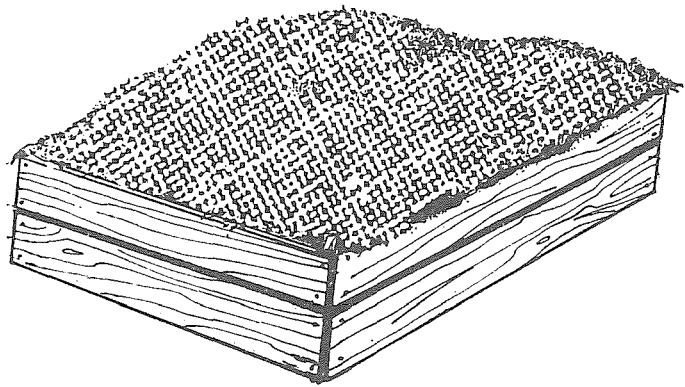
- rinse them well in clear water



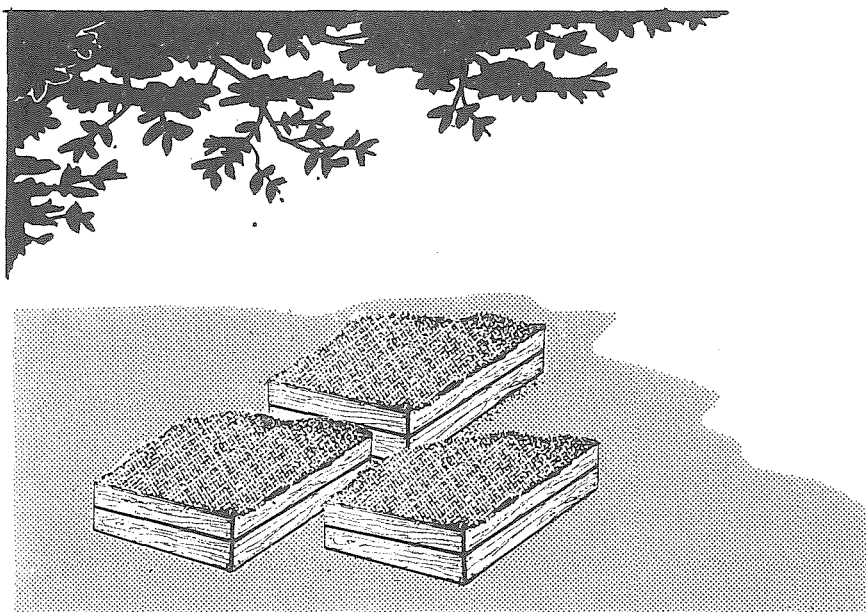
- put them in a clean and dry container



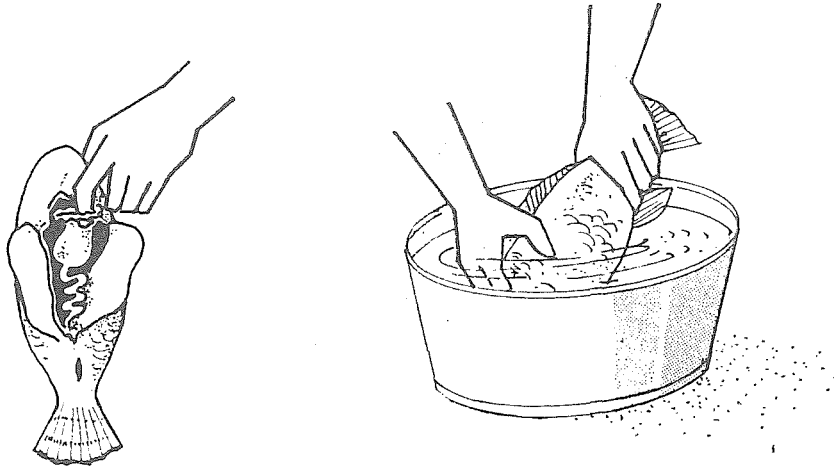
- cover them with fresh leaves or a mat, and



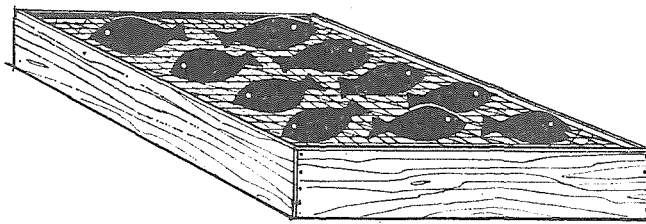
- keep them out of the sun.



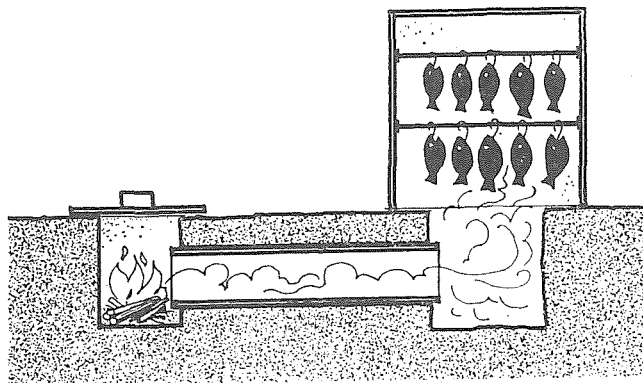
110. A fresh fish will keep better if you remove its guts and rinse it with clean water.



111. To preserve the fish you cannot sell or eat quickly, dry them in the sun, or smoke them.



or smoke them.



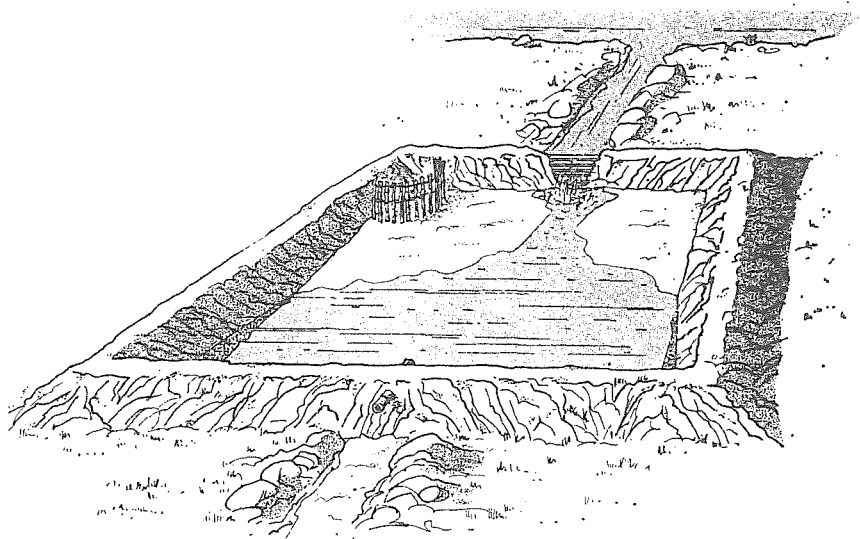
112. By putting some salt on your fish while you are drying or smoking them you will preserve your fish better.

NOW YOU MUST BEGIN AGAIN

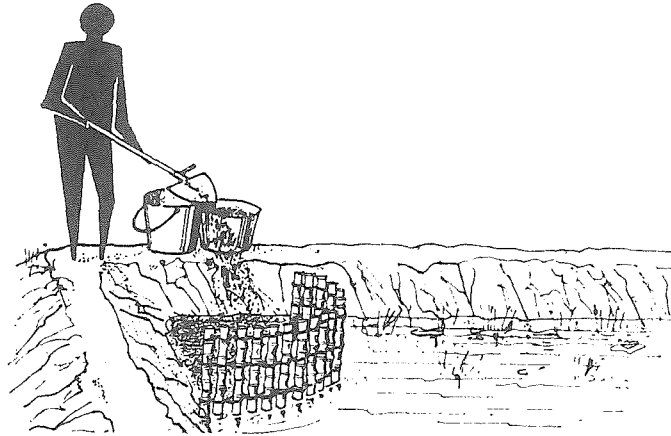
113. Be sure that your pond is very clean.
114. Repair the banks and cut the weeds and grass around the pond.



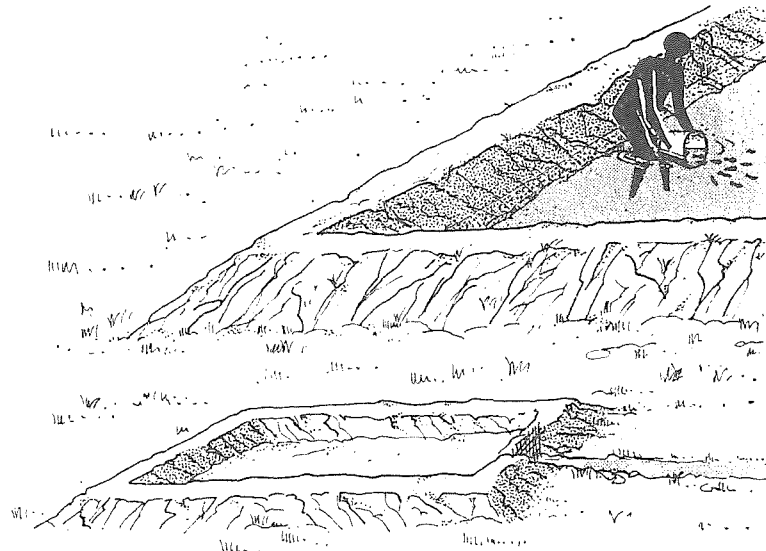
115. Fill the pond with water as before.
Be sure to use a screen
to keep out bad fish.



116. Put compost in the crib.



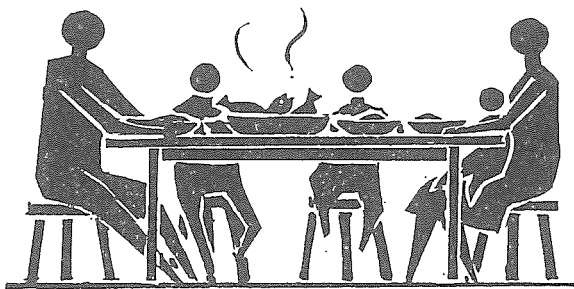
117. Then put 200 of your baby fish back in the pond.



118. If you have more baby fish than you need, sell some to a neighbour to help him start fish farming.



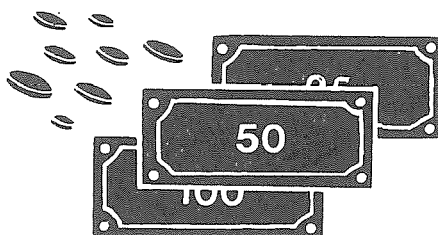
119. You will see that by farming fish
you can provide
for your family better



and you will have

- fresh fish to eat
- fish to dry, smoke and store
- fish to sell at market

120. If your family is not too big
you will have more fish to sell



and you and your family
can live better.

SUGGESTED QUESTION PAPER

FILL IN THE MISSING WORDS:

Raising fish will give you and your family more
..... and more

For your pond it is best to choose land with a
..... slope, near to

and to your Such land should
not be during the rainy season.

If a ball of soil together, it
will hold well.

Before digging your pond, you
the area and you take away all
and of soil.

To keep out bad fish, you can use a
To make the water better for the fish, you will add
..... once a week.

You should handle the baby fish very
You will your fish every day,
in the part of the pond.

To take good care of your pond, you should look for
..... in the banks, you should cut
....., and get rid of

After 5 months, you may catch
big fish each week.

When draining the pond, you will need
..... to keep baby fish alive.

ANSWER THE FOLLOWING QUESTIONS:

What do you need to raise fish?

Raising fish has several advantages. Which ones, for example?

How do you describe a good place to put your pond?

How do you test if the soil will hold water well?

You have cleared the area and removed the topsoil. How do you proceed now to build your pond?

How can you protect your fish from being stolen?

How do you make a compost pile? How do you use it?

How many baby fish will you need to stock your pond?

What can you feed to your fish? How much? How often?

You have now big fish in your pond and you want to harvest all of them. How will you do it? What will you need?

When you drain your pond, how will you keep the baby fish alive?

If you cannot eat and sell all your big fish on the same day, how can you preserve and store part of them?

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