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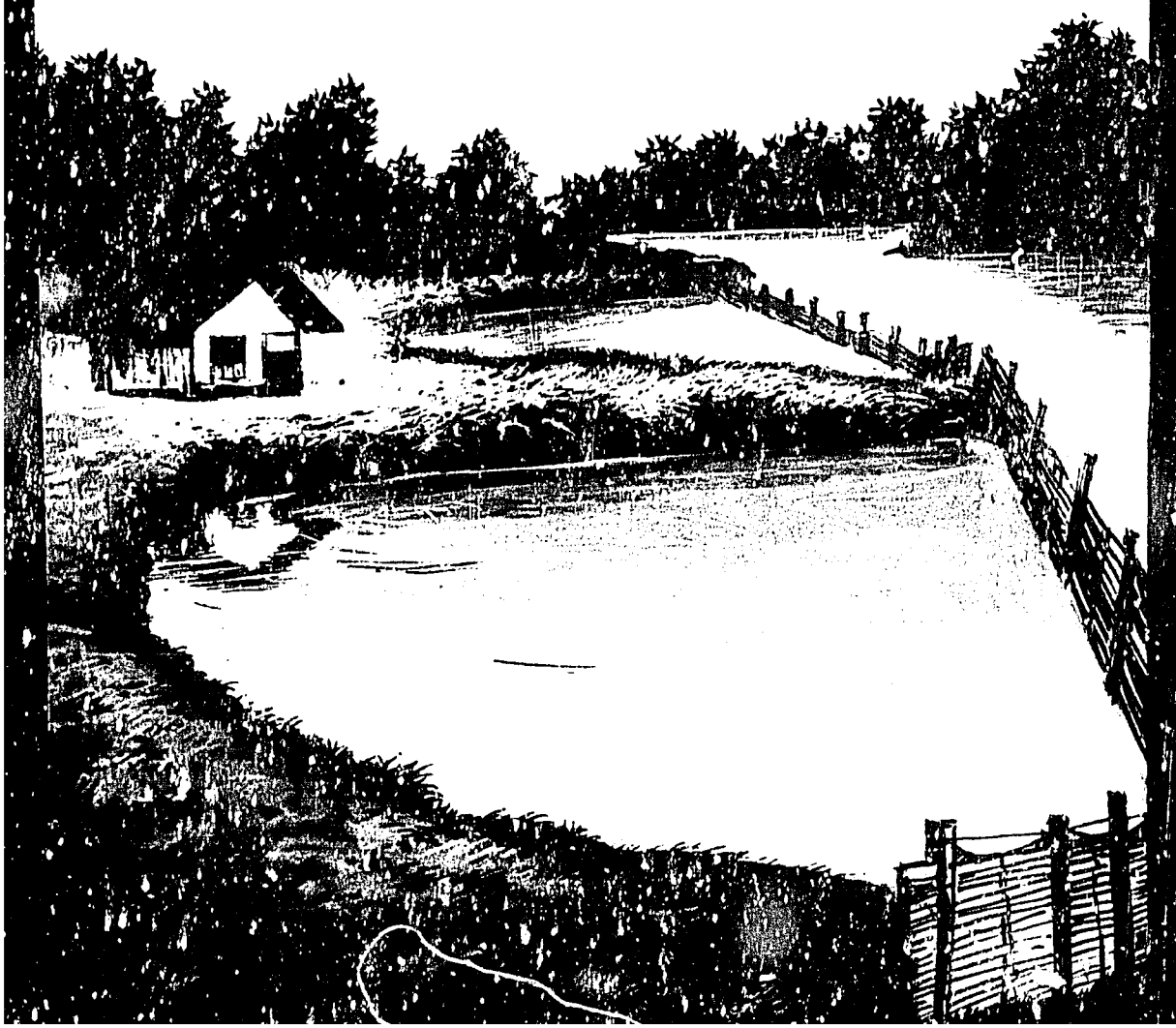
Growing Fish in Pen Systems

PN-ABF-178



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Growing Fish in Pen Systems

by

Barry A. Costa-Pierce
Rusydi
Apih Safari
Gelar Wira Atmadja

1989

Illustrated by: Trya Yudhantara and
Ovidio F. Espiritu, Jr.

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B.A. Costa-Pierce
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Published by the Institute of Ecology, Indonesian State Electric Company (IOE UNPAD-PLN), Bandung, Indonesia; and the International Center for Living Aquatic Resources Management, MC P.O. Box 1501, Makati, Metro Manila, Philippines, with funding from the International Bank for Reconstruction and Development.

Printed in Manila, Philippines

Costa-Pierce, B.A., Rusydi, A. Safari and G.W. Atmadja. 1989. Growing fish in pen systems. ICLARM Education Series 9, 40 p. Institute of Ecology, Indonesian State Electric Company (IOE UNPAD-PLN), Bandung Indonesia, and International Center for Living Aquatic Resources Management, Manila, Philippines.

ISSN 0116-5720
ISBN 971-1022-74-5

ICLARM Contribution No. 574

The techniques described in this book were developed in the Saguling and Cirata Reservoirs in Bandung, Indonesia. They can easily be adapted to other locations.

Produced by:

The Aquaculture and Fisheries Development Project
for the Resettlement of Communities from the
Saguling and Cirata Dam Regions

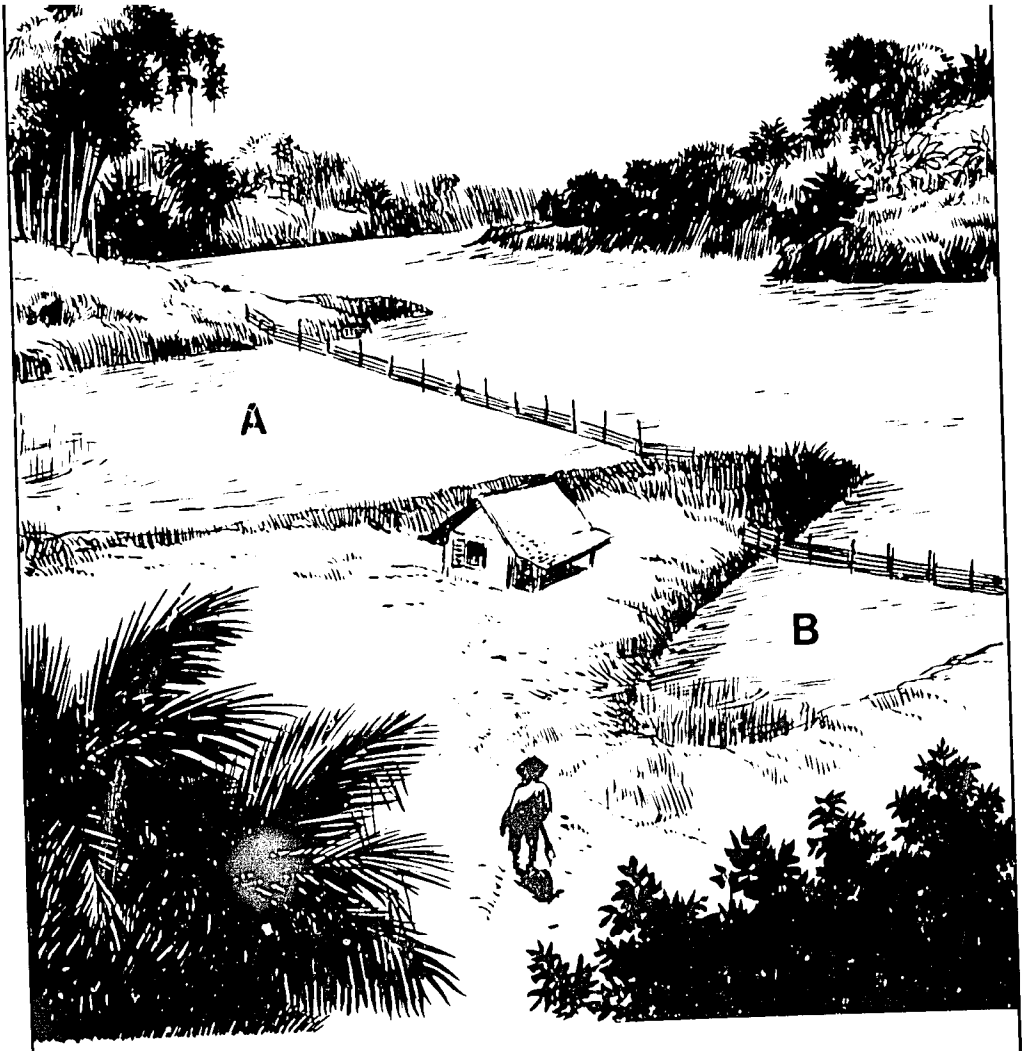
A cooperation between the Institute of Ecology, Indonesian State Electric Company (IOE UNPAD-PLN), Bandung, Indonesia; and the International Center for Living Aquatic Resources Management (ICLARM), Manila Philippines, with funding from the International Bank for Reconstruction and Development.

This book is also available in Sundanese (West Java, Indonesia).

Units of measure

kg	=	kilogram
g	=	gram
m	=	meter
cm	=	centimeter
m^2	=	square meter
l	=	liter

A pen system is a way of growing fish in a bay fenced off from a lake or reservoir, usually by a bamboo fence.

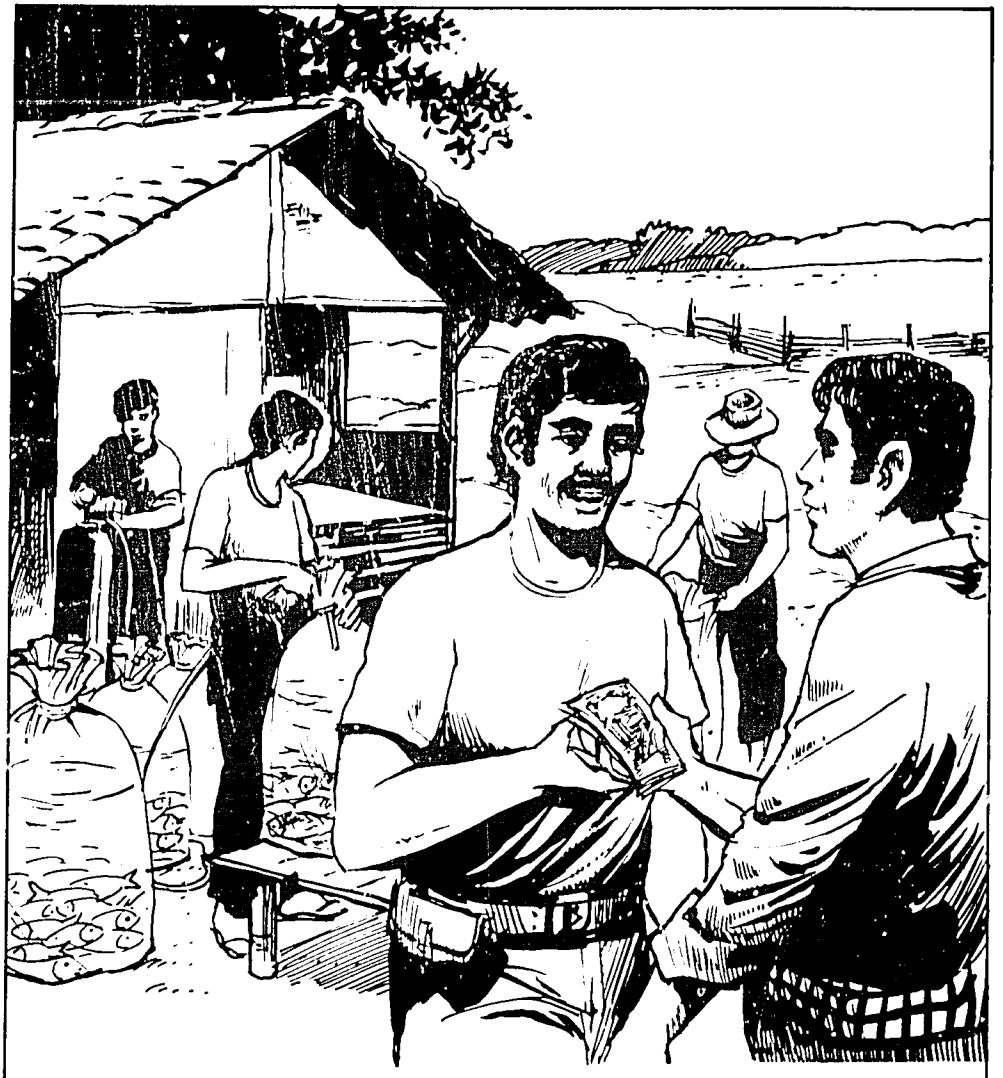


The pen can be large (**A**) or narrow (**B**), depending on the conditions of the bay.

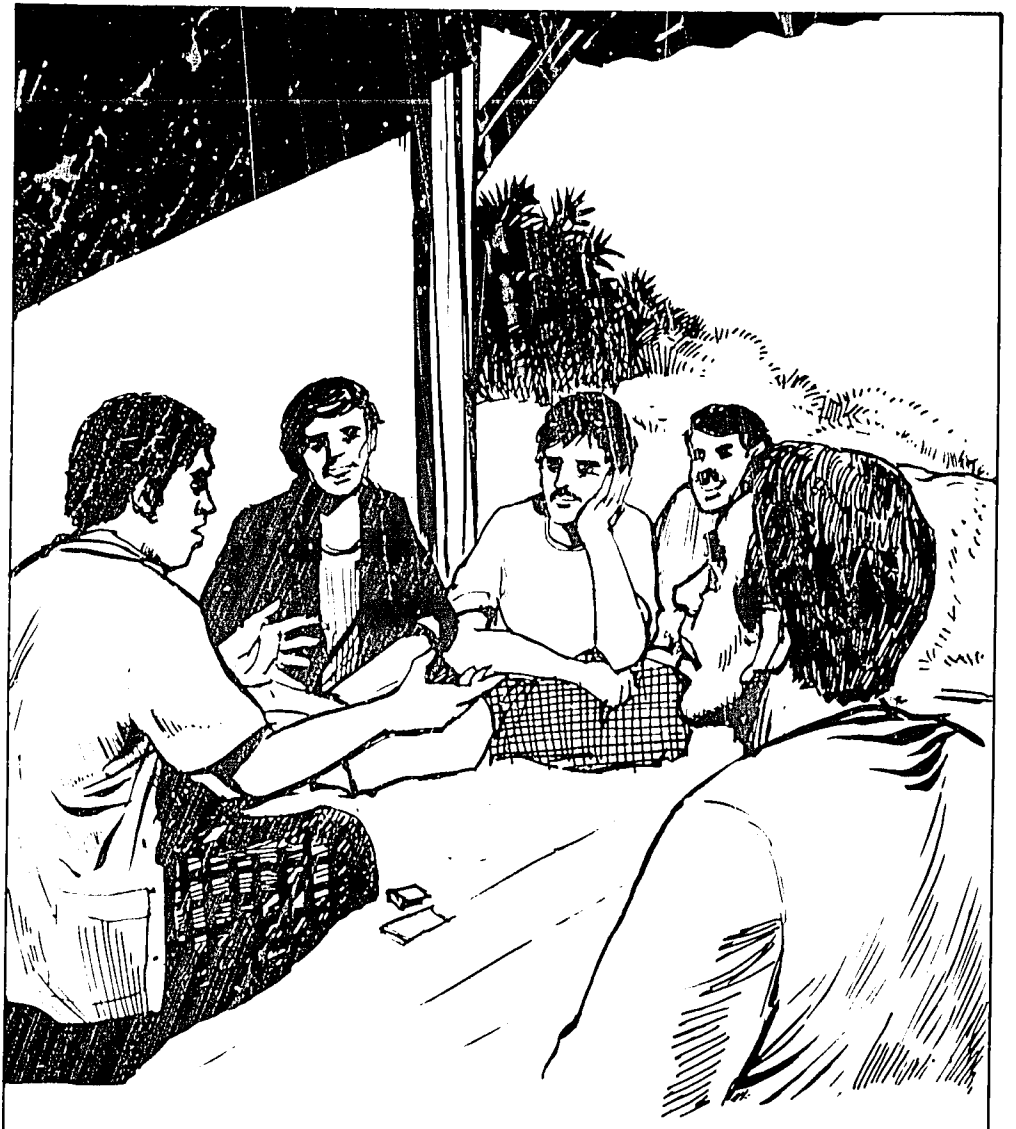
Fish may be harvested from the pen system by:

- casting a net from a raft
- using a pole and line
- using throw nets

Harvesting fish is easy when the water level drops.



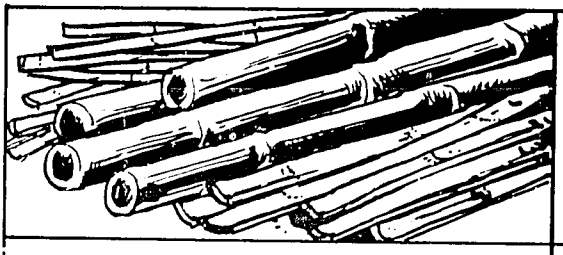
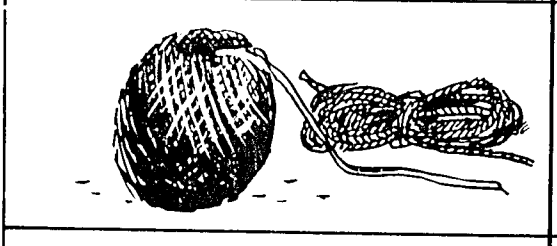
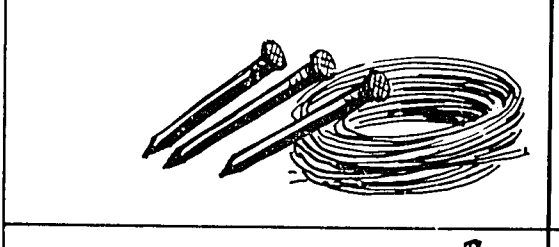
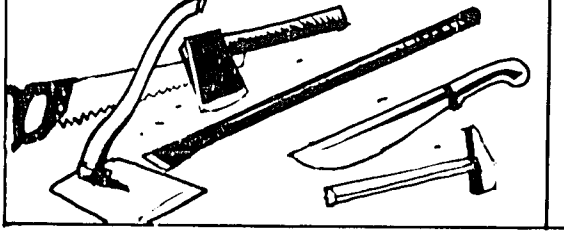
The fish can be sold or cooked for family consumption. Fish is a rich and healthful protein source.



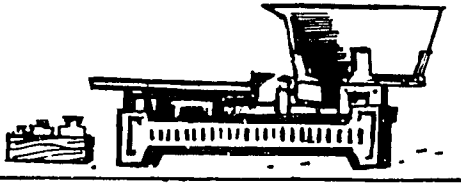
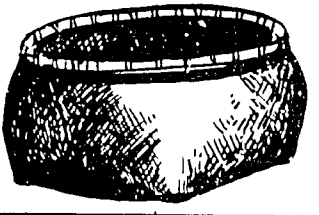
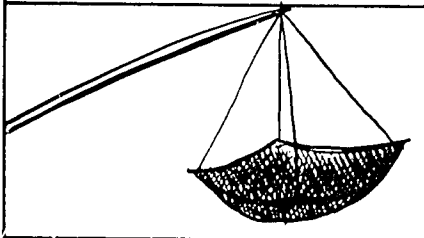
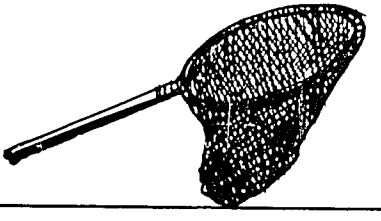
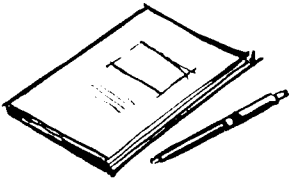
To raise enough money to construct a pen, farmers can organize themselves into a cooperative. They must hold meetings to pool their ideas, manpower and capital.

Contact a field or extension worker, the fisheries agency or its nearest office, and request information on:

- aquaculture permits
- aquaculture techniques
- aquaculture management

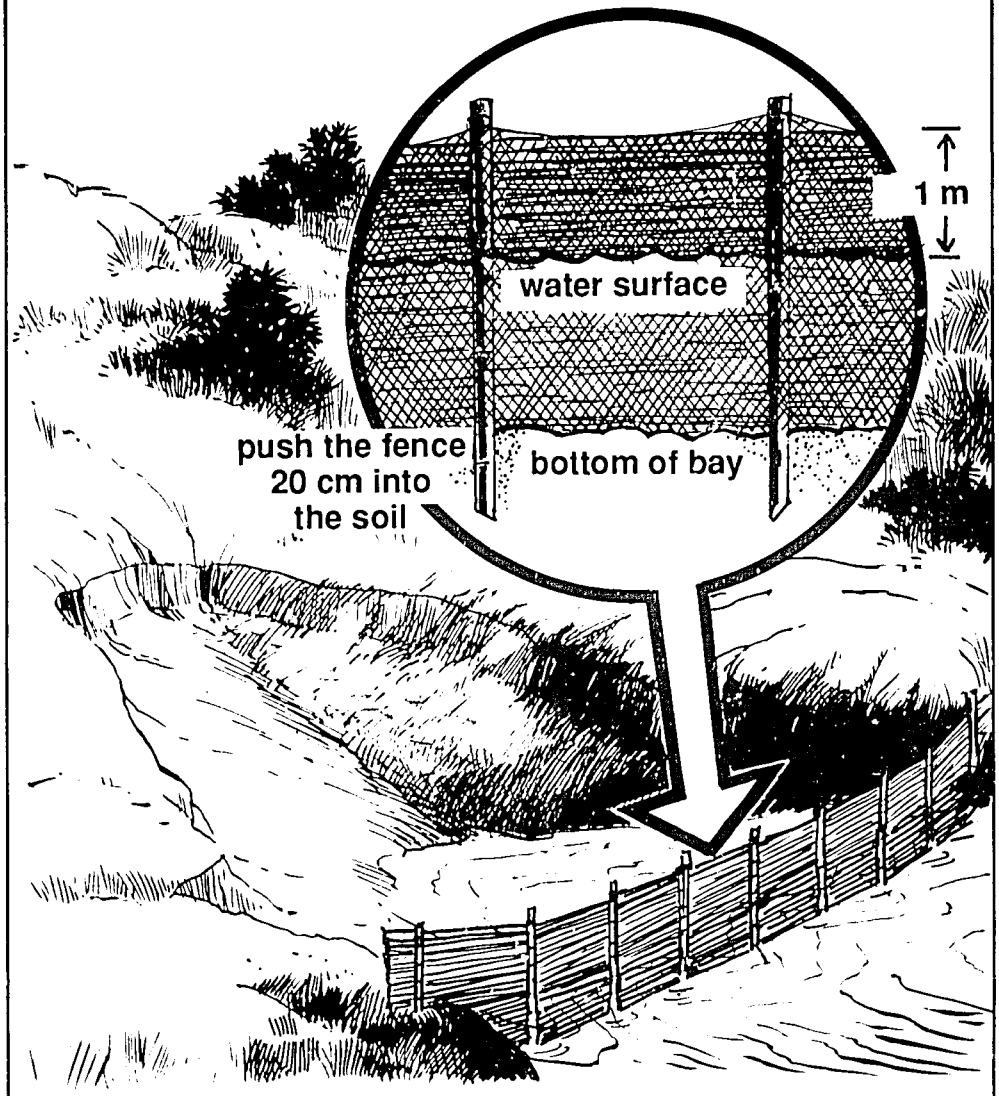
	bamboo
	plastic rope or black fiber rope from sugar palms
	nails and wire
	nylon netting and split bamboo
	carpenters' tools and a hoe

The tools and materials needed to construct a pen system

	a scale
	a basket or pail
	a big hand net
	a small hand net
	a notebook and ballpen

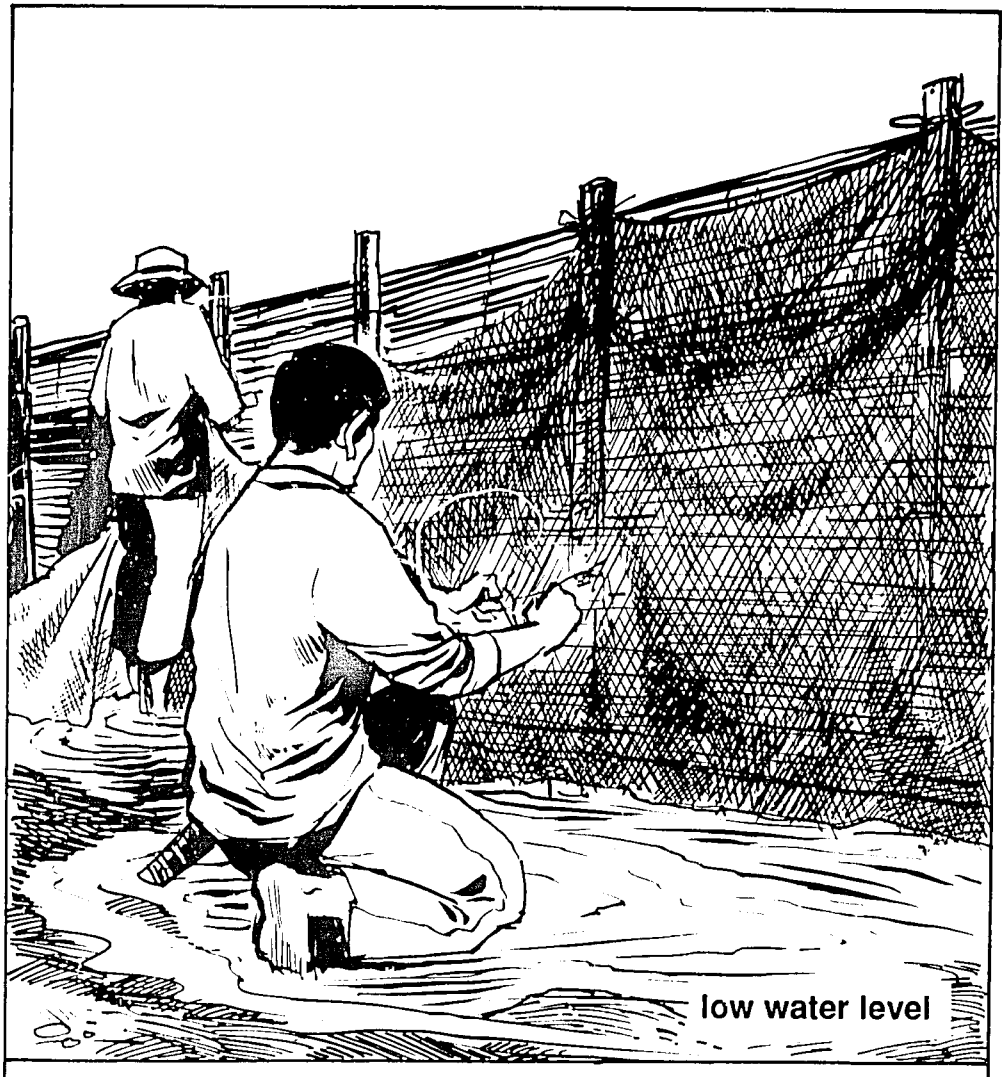
Other equipment needed for pen system activities

A good time to start constructing a pen system is when the water level is low.



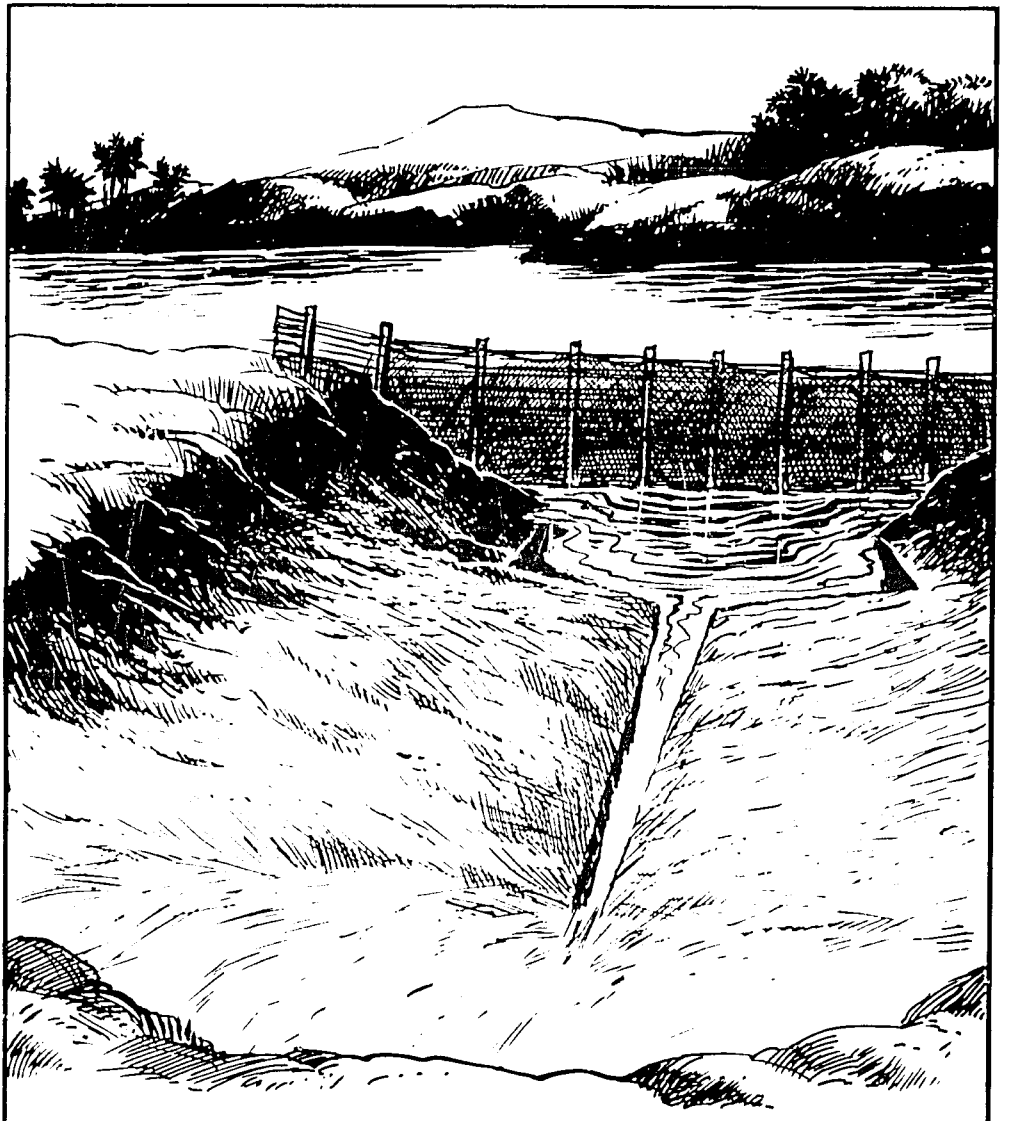
How to construct the fence

1. Push the fence poles at least 20 cm into the pond bottom.
2. Put the fence no less than 1 m above the highest water level.

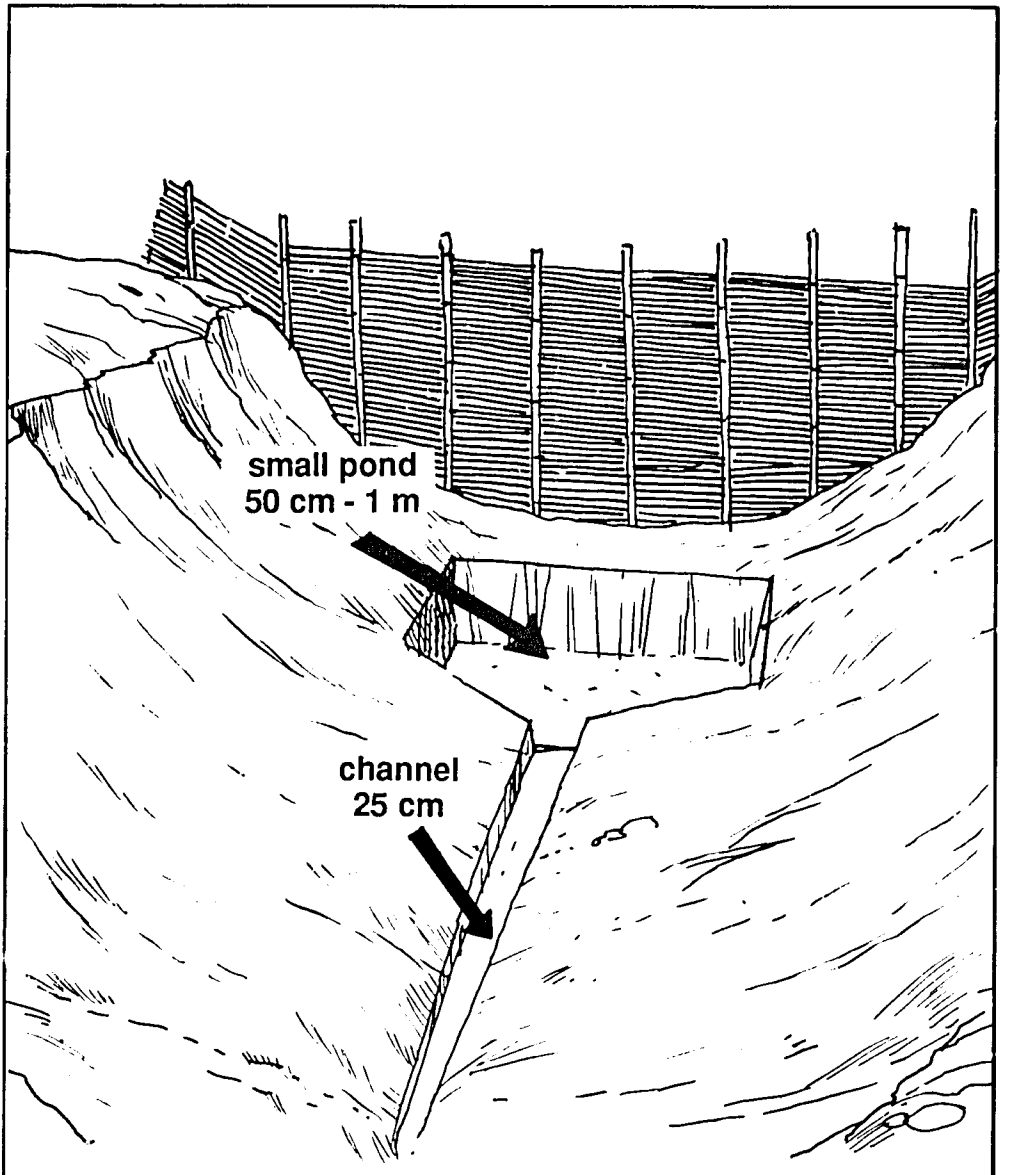


Weave a fine mesh net into the bamboo fence to prevent fish from escaping. Use enough net to cover the fence from top to bottom.

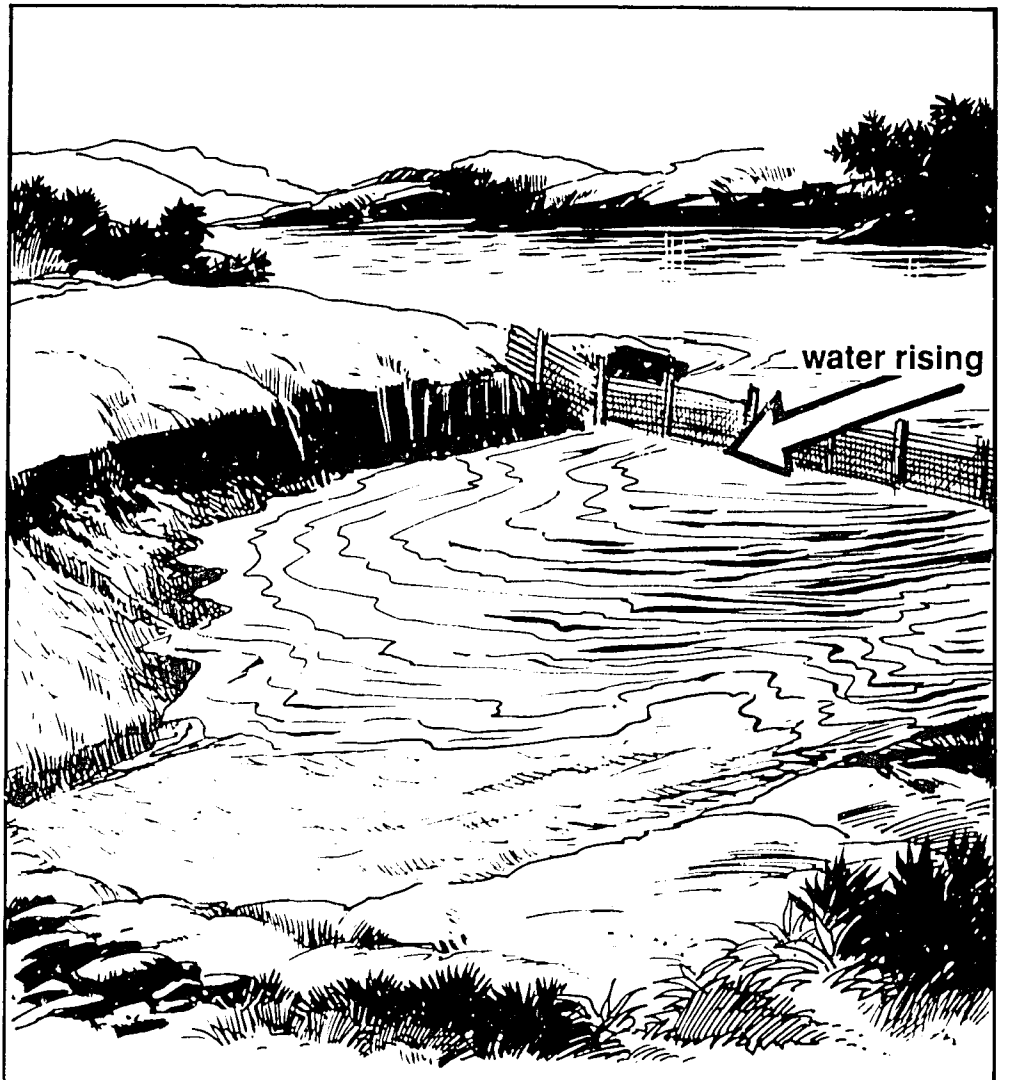
At the bottom of the pen, dig a small pond and a narrow channel to make fish harvests easy.



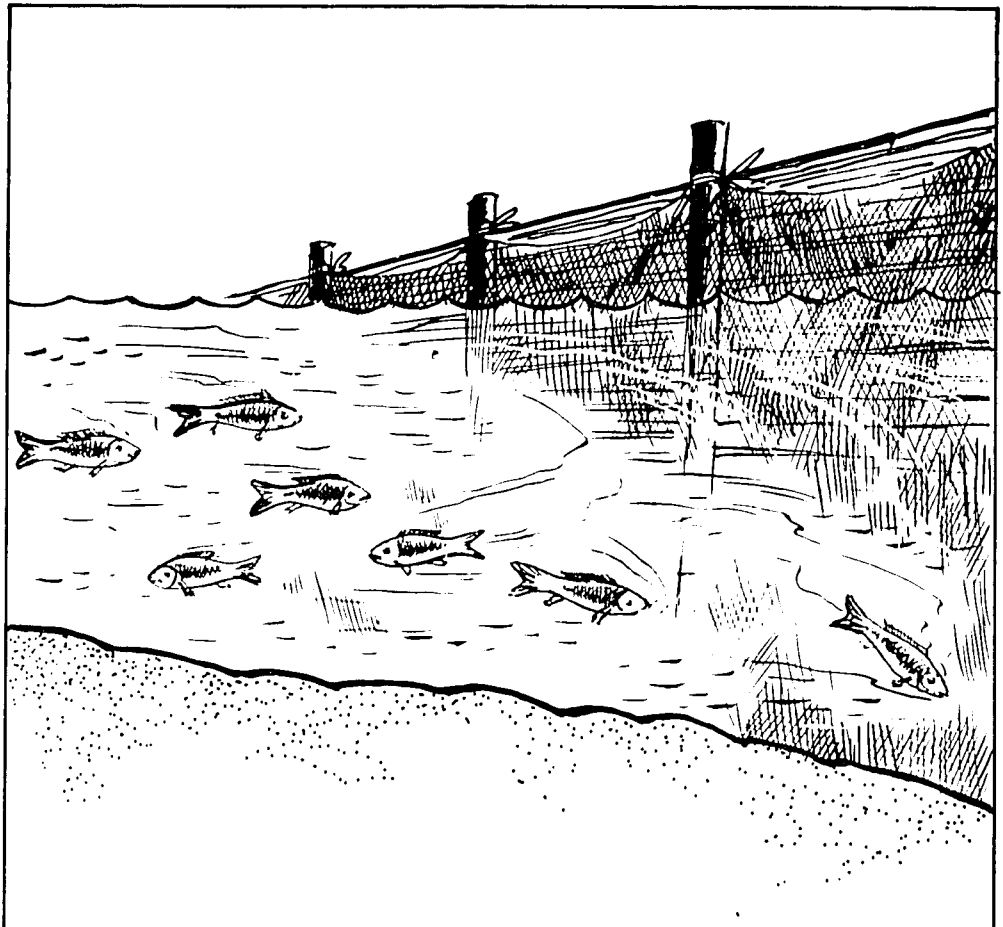
During low water levels, the water will settle into the small pond and channel so that fish may live.



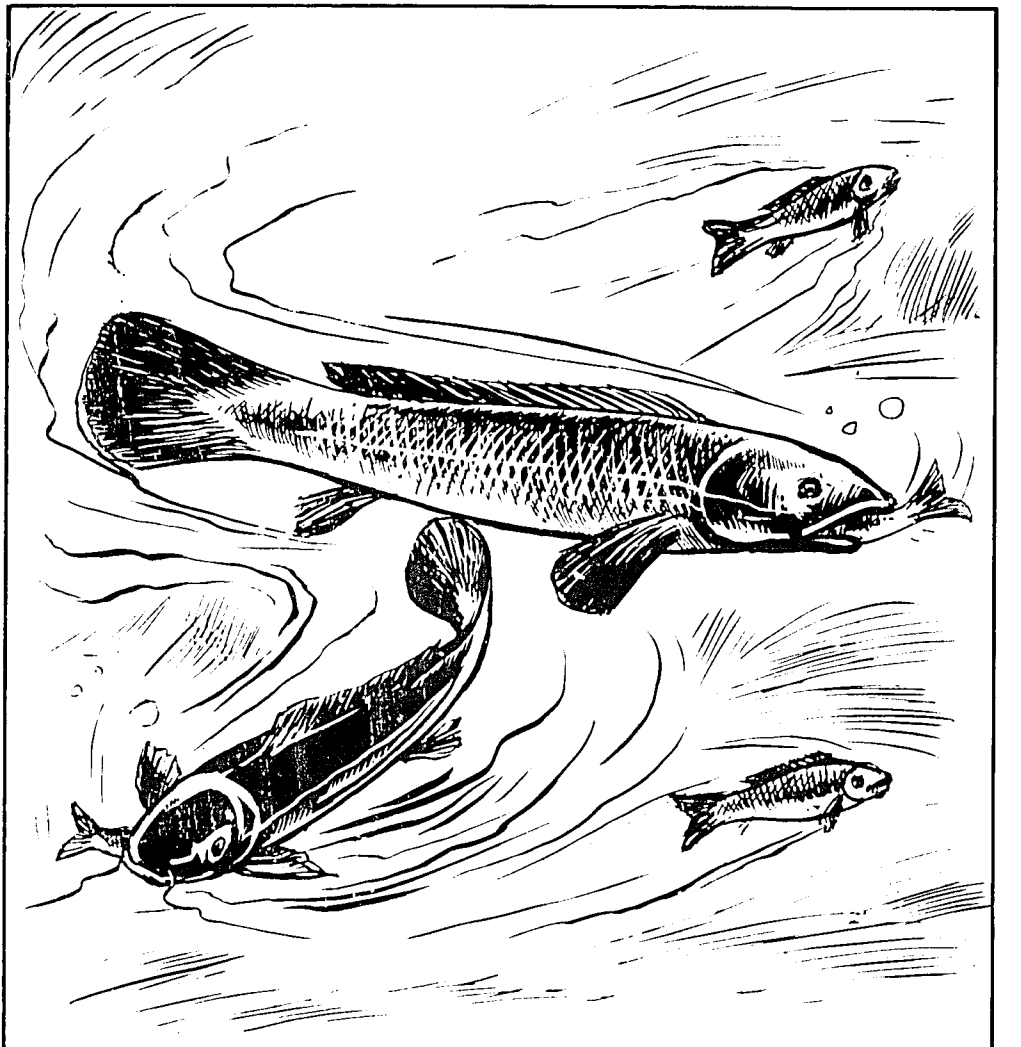
The small pond and channel should gradually slope from 25 cm to 50 cm-1 m deep. The width depends on the width of the fenced bay.



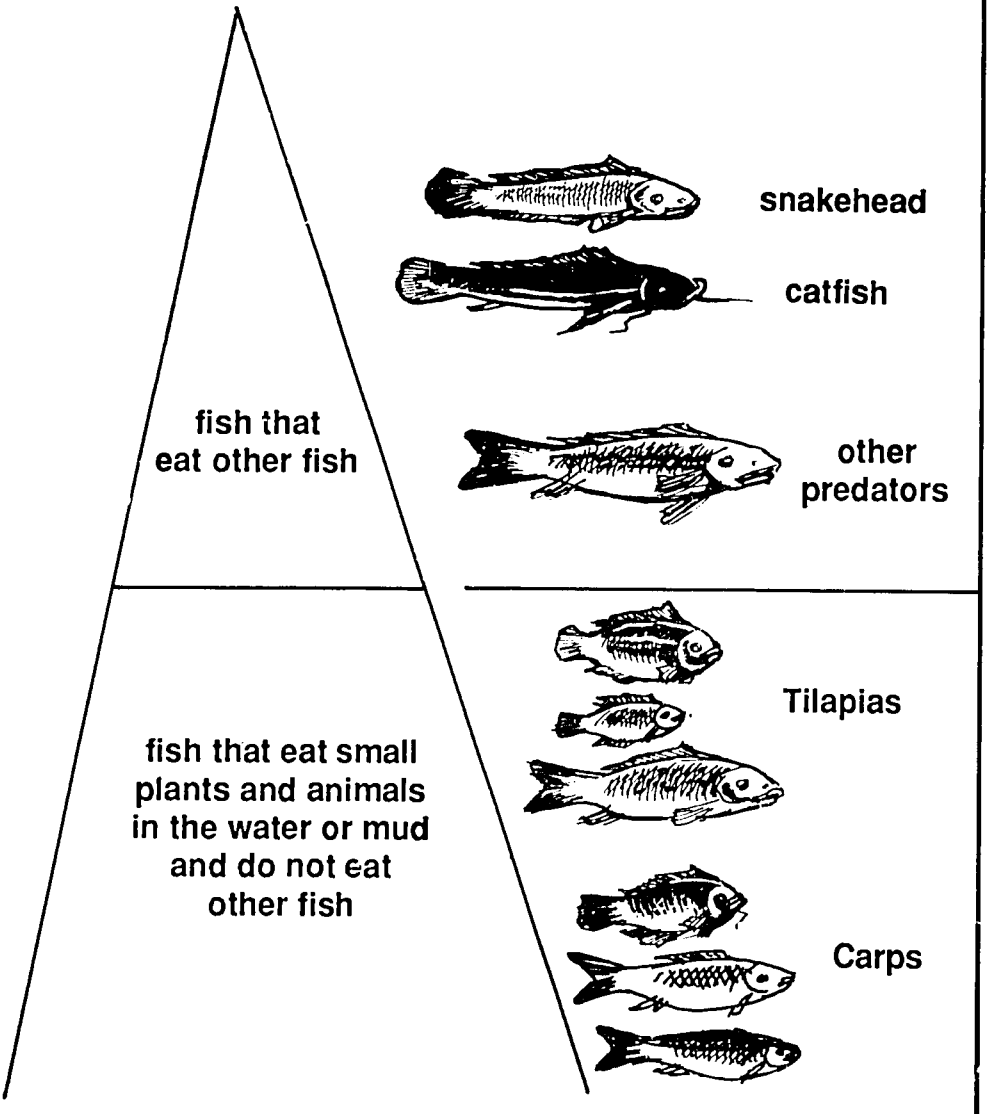
After constructing the fence, small pond and channel, wait for the water to rise. To know when a high water level will occur, inquire from the local fisheries agency.



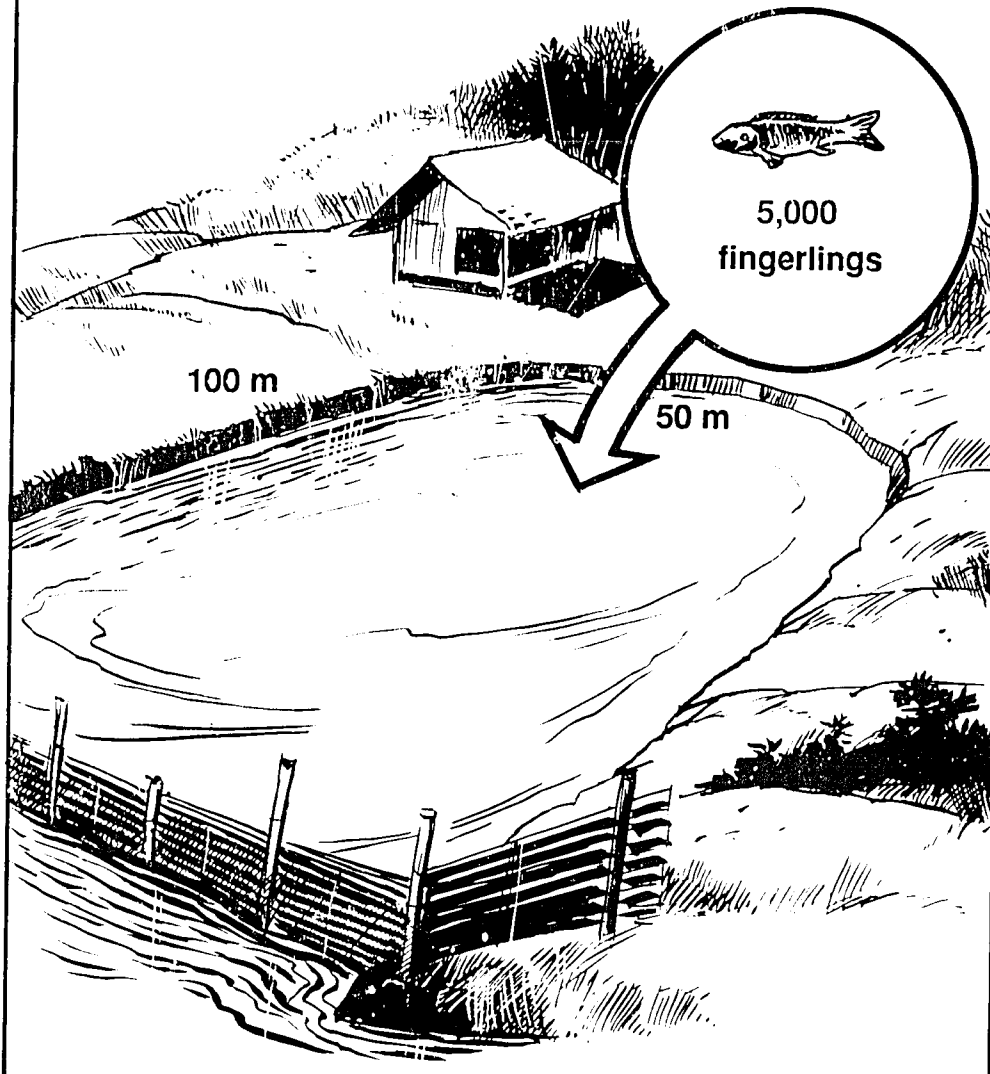
When the water level rises, check the fence and net for holes where fish could escape.



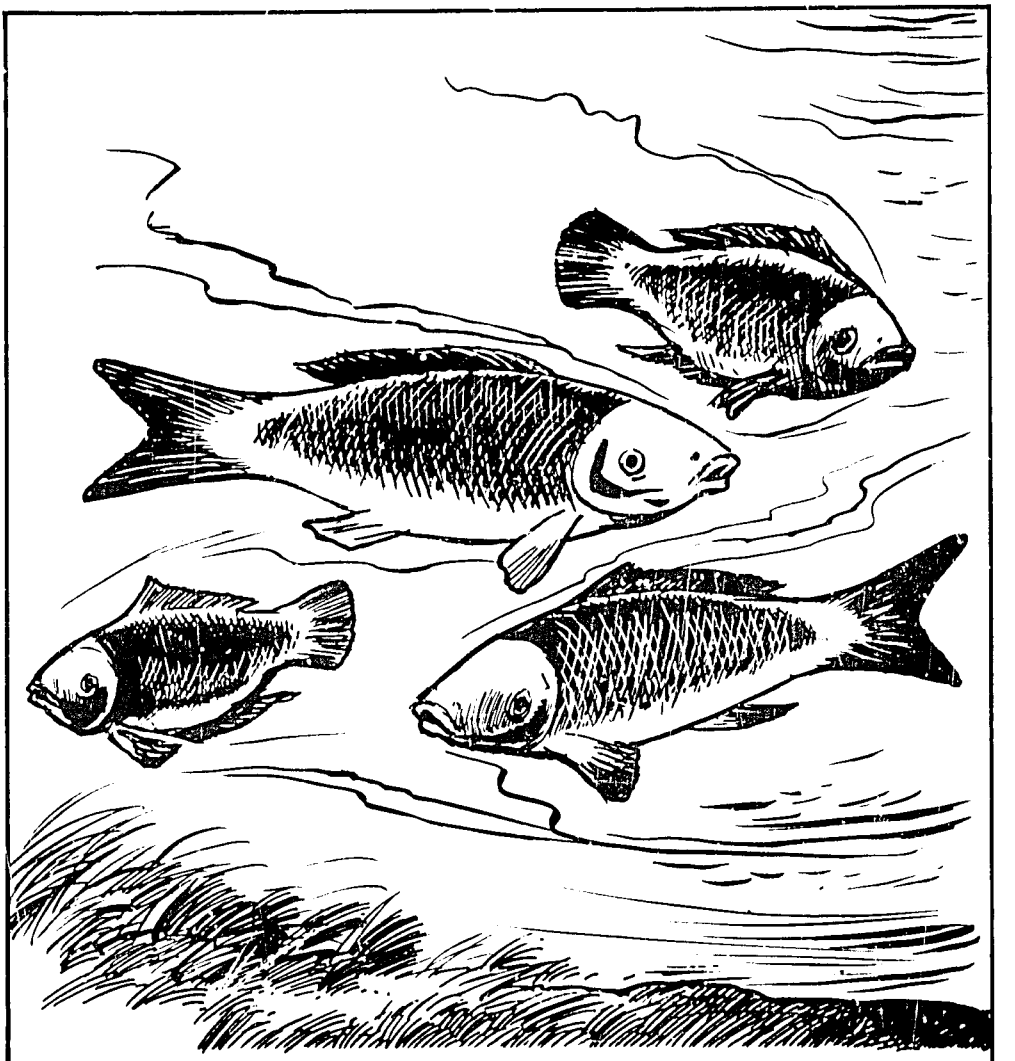
Remove fish predators, such as snakehead and catfish.



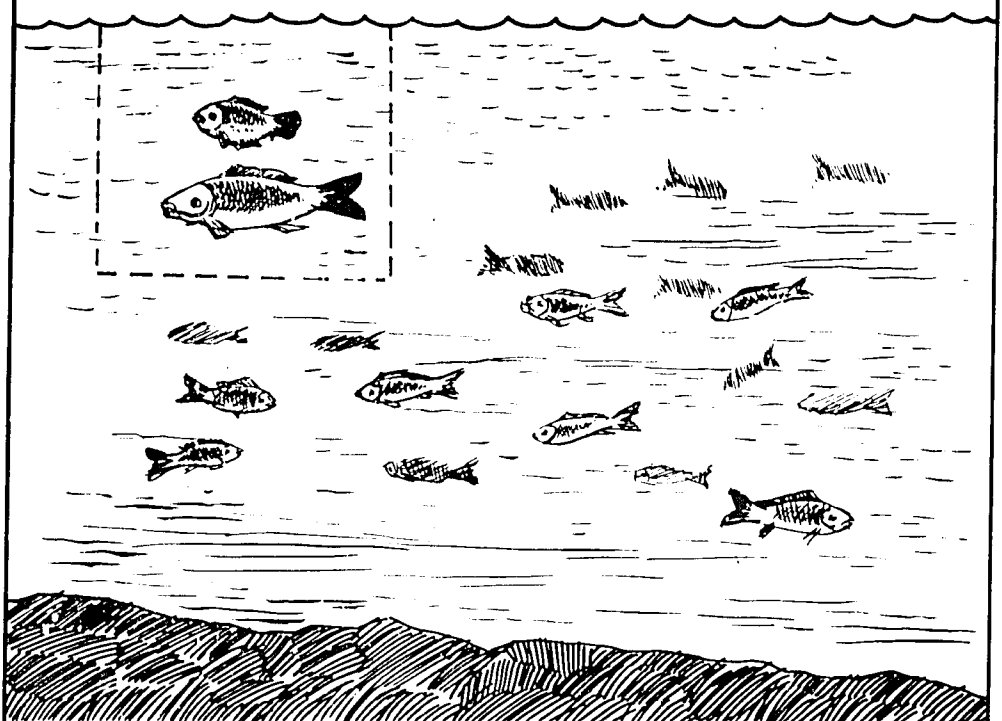
Note the different kinds of fish. You will harvest more fish from your pen if you stock fish like tilapias and carps.



A 100 X 50 m or 500 m^2 pen system is sufficient for 5,000 fish of fingerling size (5-10 g).

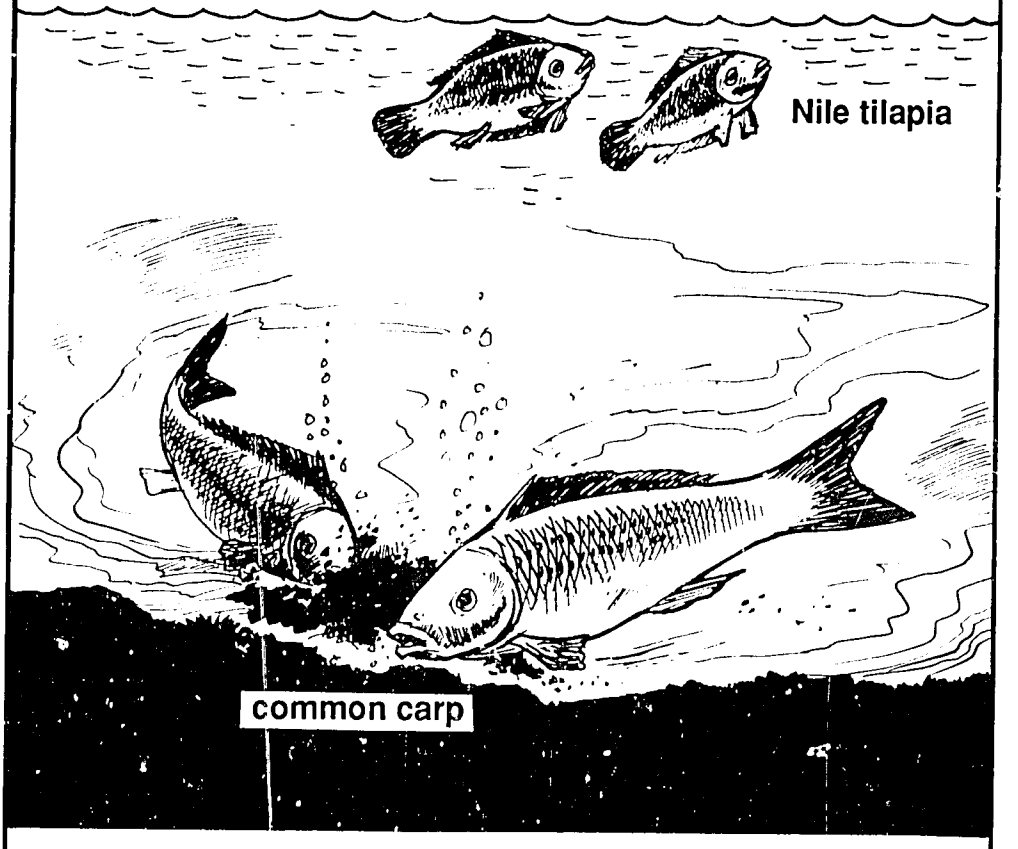


Different tilapias and carps can be stocked together.



To grow common carp and Nile tilapia together, stock one common carp and one Nile tilapia for every 2 m^2. Therefore, a total width of 100 X 50 m or 5,000 m^2 is sufficient to grow 2,500 common carp and 2,500 Nile tilapia.

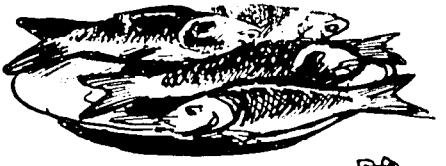
Feeding habits



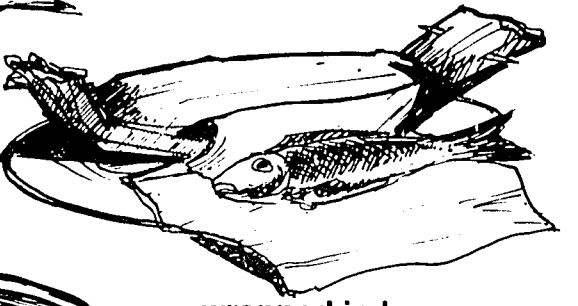
Nile tilapia feed mainly in the water column or at the surface; common carp feed at the bottom.

Large Nile tilapia and Java tilapia can be gradually harvested with fishing gear.

Cooked tilapia is nutritious and delicious with rice.

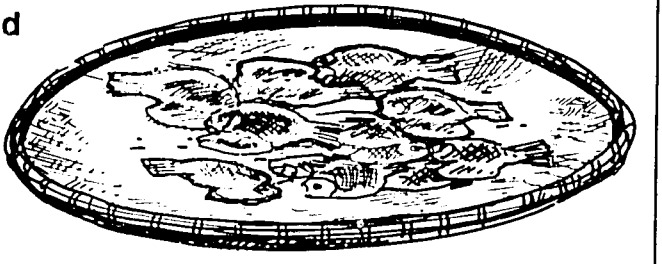


fried



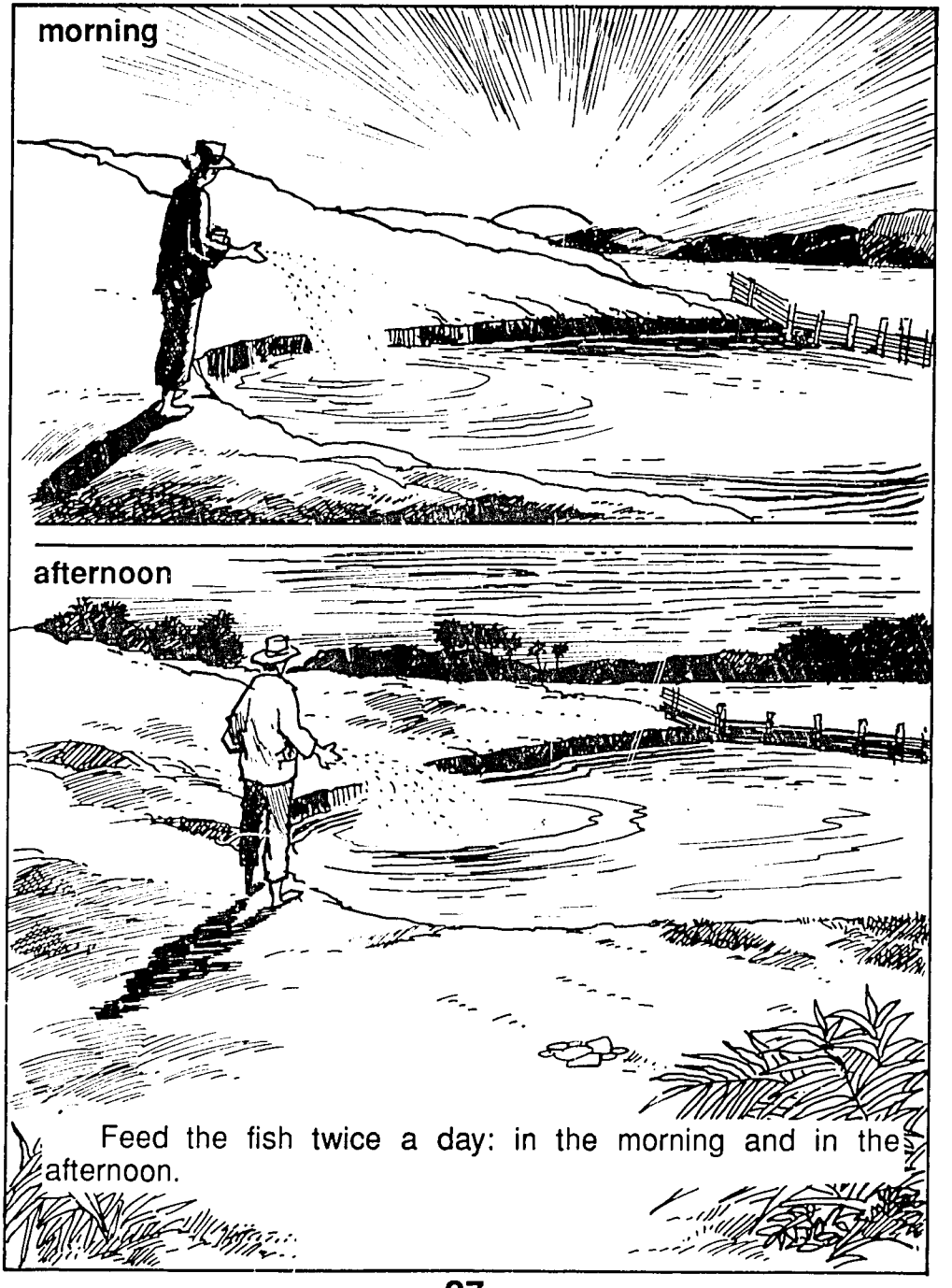
wrapped in banana leaves and roasted

fermented



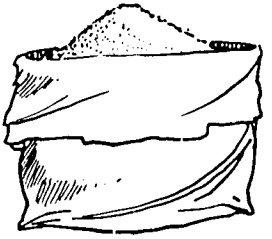
spicy-dried or salted

There are different ways of cooking tilapias and carps to meet every taste.



Feed the fish twice a day: in the morning and in the afternoon.

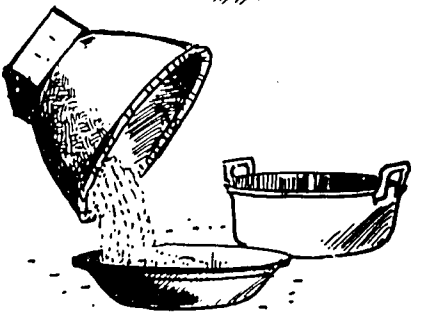
Use fish feeds which are cheap and easy to obtain.



rice bran

green leaves (cassava, taro, water plants, etc.)

pit compost from water plants



food wastes (rice, vegetables, soybean cake wastes, etc.)

Water hyacinth (or other aquatic weeds) can also be used as fish feed.

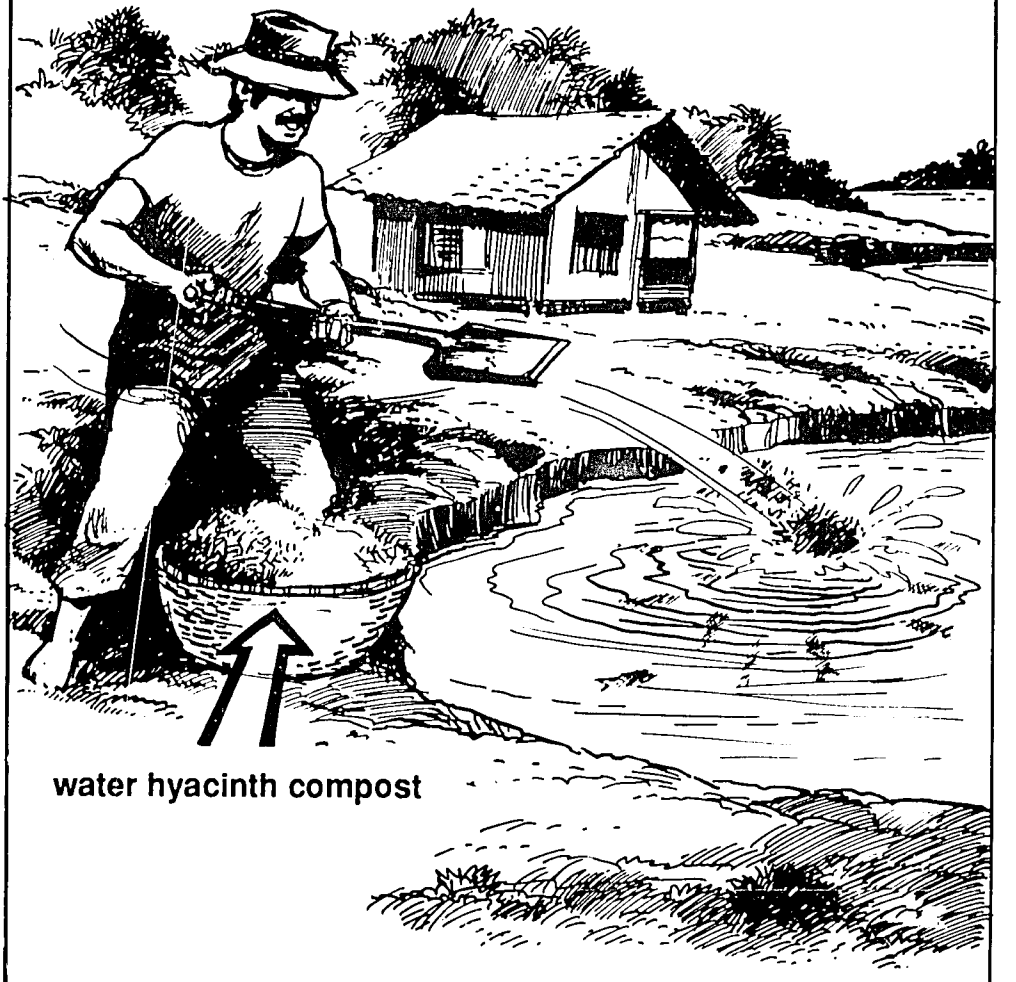
Harvest the water hyacinth.

Chop the water hyacinth into 3-5 cm pieces.

Put the chopped weeds in a 0.5 m deep, 1 m² pit.

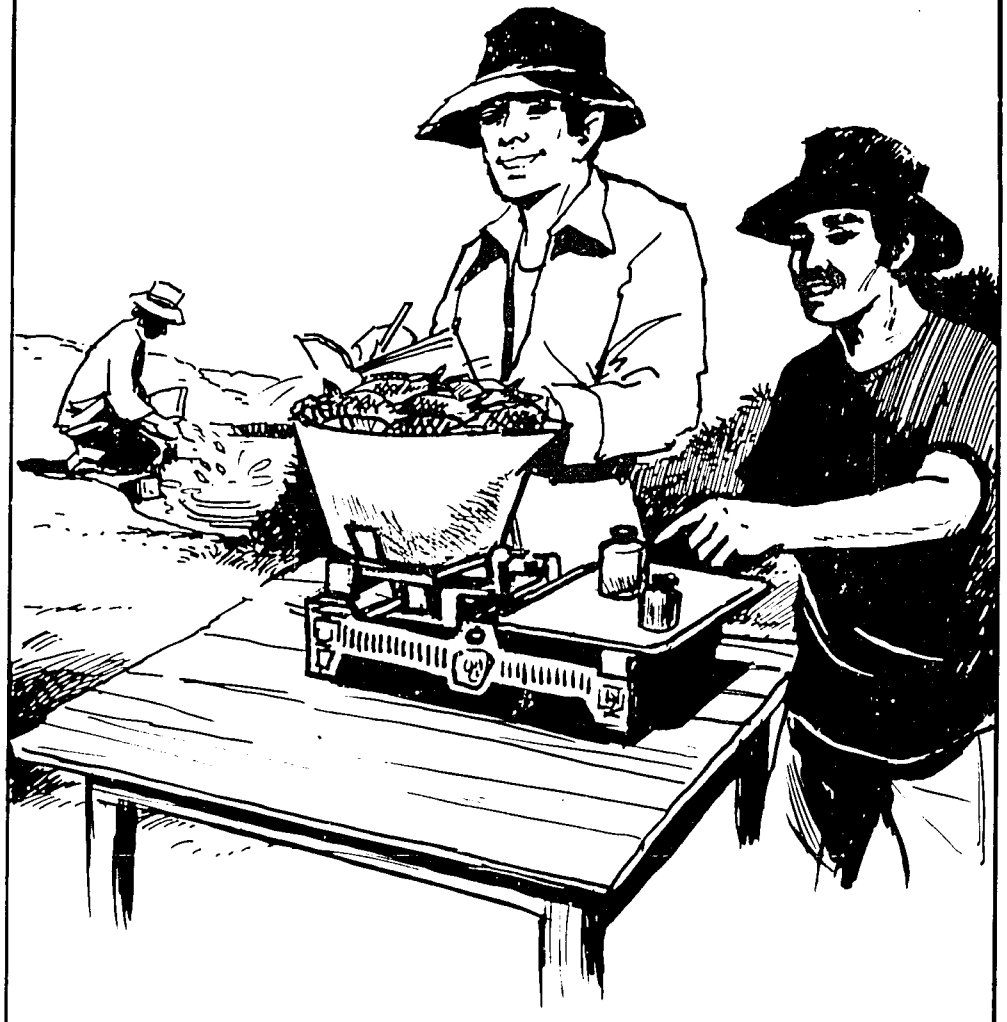
After 1 week, the weeds will have compressed down; refill the pit with chopped weeds.

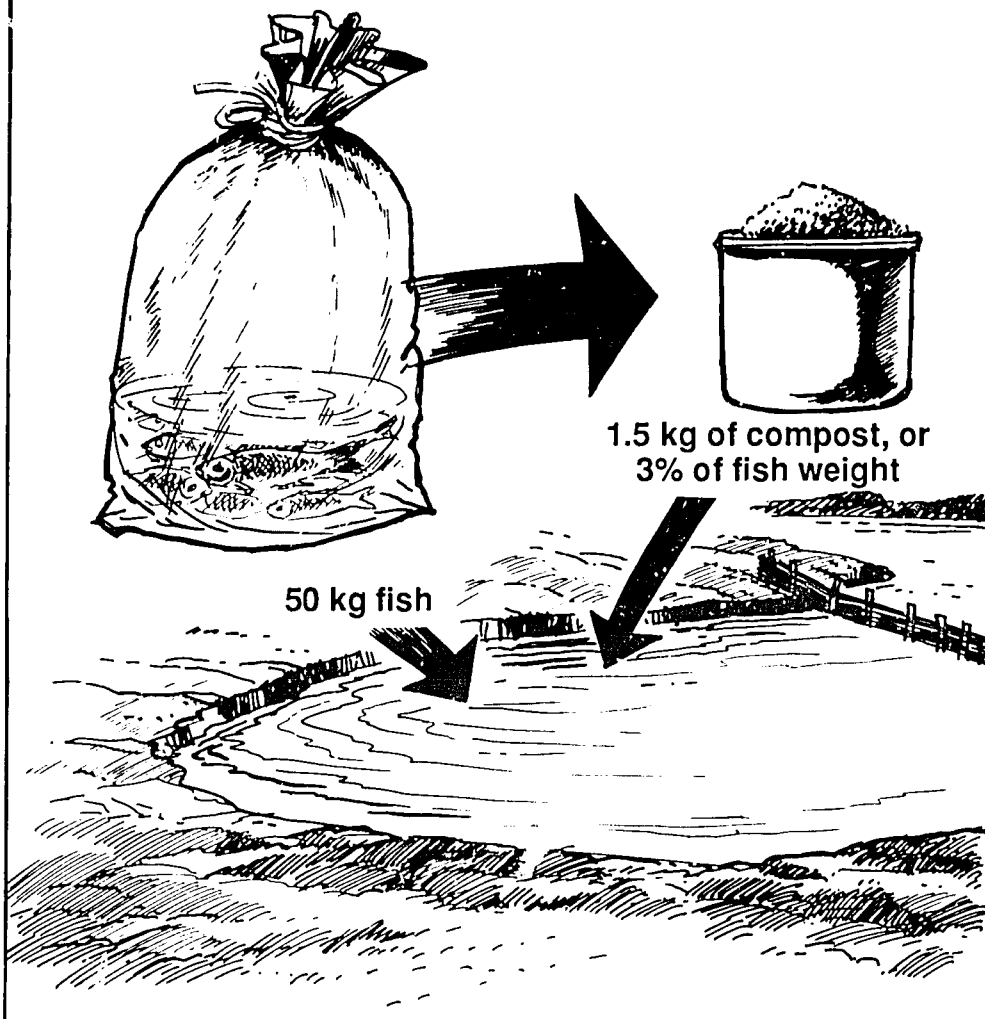
Cover the pit with soil and use the material as fish food after 30 days.



Fish may be fed with compost from water hyacinth. Feed 3% of fish weight per day (see p. 33).

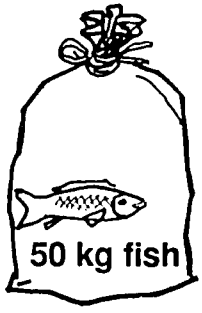
Carefully weigh the harvested fish. Use a notebook to record the weight and number of fish.



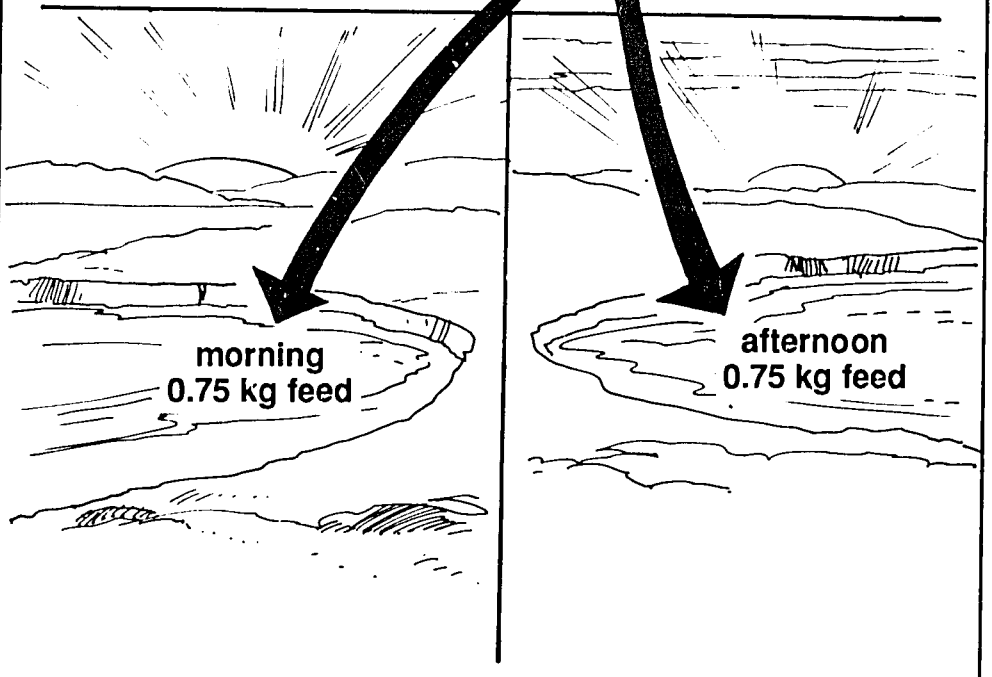


For 50 kg of fish stocked into the pen, give 1.5 kg of compost feed per day (feed = 3% of fish weight).

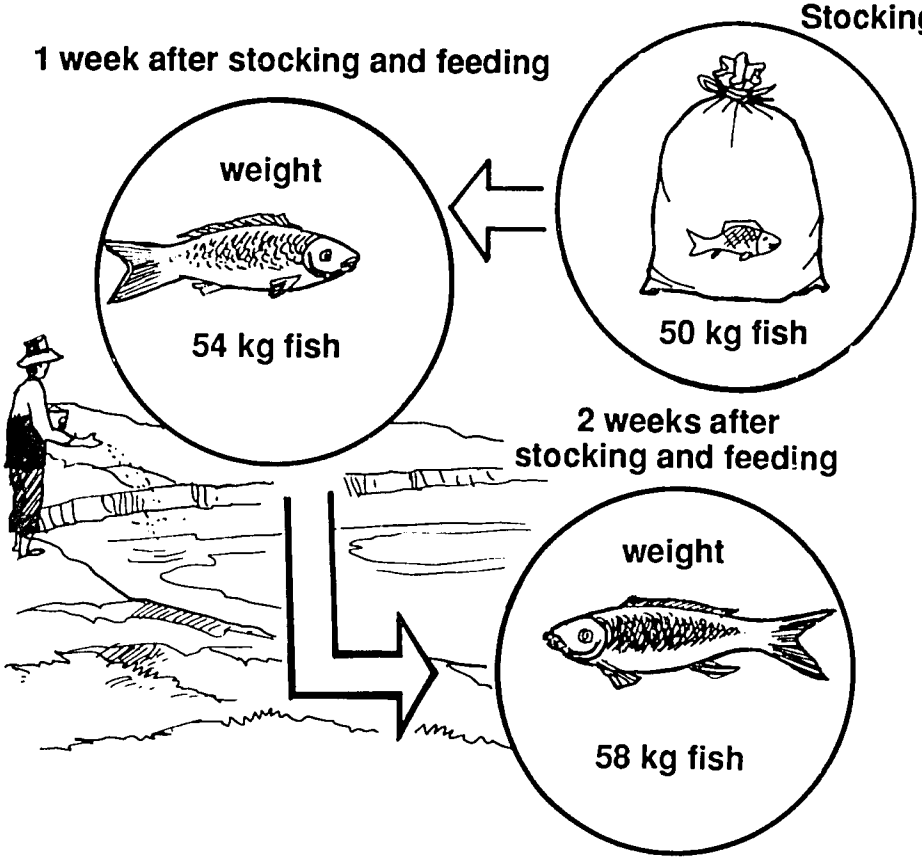
For example:



1.5 kg compost



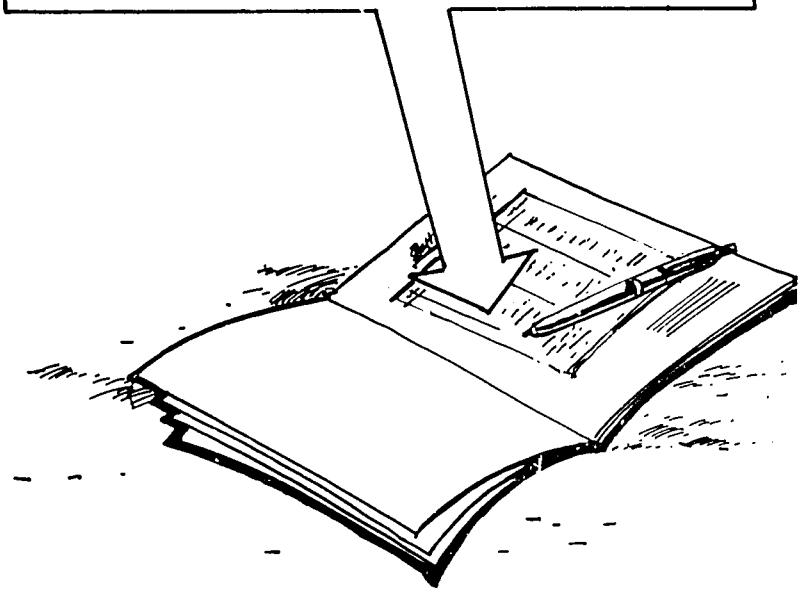
Feed the daily ration in two equal portions - one in the morning, and one in the afternoon.



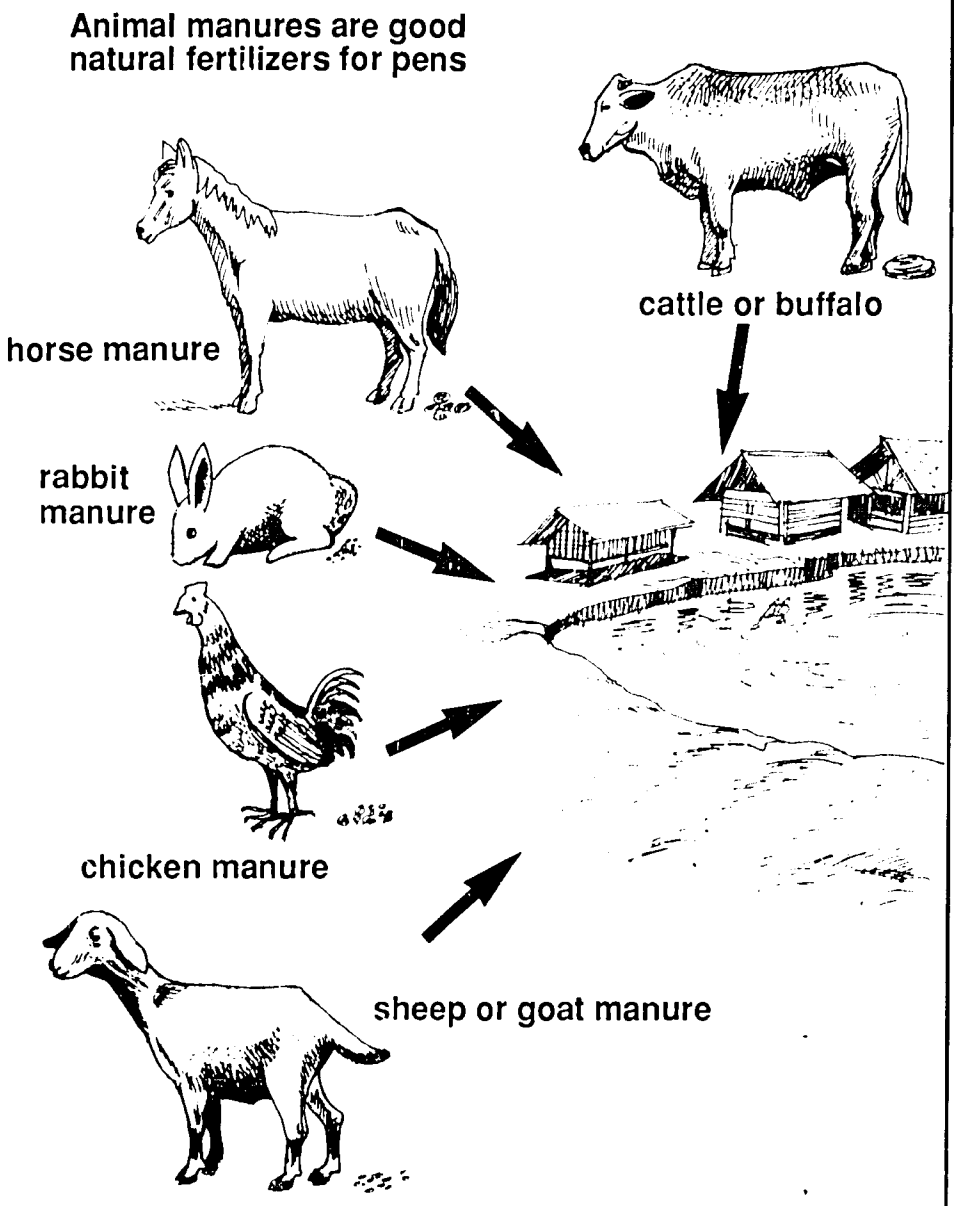
- fish weight 1 week after stocking and feeding = 54 kg
- daily amount of feed to be fed: 0.03 (3%) X 54 kg = 1.6 kg
- fish weight 2 weeks after stocking and feeding = 58 kg
- daily amount of feed to be fed: 0.03 (3%) X 58 kg = 1.7 kg

Weekly calculate the additicnal weight of feed to be given to fish from the increased fish weight.

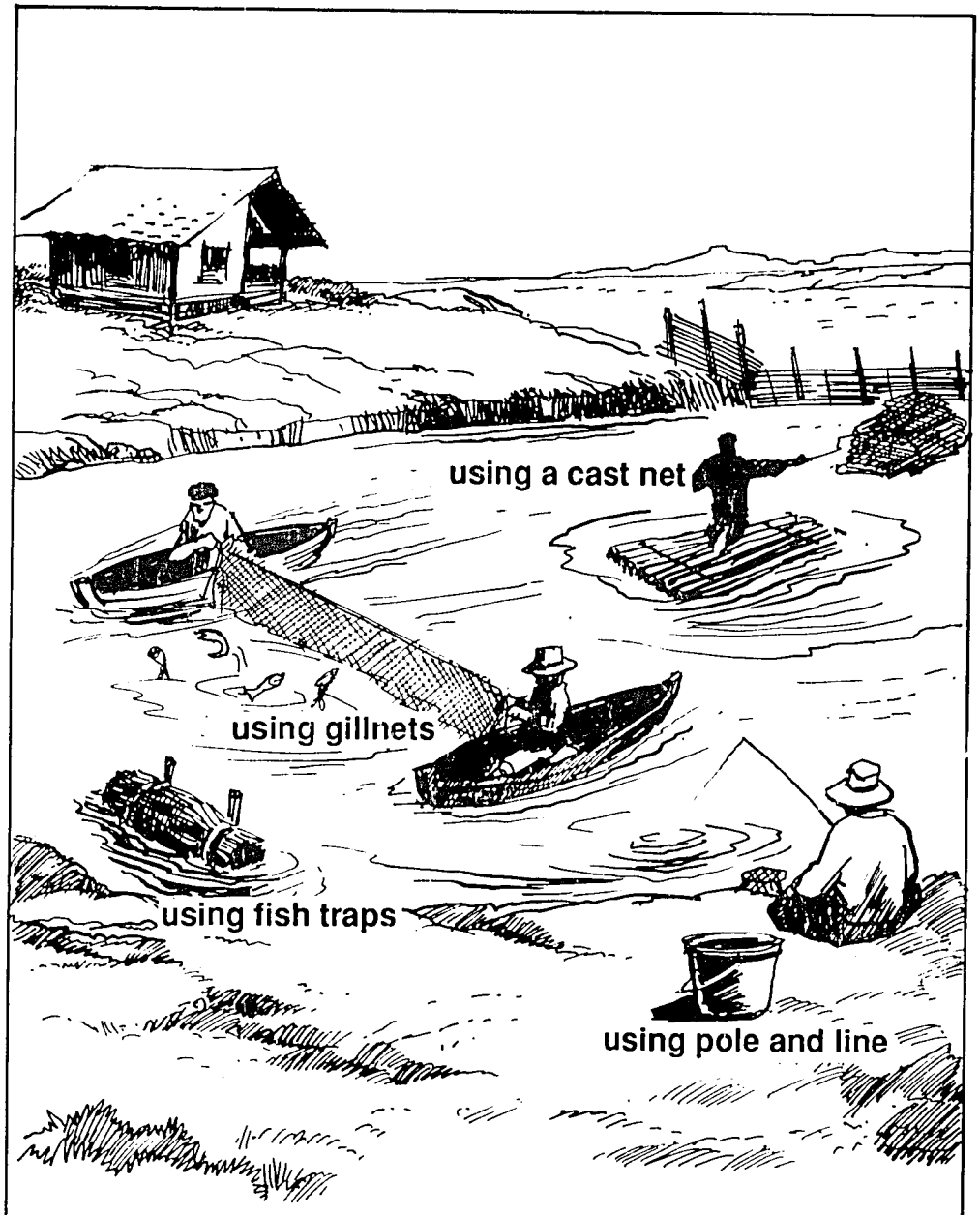
week	fish weight (kg)	weight of feed (kg)
0 (stocking)	50	1.5
1	54	1.6
2	58	1.7
3	60	1.8
4	62	1.9
5	64	2.0
6	66	2.1
7	68	2.2
8	70	2.3
	72	2.4



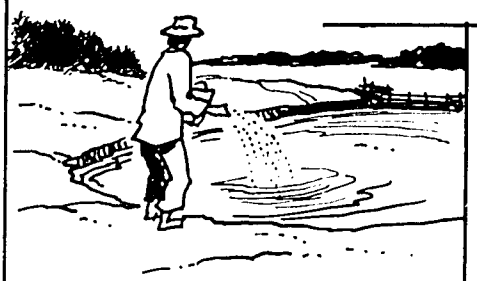
Carefully record feeding activities in a notebook.



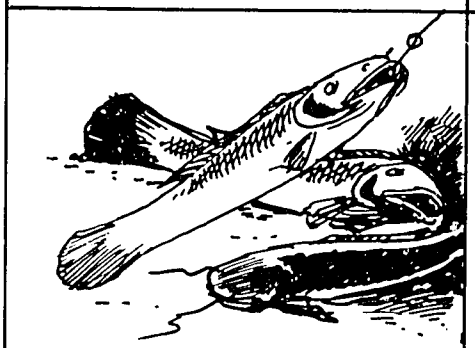
The manure of cattle or buffalo, horses, rabbits, chickens, sheep and goats are good fertilizers for fish cultured in pen systems.



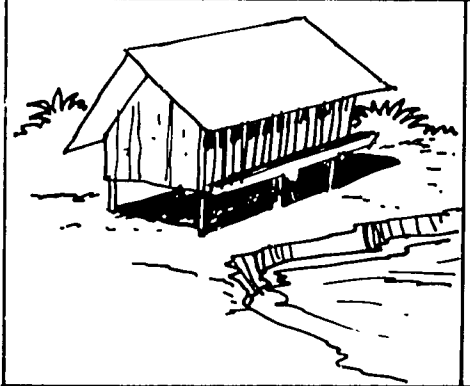
Various ways of harvesting fish in a pen system during high water levels.



Every day, feed the fish morning and afternoon.



Routinely capture predator fish and large fish.



Use animal manure as fertilizer.

For a plentiful harvest, take good care of your stocked fish.

Harvesting fish seasonally is advantageous.

Stocking fish in a pen system generates income and nutritious food for the family.