NATURAL RESOURCES SYSTEMS PROGRAMME

PROJECT REPORT[1]

DFID Project Number

R8334

Report Title

Western Orissa Rural Livelihoods Project (WORLP) Better Practice Guidelines. Part 3. Annex E3 of the Final Technical Report of projects R8334.

Report Authors

Copley, K., Haylor, G., Savage, W. and Tripathi, S.D. (eds)

Organisation

NACA-STREAM

Date

2005

NRSP Production System

High Potential

[1] This document is an output from projects funded by the UK Department for International Development (DFID) for the benefit of developing countries. The views expressed are not necessarily those of DFID.

Annex E3

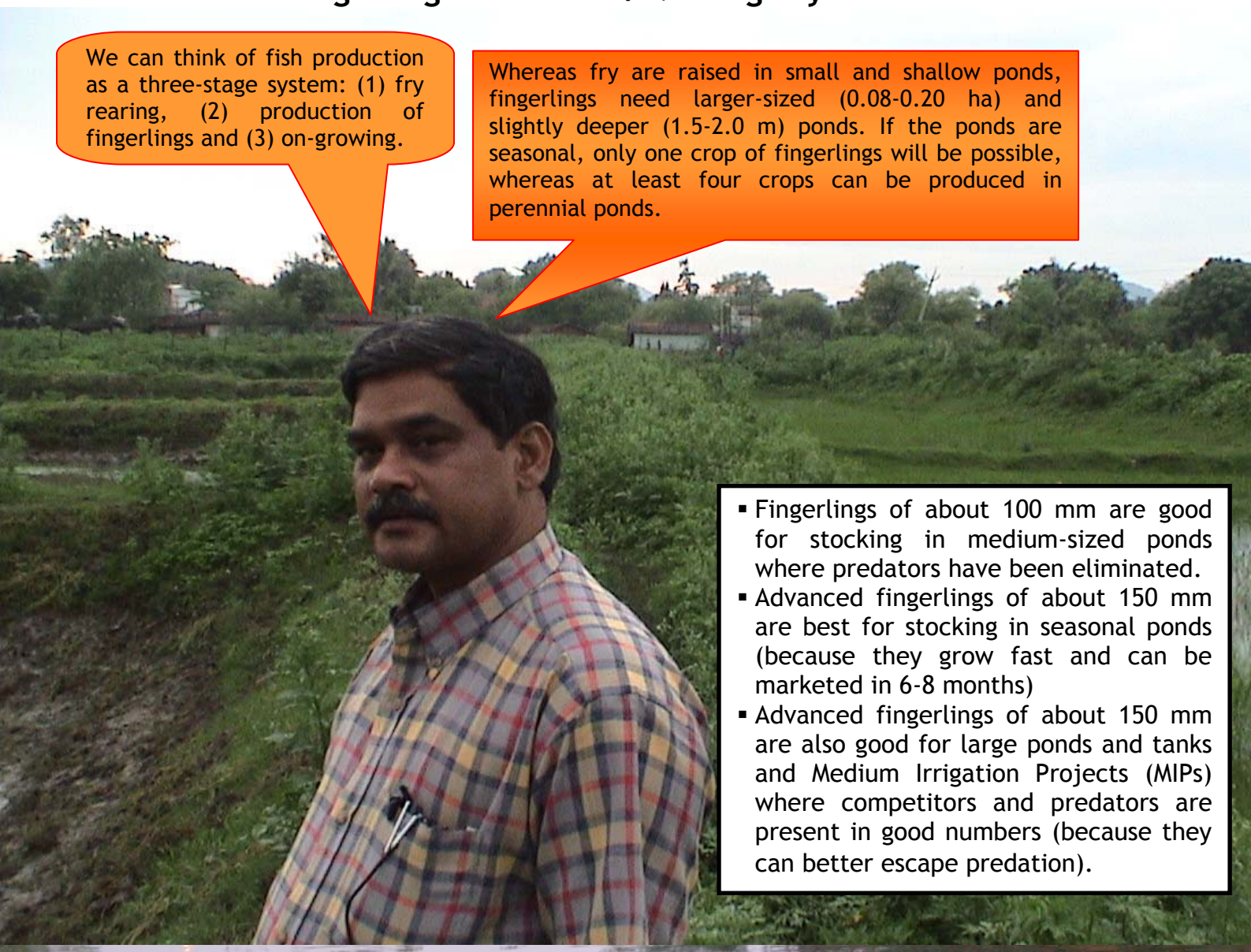
Western Orissa Rural Livelihoods Project (WORLP) Better-Practice Guidelines

1. **What is Fish Culture?**
2. **Pond Construction: Selecting Good Places for Ponds**
3. **Pond Construction: Design and Layout of Ponds**
4. **Broodstock Collection, Transport and Maintenance**
5. **Spawn Production in Hapas**
6. **Spawn Production in Hatcheries**
7. **Spawn Production of Common Carp**
8. **Fry Production: Nursing Spawn**
9. **Fast Fingerling Production: Nursing Spawn in Ponds**
10. **Fingerling Production: Nursing Fry in Ponds**
11. **Fingerling Production: Nursing Spawn and Fry in Pens**
12. **Advanced Fingerling Production: Seasonal Ponds**
13. **Advanced Fingerling Production: Perennial Ponds**
14. **Packing and Transport of Fry and Fingerlings**
15. **Marketable Fish Production: Seasonal Ponds**
16. **Marketable Fish Production: Perennial Ponds**
17. **Recognizing and Managing Common Fish Diseases**
18. **Marketing and Hygiene**
19. **One-stop Aqua Shops**

Fingerling Production: Nursing Fry in Ponds

We can think of fish production as a three-stage system: (1) fry rearing, (2) production of fingerlings and (3) on-growing.

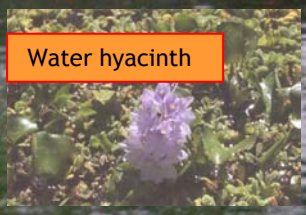
Whereas fry are raised in small and shallow ponds, fingerlings need larger-sized (0.08-0.20 ha) and slightly deeper (1.5-2.0 m) ponds. If the ponds are seasonal, only one crop of fingerlings will be possible, whereas at least four crops can be produced in perennial ponds.



- Fingerlings of about 100 mm are good for stocking in medium-sized ponds where predators have been eliminated.
- Advanced fingerlings of about 150 mm are best for stocking in seasonal ponds (because they grow fast and can be marketed in 6-8 months)
- Advanced fingerlings of about 150 mm are also good for large ponds and tanks and Medium Irrigation Projects (MIPs) where competitors and predators are present in good numbers (because they can better escape predation).

Pond preparation

Floating weeds are removed manually



Prepare the pond three weeks ahead of the date fry is expected.

The fingerling rearing pond, like the nursery pond, should be free from weeds and predators. Submerged weeds and predators are killed by *mahua* oilcake (which is toxic for three weeks), which then acts as a good fertilizer, giving a rich crop of zooplankton which is good for catla in rearing ponds.

If there are no weeds, to kill predators and competitors quickly you can just add 100 kg of urea followed 24 hours later by 200 kg of fresh bleaching powder (which is toxic for only a week) for a 1-ha area of a 1-m deep pond. Fish killed in this way can be eaten.

A week after treatment with bleaching powder, add fresh cow dung (2,500 kg/ha) or a mixture of cow dung (2,500 kg/ha) and poultry manure (1,250 kg/ha). If *mahua* oilcake is used, no fertilizer need be added for the first 15 days.

Stocking the fry

The pond should be stocked as soon as it is ready and as early in the season as possible to get fry. This makes best use of the available water and the high temperatures.

While monoculture (growing one species) is preferred in a nursery pond, now stock the three species together for polyculture in the rearing pond.

Stocking density

The number of fish you add to a rearing pond affects the size they reach.

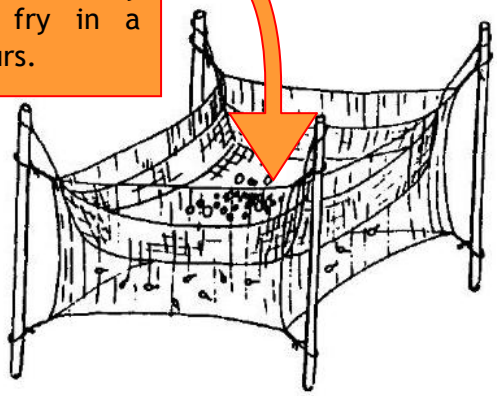
- Stocking 100,000 fry in 1 ha would give 100 mm fingerlings in eight weeks and an average survival of 75%.
- The same stocking density would yield 150 mm fingerlings in 12 weeks with an average survival of 70%.
- If 150 mm fingerlings are the target in eight weeks, the stocking density should be reduced to 75,000 fry/ha.

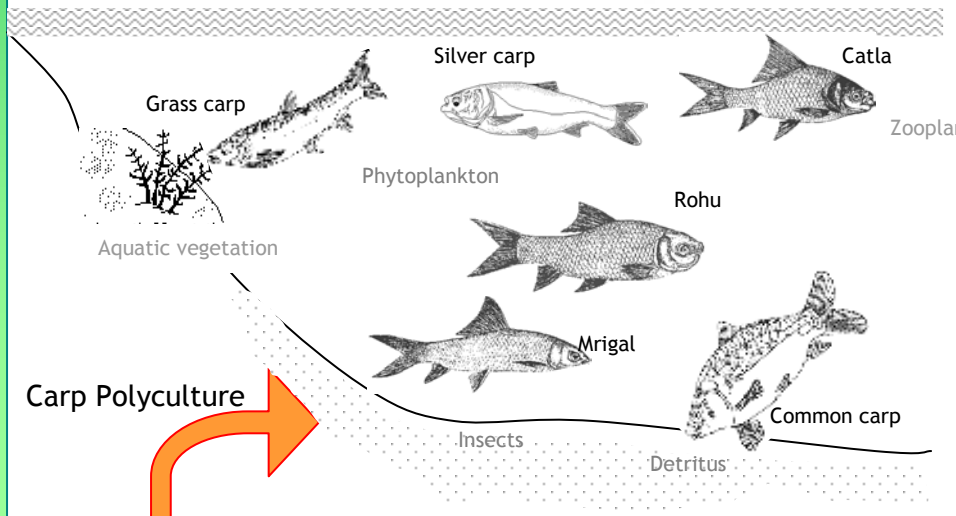
Most rearing ponds are 0.08-2.0 ha.

Use the table below: select your pond size, the size of fingerling you want and the time you have.

area (ha)	number	size (mm)	time (weeks)
0.05	5,000	100	8
	5,000	150	12
	3,750	150	8
0.08	8,000	100	8
	8,000	150	12
	6,000	150	8
0.10	10,000	100	8
	10,000	150	12
	7,500	150	8
0.15	15,000	100	8
	15,000	150	12
	11,250	150	8
0.20	20,000	100	8
	20,000	150	12
	15,000	150	8

The quality of water should be tested for residual toxicity before the fry are stocked by putting 10-20 fry in a hapa for 24 hours.





At this stage, the fish live in different layers of the water and eat different things. To use all the space and food available in the pond, it is advisable to stock different species together.

Fry from a hatchery will usually be packed in bags with oxygen like this.

Post-stocking management

To provide food for the fish, you will need to fertilize the pond water every few weeks and supplement with feed every day.

If *mahua* oilcake was used to kill predators:		
Time	Action	Notes
2 weeks after stocking	add **lime** (50 kg/ha) 2.5 kg in 0.05 ha 5.0 kg in 0.1 ha 10.0 kg in 0.2 ha	Broadcast the lime evenly over the pond
4 weeks after stocking	add **urea** (25 kg/ha) 1.25 kg in 0.05 ha 2.5 kg in 0.1 ha 5.0 kg in 0.2 ha and add **superphosphate** (50 kg/ha) 2.5 kg in 0.05 ha 5.0 kg in 0.1 ha 10.0 kg in 0.2 ha	To promote the growth of phytoplankton as food Adding too much can cause fish to die
If you added organic manure:		
Time	Action	Notes
4 weeks after stocking	add a second dose of (2,500 kg **cow dung** and 1,250 kg **poultry manure**/ha) 125 kg(CD)+63 kg(PM) in 0.05 ha 250 kg(CD)+125 kg(PM) in 0.1 ha 500 kg(CD)+250 kg(PM) in 0.2 ha	To promote the growth of plankton as food Adding too much can cause fish to die

Feeding:		
Time	Action	Notes
From the day after stocking	feed twice daily an **oilcake-rice bran** mixture (10 kg/ha) 0.5 kg in 0.05 ha 1.0 kg in 0.1 ha 2.0 kg in 0.2 ha	Feed half in the morning and half in the evening
2 weeks after stocking	feed twice daily an **oilcake-rice bran** mixture (15 kg/ha) 0.75 kg in 0.05 ha 1.5 kg in 0.1 ha 3.0 kg in 0.2 ha	Adding feed in the same place helps fish to feed and allows you to sometimes catch fish
4 weeks after stocking	feed twice daily an **oilcake-rice bran** mixture (22.5 kg/ha) 1.125 kg in 0.05 ha 2.25 kg in 0.1 ha 4.5 kg in 0.2 ha	Continue to increase the ration by 50% every two weeks

Avoid adding feed and manure on cloudy days because there may not be enough oxygen for the fish.


Adding lime


Adding manure


Carp feeding

Harvesting, packaging and transport

Once the fingerlings reach the right size they can be sold. After making arrangements with customers, the fingerlings should be harvested early in the morning and properly conditioned for transport in a hapa.

Fingerlings are active. Any mishandling will easily result in heavy mortality.

Like fry, fingerlings can be transported in polythene bags 1/3 full of water and 2/3 oxygen but this is expensive and only a limited number can be packed per container.

Large numbers of fingerlings can be transported in a Fiberglass Reinforced Plastic (FRP) transportation tank, which can be moved on the back of a truck. The one pictured (right) has been developed by the Central Institute of Freshwater Aquaculture (CIFA) in Bhubaneswar.

It is good to raise fingerlings near to water bodies that can be stocked, such as in ponds next to a reservoir or tank. This avoids costs and potential losses due to transport.

A large hapa

FRP transport tank

Useful Contacts

Other Better-Practice Guidelines

There are many more Better-Practice Guidelines in this series.

You can get more copies of this and other Better-Practice Guidelines from your local One-stop Aqua Shop, STREAM India Communications Hub, from the STREAM Regional Office or from the STREAM Website.

www.streaminitiative.org

We would like your feedback about these Better-Practice Guidelines. You can let us know by phoning, emailing or writing to the Communications Hub Manager at your STREAM Country Office.

Your local One-stop Aqua Shop is:

The STREAM India Communications Hub is:

STREAM Country Office India
Duplex No.02, T.S. Homes,
Tankapani Road, Bhubaneswar - 18
Phone: +91-674-2381851
Fax: +91-674-2381851
E-mail: streamin@sancharnet.in

The WORLP Office is:

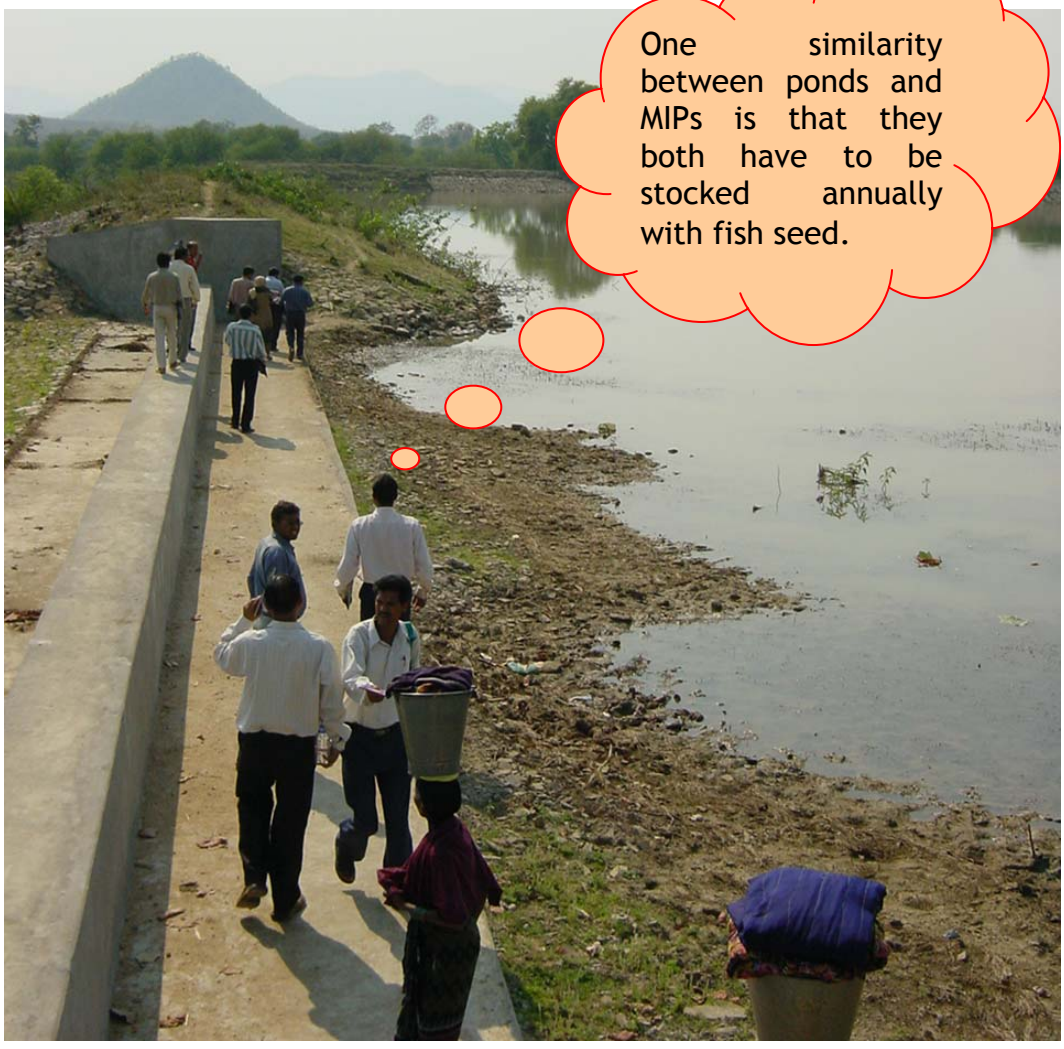
Fingerling Production: Nursing Spawn and Fry in Pens

In watersheds, medium irrigation projects (MIPs) can be useful for aquaculture even though these water bodies are many times larger than ponds, and are basically built for irrigation or water storage. However, the full potential of these water bodies is not yet realized.

Why is that?

Well, they are often in remote areas and difficult to reach, because of the poor condition of roads especially during the monsoons, so it is difficult to deliver fingerlings.

During transport, large-sized fingerlings (more than 100 mm long) can die. They are also expensive and only available late in the season. Therefore, these large water bodies are stocked with early fingerlings (50-60 mm) and often inadequately, which ends up with low survival and poor production.



If the production of fingerlings is taken up locally, the twin problems of transportation costs and mortality can both be solved.

If much larger fingerlings can be produced and the MIP can be stocked early in the season, then fish-eating fish in the MIP will cause fewer problems.

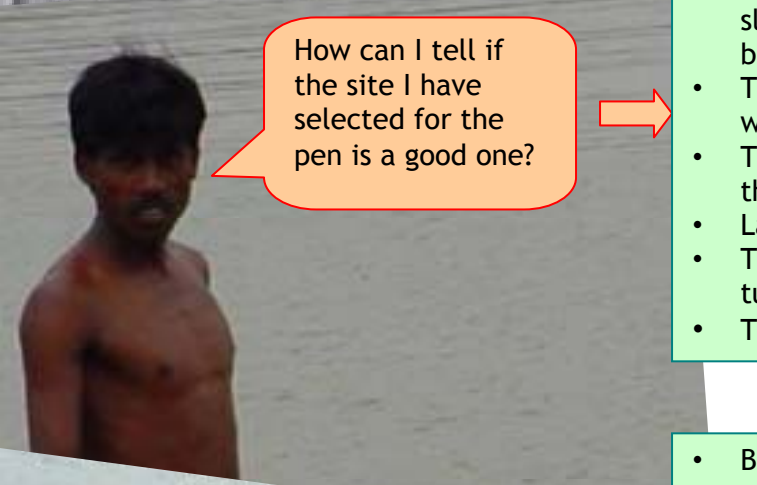
Nurseries have been built next to many of the MIPs where spawn is reared and fingerlings produced for stocking the reservoir. This still involves transportation in buckets or *hundies* and needs considerable manpower.

To solve this problem we can use either pens or cages in the water, as widely used in almost all Southeast Asian countries. The cages are more expensive to construct and manage. Pens, however, are less costly to construct and operate.

Pens: selection of site and construction

If I want to raise fingerlings in the MIP, should I use a cage or a pen?

A cage is a big net bag and can either be floating or submerged. Pens are enclosures that are open both at the top and at the bottom. Pens are cheaper to construct and operate than cages and are preferred for fingerling production.



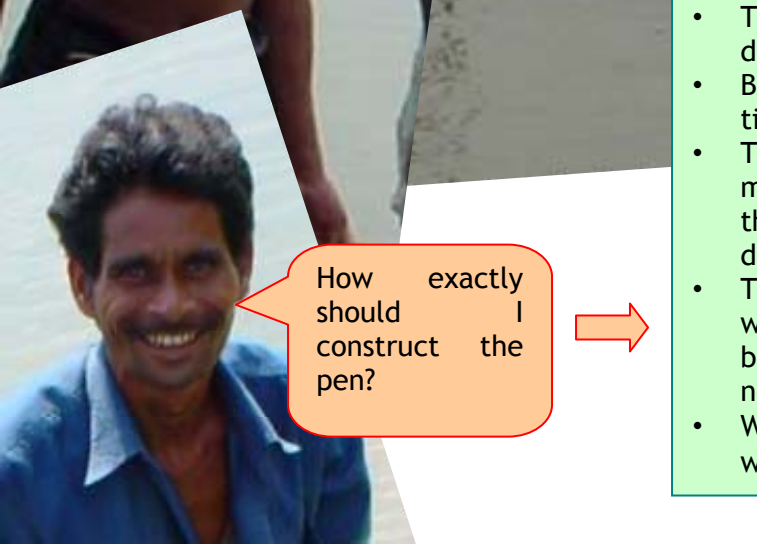
How can I tell if the site I have selected for the pen is a good one?

The position of pens has to be as carefully thought about, like when building ponds. The ideal characteristics are:

- The bottom should be clean, smooth, leveled or with a slight gradient, without weeds or rotting vegetation, stones, bricks, rocks or pits.
- The site should not be prone to flooding and the level of water at the site of the pen should not be more than 1.5 m.
- The level of water at the site should not fluctuate during the period when spawn and fry are being reared.
- Lack of rain should not expose the pen site.
- The site should not be exposed to heavy winds and high, turbulent waves.
- The soil and water quality should be good.

When should I construct the pen and how big should it be?

- Build the pen when the bottom is exposed to the sun, maybe during April-May.
- The bigger the pen, the more expensive to build and difficult to manage and operate.
- A good size is 40 m x 25 m (0.1 ha). This could serve the twin purpose of a nursery as a place to produce fry (if there is a market for fry nearby) and then fingerlings.

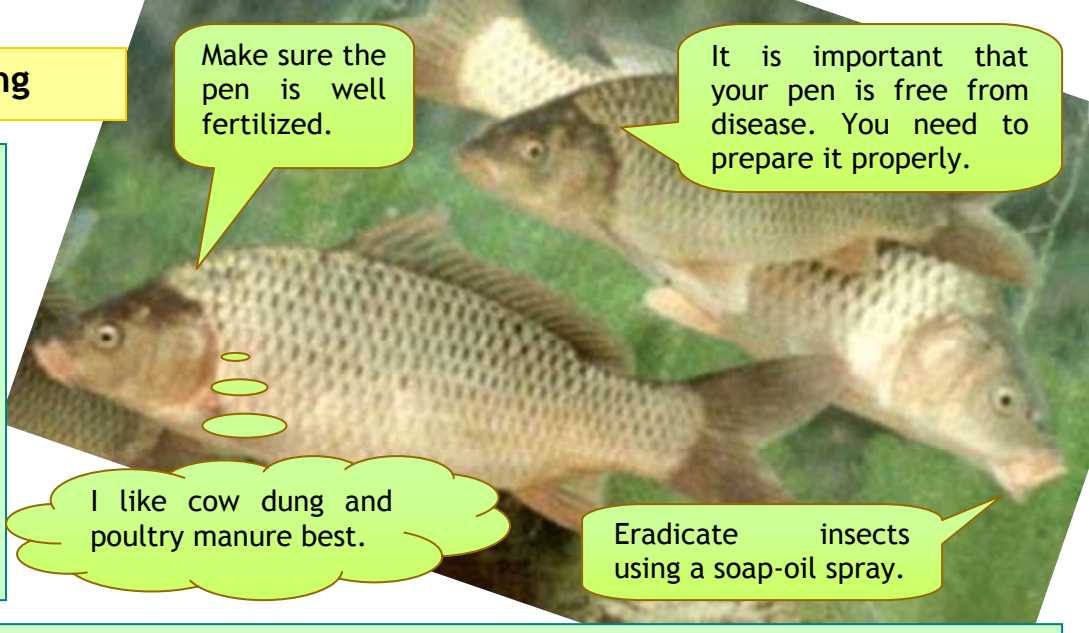


How exactly should I construct the pen?

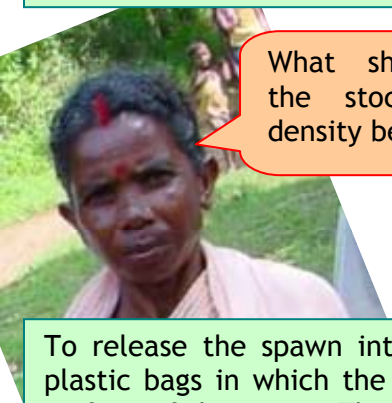
- First, mark out and clean the area.
- To save money, a pen at the edge can use three sides of netting, but there is more chance of the water level dropping near the edge.
- If a pen is built away from the edge, all four sides will be netting.
- The boundary of the pen is dug to about 30 cm.
- Then, at suitable intervals (3-5 m), pits (60 cm deep) are dug to fix bamboo or wooden poles.
- Between these poles, split bamboo or mats are fixed and tied with nylon ropes to form a complete enclosure.
- The inner wall of the pen is then covered with a fine-meshed (mesh 0.8 mm) nylon screen so that about 30 cm of the screen is put in the pit. The earth removed during digging is then put over this.
- The screen should be at least 1 m above the maximum water level in the pen to stop fish escaping. A ladder is put both outside and inside the pen and a boat is usually needed.
- When the water level rises, it will enter the pen but no fish will be able to get in.

Preparation and stocking

To be free from disease, bleaching powder (150 kg/ha) may be uniformly sprayed on the bottom of the pen to kill harmful spores and parasites. After 10 days, lime could be added (200 kg/ha) to make the best use of the manure which should be broadcast before the entry of water. Cow dung (5,000 kg/ha) and poultry manure (2,500 kg/ha) are currently the best and cheapest to use.



Spawn should be stocked as soon as the water is full with plankton and when the water is about 1 m deep. Before stocking it is important to get rid of any insects. For this, a soap-oil mixture (1:3) at 50 kg oil/ha can be sprayed onto the water. The spawn can be stocked after 24 hours.



The stocking density (fish/area of pen) depends on how much water exchanges between the pen and the water outside, and its quality inside the pen. It can be good to arrange the pen in line with the direction of the wind. This is so the current will help water to exchange between the water body and the pen. If fry is to be produced, a stocking density of 5 million/ha (or 5,00,000 in a 40 m x 25 m pen) can be used. If fingerlings are targeted, the density should be 1.5-2 million/ha (or 1.5 - 2,00,000).

To release the spawn into the pen, first float the plastic bags in which the spawn is packed over the surface of the water. This acclimatizes the spawn to the water temperature in the pen. After opening the tops of the bags, slowly allow them to take in small quantities of pond water. The fry should then be allowed to move out into the pen by itself.

If there is only one pen, the spawn of three species – catla, rohu, and mrigal – can be stocked together in the proportion of 40:30:30 or 35:30:35. If there are three or more pens, the spawn of different species can be reared separately.

A fish farmer in Cambodia floats bags in a hapa to acclimatize the spawn before releasing it.

Post-stocking management

Women feed their fish in Vietnam.

The fish should be fed daily from the first day, feeding four times the weight of spawn for the first five days. Then for the next five days, it should be fed at eight times the weight of the spawn. Feeding should be done in two installments: once in the morning and again in the evening. The weight of 100,000 (1 lakh) spawn is approximately 150 g. After 10 days, when the spawn have developed into fry, the feeding rate should be changed. The fry should be fed at 10% of the body weight during the first month which can be reduced to 5% during the next month. The weight of 1,000 fry is 200 g on average.

Production of natural fish food organisms should be kept in mind and manuring should be done periodically. A spray of diluted and thoroughly mixed cow dung (500 kg/ha) and poultry manure (250 kg/ha) could be done every tenth day.

A survival of over 75% at the fry stage and an overall survival of 50% at fingerling stage are expected.

Harvesting and stocking

The fingerlings can be harvested and counted during the second half of September.

After harvesting, the fingerlings can be stocked outside the pen but they should not all be put out at the same time but in stages so that you do not lose them all to predators.

If the water level is not receding, even larger fingerlings, i.e., juveniles, can be produced by extending the rearing period.

Useful Contacts

Other Better-Practice Guidelines

There are many more Better-Practice Guidelines in this series.

You can get more copies of this and other Better-Practice Guidelines from your local One-stop Aqua Shop, STREAM India Communications Hub, from the STREAM Regional Office or from the STREAM Website.

www.streaminitiative.org

We would like your feedback about these Better-Practice Guidelines. You can let us know by phoning, emailing or writing to the Communications Hub Manager at your STREAM Country Office.

Your local One-stop Aqua Shop is:

The STREAM India Communications Hub is:

STREAM Country Office India
Duplex No.02, T.S. Homes,
Tankapani Road, Bhubaneswar - 18
Phone: +91-674-2381851
Fax: +91-674-2381851
E-mail: streamin@sancharnet.in

The WORLP Office is:

Advanced Fingerling Production: Seasonal Ponds

It is best to stock advanced fingerlings in large ponds, tanks, and in both small and large reservoirs, since they can better escape predators and competitors. Seasonal ponds, often 0.10-0.15 ha and 1.5-1.8 m deep can be used as rearing ponds for raising advanced fingerlings. Low water levels at the end of the season will make netting and harvesting easy.

Pond preparation

Seasonal ponds must be weed-free. Weeds take nutrients out of the water. They hinder the movement of the fish. They also reduce oxygen during the night and early in the morning.

Many seasonal ponds are in low-lying areas with no proper dykes, inlets or outlets, so weed fish and predators can get in easily. These must be removed before raising fingerlings.

Mahua oilcake, which is readily available in parts of Orissa, can be added at 2,500 kg/ha. It not only kills predatory fish but also the submerged weeds and then acts as a nutrient itself. The dead weeds also make good manure in the pond. *Mahua* does not affect floating weeds like water hyacinth, *Pistia* and *Salvinia*. You need to take these out by hand.

For a healthy pond and healthy fish, make sure you get rid of:

- Weeds
- Weed fish
- Predators

If there are no weeds in the pond, you can destroy predators and competitors. First apply urea at 100 kg/ha where the water is 1 m deep.

After 24 hours apply 200 kg of fresh bleaching powder/ha. Fish start dying within one hour of adding the bleaching powder. These fish can be harvested and eaten. It takes a week for the toxic effect of bleaching powder to go.

When *mahua* oilcake is used, its toxic effect lasts three weeks. However, *mahua* oilcake is important since it is an extremely good fertilizer that helps produce zooplankton which young fish eat.

The quantities of *mahua* oilcake or bleaching powder required for pond preparation are given on an area basis (assuming about 1 m depth of water).

If *mahua* oilcake is used, you do not need to manure for the first 15 days. However, bleaching powder is not a fertilizer so you need to manure the pond a week after you have applied the bleaching powder.

To fertilize your pond, use fresh cow dung (10,000 kg/ha) or a mixture of cow dung (5,000 kg/ha) and poultry manure (2,500 kg/ha).

Stocking the fry

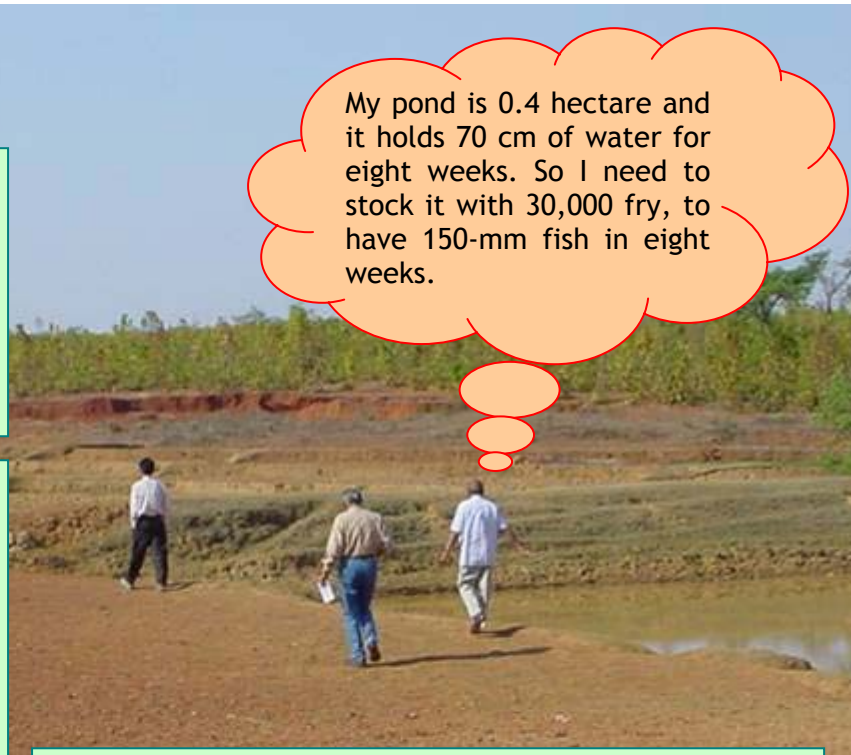
Stock your pond with fry as early in the season as possible. In this way you will benefit from the fresh rainwater that tops up the pond. This provides a healthy environment.

Also, the high temperatures in the monsoon season help the young fish grow faster.

You need to have an idea of the duration that the pond will hold about 70 cm of water. This helps you decide on the stocking density.

If the pond is stocked at 100,000 fry/ha, one can expect fingerlings (150-mm in size) in 12 weeks with a survival of around 70%.

However, if the pond is expected to dry early, the stocking density may be reduced to 75,000 fry/ha so that 150-mm fingerlings are available in eight weeks.

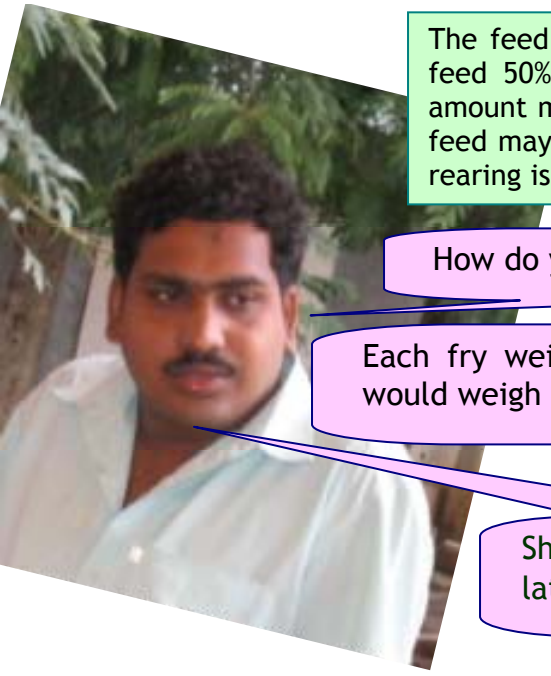


Juveniles can also be grown in seasonal ponds, if the water lasts for 5-6 months. For this, the proportion of fry of catla, rohu and mrigal at the time of stocking should be 3:4:3.

Post-stocking management

The fry will not get enough food from the pond, so you should feed them from the day after you stock the pond.

The feed should be a mixture of groundnut oilcake and rice bran and you should feed 50% of the fry's body weight each day. This is about 10 kg/ha/day. This amount may be increased by 50% each fortnight during the first three months. The feed may be reduced from the fourth month onwards back to 10 kg/ha/day where rearing is continued further.



How do you work out how much to feed the fry?

Each fry weighs 0.2 g on average, so 100,000 fry would weigh 20 kg and 50% of this would be 10 kg.

Should I reduce the feed gradually later in the season?

Reduce the feed every week from the fourth month back down to 10 kg/ha/day. By this time the requirements of the fish are less because of lower temperature.

More about post-stocking management

What is the best way for me to look after the fingerlings?

If *mahua* cake has been used for eradication of predators, at least a fortnight after stocking the pond you should add lime at 100 kg/ha.

Then, a fortnight after liming, the growth of the fingerlings is better if you fertilize the pond so that small plants that fish eat called *phytoplankton* will grow. Add 25 kg of urea and 50 kg of superphosphate per ha.

Take great care not to add too much or too little inorganic fertilizers. Large blooms of tiny plants (plankton) without enough fertilizer can die and use up the oxygen in the water, affecting the growth of fingerlings and may even cause fish deaths.

A month after stocking, a second dose of organic manure (2,500 kg cow dung and 1,250 kg poultry manure/ha) should be given. Choose a bright and sunny morning.

Feeding and manuring should **not** be done on cloudy days or if the oxygen levels fall below the minimum requirement when the fish start coming up to the surface to gulp the air.

What should the oxygen level be? What is the minimum requirement?

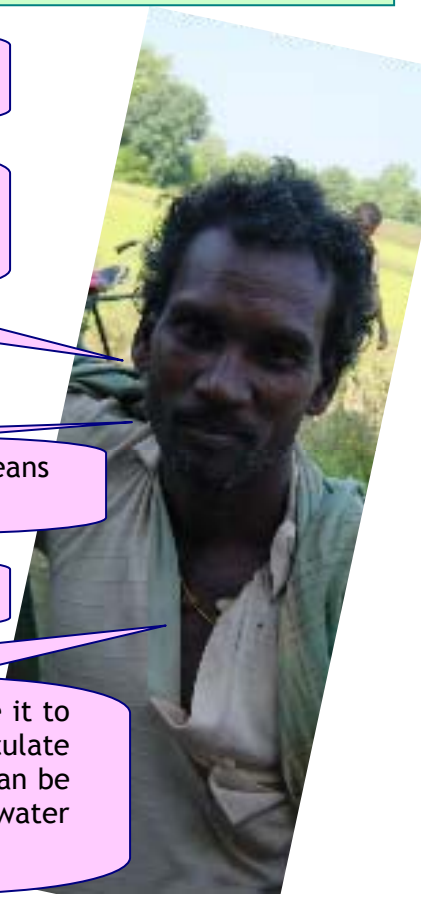
The minimum for the fish seed would be '3 ppm' but it should always be above '5 ppm' to keep them active and in good healthy condition.

How can you tell what the oxygen level in the pond is?

When the fish come up to the surface and start gulping air it means that the minimum level has already been reached.

If there is not enough oxygen, what can be done about it?

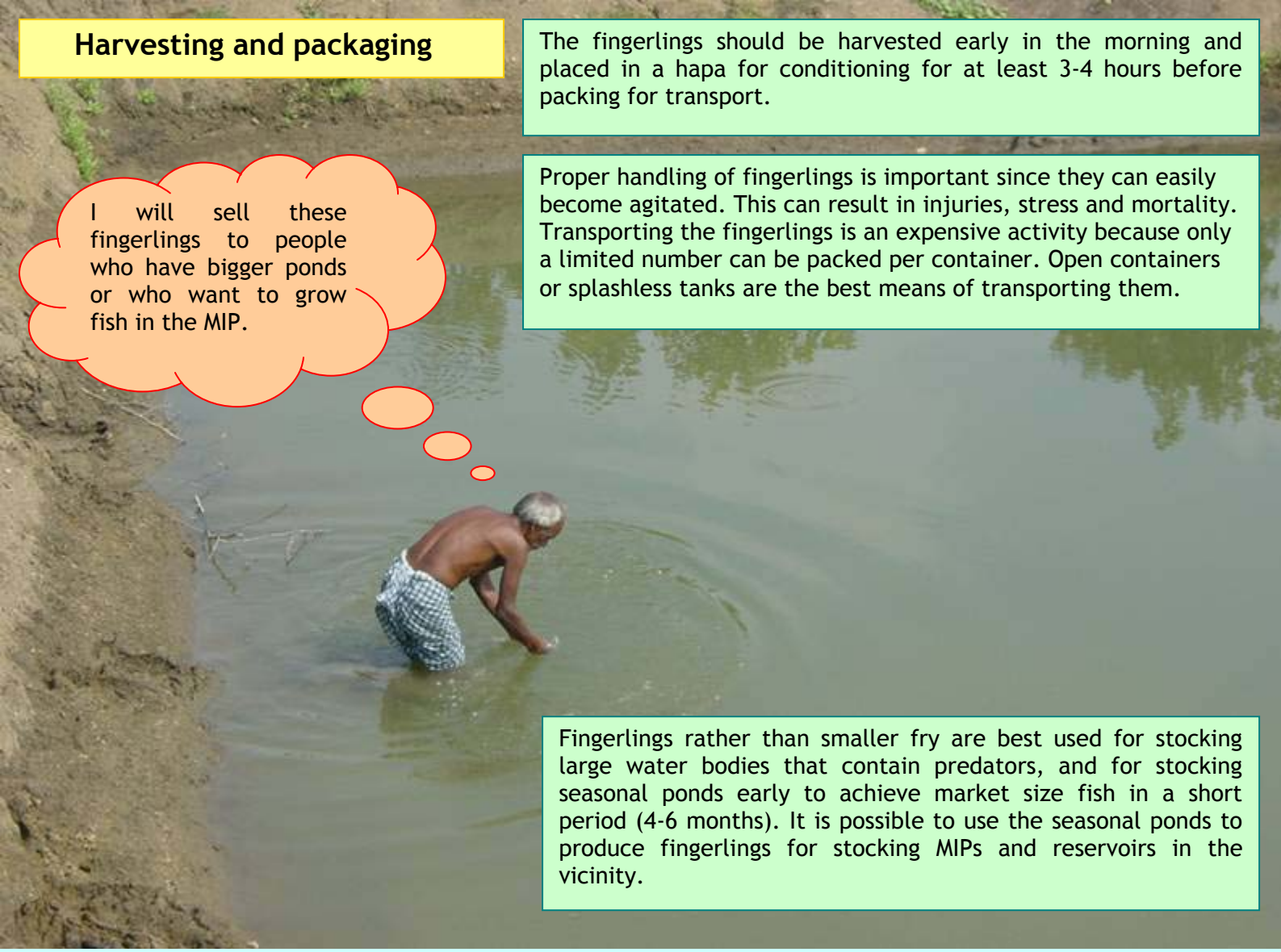
Here are three options if oxygen levels fall: If you have a pump, use it to pump fresh well-oxygenated water from a neighboring pond, or circulate the pond water. Otherwise, a solution of potassium permanganate can be sprayed on the water. If neither option is possible you can beat the water surface with sticks to agitate it.



Harvesting and packaging

The fingerlings should be harvested early in the morning and placed in a hapa for conditioning for at least 3-4 hours before packing for transport.

Proper handling of fingerlings is important since they can easily become agitated. This can result in injuries, stress and mortality. Transporting the fingerlings is an expensive activity because only a limited number can be packed per container. Open containers or splashless tanks are the best means of transporting them.



Fingerlings rather than smaller fry are best used for stocking large water bodies that contain predators, and for stocking seasonal ponds early to achieve market size fish in a short period (4-6 months). It is possible to use the seasonal ponds to produce fingerlings for stocking MIPs and reservoirs in the vicinity.

Useful Contacts

Other Better-Practice Guidelines

There are many more Better-Practice Guidelines in this series.

You can get more copies of this and other Better-Practice Guidelines from your local One-stop Aqua Shop, STREAM India Communications Hub, from the STREAM Regional Office or from the STREAM Website.

www.streaminitiative.org

We would like your feedback about these Better-Practice Guidelines. You can let us know by phoning, emailing or writing to the Communications Hub Manager at your STREAM Country Office.

Your local One-stop Aqua Shop is:

The STREAM India Communications Hub is:

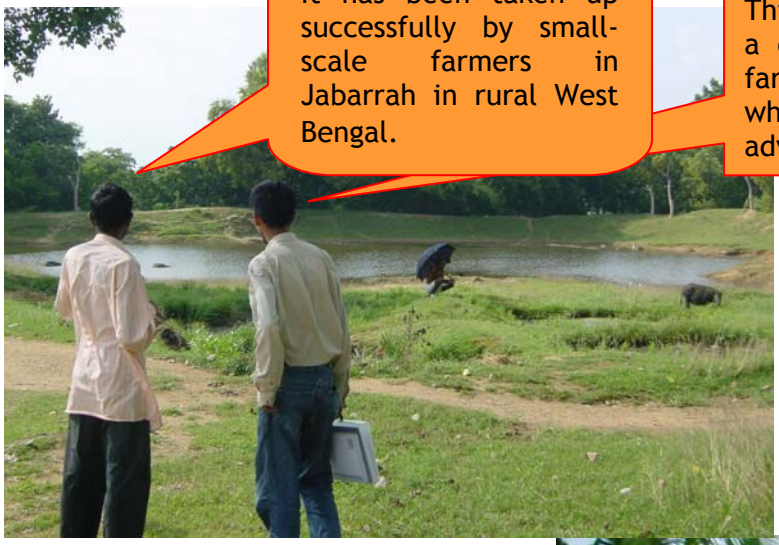
STREAM Country Office India
Duplex No.02, T.S. Homes,
Tankapani Road, Bhubaneswar - 18
Phone: +91-674-2381851
Fax: +91-674-2381851
E-mail: streamin@sancharnet.in

The WORLP Office is:

Advanced Fingerling Production in Perennial Ponds

Everyone wants advanced fingerlings as early after the rains as possible. They fetch a good price and they make marketable fish production possible in seasonal ponds.

One way to produce early season advanced fingerlings is to grow them in perennial ponds and store them at high density with minimal feeding for the coming year. When such "stunted fingerlings" are stocked into ponds with good feed they grow fast and can be marketed in about 6-8 months.



It has been taken up successfully by small-scale farmers in Jabarrah in rural West Bengal.

This way of working is now a common feature of fish farming in Andhra Pradesh, where carp culture is advanced in India.

It should however be clearly understood that managing advanced fingerling ponds throughout the year is not an easy task and needs a lot of attention. Farmers risk fish losses and problems with predation, theft and water availability and quality.

Advanced fingerlings can be reared in ponds from 0.1-0.4 ha in size ranging in depth from 1.5-2.0 m.

These ponds should retain enough water in the summer so that the fingerlings are not affected.

The fingerlings range in size from 100 to 200 mm and are 10 g to 150g in weight.

These advanced fingerlings can be stocked in perennial ponds, which have a resident population of competitors and predators (that cannot be removed), or in seasonal ponds which hold water for only 6-8 months.

Pond preparation

How should I prepare my perennial pond for stocking?

The perennial rearing ponds need to be made free from competitors and predators as well as from aquatic weeds.

If fish are found with parasites during the course of rearing, bleaching powder (200 kg/ha) can be used after harvesting and drying the pond to kill the parasites before restocking fish.

Before stocking, it is good to treat the pond with lime (200 kg/ha) and then seven days later to fertilize either with *mahua* oilcake at 1,000 kg/ha or mustard oilcake at 300 kg/ha.

What is the best way to manure and maintain my perennial pond?

Maintaining a consistent level of natural feed within the pond is important. Fresh cow dung (1,000 kg/ha) or a mixture of cow dung (500 kg/ha) and poultry manure (250 kg/ha) should be used to fertilize the pond every month. If the density of natural feed becomes reduced, the water color changes or becomes clear, water-soaked mustard oilcake (30 kg/ha) can be sprayed on to the pond.

A word about plankton

Fish need the natural feed in water that is called plankton, so it is important to check the level of plankton in your pond from time to time.

When there is enough plankton the water is a brownish-green color and it is difficult to see into the water. As plankton is eaten, the water changes color and clears. With no silt or plankton, it is possible to see deep down into the pond.

A test is to put your arm in the water to the elbow and if the fist is not seen the pond is rich enough in plankton (check that the color is due to plankton and not cloudiness due to silt and clay or any coloring material).

When there is no plankton, you can see to a depth of 1-2 m - spray the mustard oilcake mix.

Stocking the fry

When the old stock is sold out by May-June, the pond is prepared and restocked within two to three weeks with the fry of all the three major carps – Catla, Rohu and Mrigal. It is often recommended that these fish are stocked in the ratio 3:4:3.

The best mix of the fry of Catla, Rohu and Mrigal depends on the pond. If there is a lot of debris on the bottom of a pond, more Mrigal (which is a bottom feeder) could be stocked or Common Carp added to the mix. If there are lots of submerged plants with tiny plants growing on them, which Rohu eat, then more Rohu could be added. Where a lot of succulent grasses are submerged, Grass Carp could be added to the mix.

The stocking density is high for advanced fingerling production in perennial ponds because the target is slow growth and a fingerling that is small for its age. When stocked at 300,000 fry/ha, the fry attain a size of 150 mm fingerlings in six months. All the fry grow fast during the monsoon months (July-August). However, the growth rate slows down considerably by October and only the maintenance requirements need to be met.

Post-stocking management

Do the fingerlings need a lot of feeding?

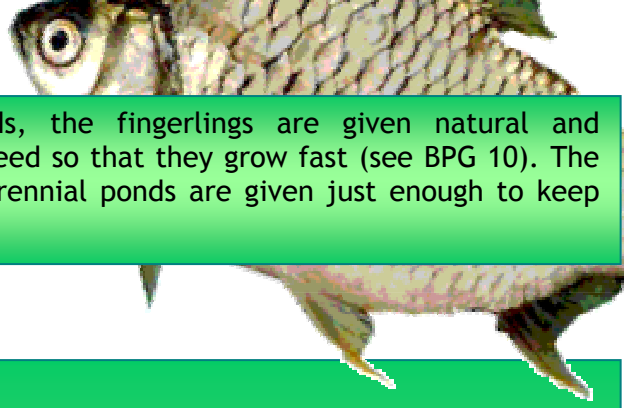
How much should I feed them?

Should the quantity of feed stay the same or increase?

The right way to feed is suggested in this table.

October-November and March-April are times when the farmer has to be extremely careful about the water quality and fish diseases.

Liming the pond at 50 kg/ha during October-November and again during March-April is a must. Periodic fertilization with fresh cow dung (1,000 kg/ha) or a mixture of cow dung (500 kg/ha) and poultry manure (250 kg/ha) should be done every month. Feeding and application of the manure should be avoided on cloudy days when special attention must be paid to oxygen levels.



In rearing ponds, the fingerlings are given natural and supplementary feed so that they grow fast (see BPG 10). The fingerlings in perennial ponds are given just enough to keep them healthy.

We have stocked 300,000 fry/ha. Feeding should be done with a mixture of oilcake and rice bran (1:1 by weight) at 6 kg/day during the first week followed by 12 kg/day during the second week. The feed should be split and given in two installments.

Feeding:		
Time	Action	Notes
From the day after stocking (August)	feed twice daily an **oilcake-rice bran** mixture (6 kg/ha) 0.6 kg in 0.1 ha 2.4 kg in 0.4 ha	Feed half in the morning and half in the evening
1 week after stocking	feed twice daily an **oilcake-rice bran** mixture (12 kg/ha) 1.2 kg in 0.1 ha 4.8 kg in 0.4 ha	Adding the feed in the same place helps fish to feed and allows you to sometimes catch fish
2 weeks after stocking	feed twice daily an **oilcake-rice bran** mixture (18 kg/ha) 1.8 kg in 0.1 ha 7.2 kg in 0.4 ha	
3 weeks after stocking	feed twice daily an **oilcake-rice bran** mixture (24 kg/ha) 2.4 kg in 0.1 ha 9.6 kg in 0.4 ha	
4-8 weeks after stocking (September-October)	feed twice daily an **oilcake-rice bran** mixture (30 kg/ha) 3.0 kg in 0.1 ha 12.0 kg in 0.4 ha	Keep feed level constant
9-12 weeks after stocking (November)	feed twice daily an **oilcake-rice bran** mixture (30 kg/ha) 3.0 kg in 0.1 ha 12.0 kg in 0.4 ha	Feed level should be reduced if the weather is cool
13-21 weeks after stocking (December - January)	feed twice daily an **oilcake-rice bran** mixture (10 kg/ha) 1.0 kg in 0.1 ha 4.0 kg in 0.4 ha	A small ration
22-26 weeks after stocking (February)	feed twice daily an **oilcake-rice bran** mixture (15 kg/ha) 1.5 kg in 0.1 ha 6.0 kg in 0.4 ha	Feed level should be increased during warm weather
27-35 weeks after stocking (March - April)	feed twice daily an **oilcake-rice bran** mixture (20 kg/ha) 2.0 kg in 0.1 ha 8.0 kg in 0.4 ha	As the weather warms more plankton also is available

Harvesting and packaging

Advanced fingerlings are miniature adults – a high value product – and in great demand. They sell like hot cakes either by weight (Rs 50-60/kg) or by numbers (Rs 5/ piece).

These are harvested and conditioned and often delivered by the producer's own workers.

Fish transport in large *hundies* is a skilled traditional practice. Fingerlings can also be transported in FRP tanks with a supply of oxygen or in tied plastic bags with 1/3 water and 2/3 oxygen.

Useful Contacts

Other Better-Practice Guidelines

There are many more Better-Practice Guidelines in this series.

You can get more copies of this and other Better-Practice Guidelines from your local One-stop Aqua Shop, STREAM India Communications Hub, from the STREAM Regional Office or from the STREAM Website.

www.streaminitiative.org

We would like your feedback about these Better-Practice Guidelines. You can let us know by phoning, emailing or writing to the Communications Hub Manager at your STREAM Country Office.

Your local One-stop Aqua Shop is:

The STREAM India Communications Hub is:

STREAM Country Office India
Duplex No.02, T.S. Homes,
Tankapani Road, Bhubaneswar - 18
Phone: +91-674-2381851
Fax: +91-674-2381851
E-mail: streamin@sancharnet.in

The WORLP Office is: