

**FISH CULTURE FOR ASSURED PROTEIN SECURITY,
LIVELIHOOD SUPPORT
AND ECONOMIC PROSPERITY**



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WHAT IS FISH FARMING ?

Fish culture also called pisciculture or aqua culture. Fish farming is an art of raising fish in ponds and tanks. Successful fish culture depends on skillful management of the stocks (fishes) and the environment (pond).

WHY FISH FARMING?

- ❖ Fish provides affordable nutritious food and is easily available.
- ❖ Extra money from the sale of surplus fish.
- ❖ An interesting activity enjoyed by young and old alike.
- ❖ Declining trend of fish supply from capture resources.
- ❖ To meet the increasing demand for fish for the ever increasing population who are mostly non-vegetarian.
- ❖ As the food conversion rate is known to be 1.5 times more in fish as compared to pig or poultry and 2.5 times in case of cattle or sheep.
- ❖ The system is more or less rural resource based and requires very low inputs resulting in low production cost per unit having high market demand.

WHAT DO YOU NEED TO RAISE FISH?

- ❖ A piece of land where you can digout a pond with strong embankments to retain water.
- ❖ Supply of water.
- ❖ Quality fish seed/fingerling from a good source.
- ❖ Manuring fish ponds.
- ❖ Granulated/pelleted fish feed mixed with agriculture wastes like rice bran, oil cake, leaves, grass etc.
- ❖ Regular care of pond/fish.

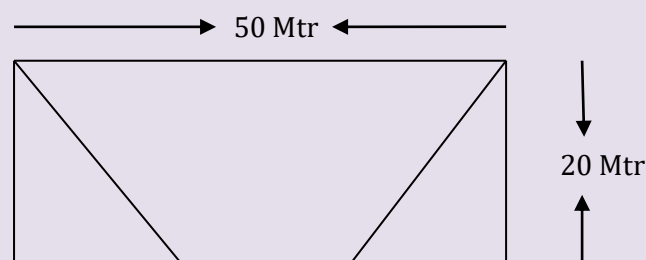


WHERE TO CONSTRUCT YOUR POND?

- ❖ It is best to choose a low lying area or deeper areas or a place having gentle slope.
- ❖ Do not construct pond on a steep slope or in flood pond areas.
- ❖ Choose a sunny place close to your house for better care and protection from poaching and other fish enemies like otters, snakes etc.
- ❖ Pond should be near to water source such as streams or a spring or in marshy ground.

HOW TO DIG PONDS?

- ❖ Rectangular shaped pond as shown below is more suitable than a square or circular ponds for easy netting operations.
- ❖ The average area of pond should be minimum 0.2 ha or more. If such suitable land/area is not available it should not be less than 0.1 ha area i.e 50 Mtr X 20 Mtr.



- ❖ Pond should have 1.5 to 2.0 Mtr depth. If the pond is shallower than 1.2 Mtr (a) aquatic weeds will grow at the bottom and (b) the pond water may become too hot during the summer months for fish to survive resulting in their slow growth and death.
- ❖ Do not make the sides of the pond too steep.
- ❖ Bottom of the pond should be even and slightly slopped towards the deeper side.
- ❖ Inlet and outlet should be provided to the pond for letting water in and draining excess water.

COMPOSITE FISH CULTURE MANAGEMENT TECHNIQUE CAN BROADLY BE CLASSIFIED INTO:

- ❖ Pre stocking management.
- ❖ Stocking management.
- ❖ Post stocking management.

PRE STOCKING MANAGEMENT:

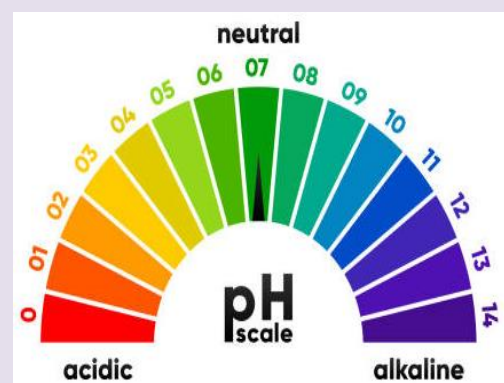
Activities undertaken prior to stocking of fish seed when digging is complete in case of new ponds and after complete harvesting in case of old/existing ponds. The steps to be followed are:

- **DRAINING AND REMOVAL OF UNWANTED ORGANISMS:**
 - ❖ Drain out water from the pond and the pond bottom be ploughed or tilled and left exposed to sun light for at least 10 to 15 days in case of existing ponds.
 - ❖ Dewatering ensures complete removal of unwanted organisms like aquatic weeds, unwanted fishes, insects, frogs, snakes etc., as they are detrimental to fish culture.
 - ❖ Instead of chemical & mahua oil cake a popular fish poison of plant origin can be used and is found to be effective at a dose of 250 to 300 kg/100 M² water area. Mahua oil cake in due course of time serves as manure.

LIMING OF POND:

Next step towards pond preparation is application of quick lime to maintain/correct the pH of pond soil and water.

- ❖ Acid water is not good for fish growth.
- ❖ Water can be tested by using pH paper which is readily available in the market. pH is a measure of acidity. The desirable pH of pond water should be between 6 to 8 and in this range of pH is above 11 and below 6 fishes do not grow well and may die.
- ❖ Liming helps in correcting acidity of soil and water.
- ❖ In case of drained out ponds/newly constructed ponds lime can be applied directly to the pond bottom.



DOSAGE OF QUICK LIME:

Soil/Water pH	Condition	Dose of quick lime (kg/1000M ² area)
4.5-5.0	Highly acidic	60
5.0-6.0	Moderately acidic	40
6.0-6.5	Mildly acidic	30
6.5-7.0	Near neutral	10
7.0-7.5	Mildly alkaline	6

MANURING THE WATER IN POND:

Manuring of water in pond should be undertaken after 7 days of application of quicklime. Manuring helps to produce more fish food in the form of micro organisms (Phyto& Zoo plankton) which is one of the best natural fish food for the newly stocked fish seed/fingerlings.

- ❖ The objective of fertilizing fish pond is to enhance the growth of fish food organism by improving the nutrients status of the pond.
- ❖ Inorganic fertilizers should also be applied in equal monthly doses alternatively with the organic manure with a gap of about fortnight.
- ❖ Manuring needs to be suspended if thick green or blue green bloom develops in ponds.

INDICATIVE DOSAGE OF FERTILIZER APPLICATION:

Nutrient requirement Kg/1000 M ² /Year	Pond category		
	Low	Medium	High
(i) Raw cattle dung (RCD)	1000-1200	800-1000	500-800
(ii) Poultry litters	400-500	300-400	200-300
(i) Phosphorus	10-12	7-10	5-8
(ii) SSP	60-78	47-63	31-47
(i) Nitrogen or	20-25	15-20	10-15
(ii) Urea	44-55	33-44	22-32

After a fortnight of application of inorganic fertilizers the pond becomes ready for stocking of fish seeds.

All the process of liming and manuring should be carried out on clear sunny days and should not be done during the persistent cloudy days or when the algal bloom appears and preferably early morning before sun rise.

STOCKING MANAGEMENT:

Releasing fish seed into the pond only after a fortnight of last step of pond fertilization is complete and termed as stocking management .

WHAT KIND OF FISHES TO CULTURE?

- ❖ For obtaining better fish production 6(six) varieties of fishes can be cultured.
- ❖ Space in the pond has to be optimally utilized with such a combination of fish varieties as they occupy separate living space/niche.
- ❖ Some fishes have month at the top (surface feeder) some at the front (column feeder) and a few have month at bottom (bottom feeder).
- ❖ Give potash bath to fish seeds before stocking them into the pond.

■ **SURFACE LAYER/FEEDER**



■ **BOTTOM LAYER/FEEDER**



- ✓ The best time for introduction of fish seeds is from May to July when fish seed of all varieties is abundantly available during the breeding season.
- ✓ Altitudinal variation and species combination with proportionate ration be taken care of while selecting species.
- ✓ For **lower altitude** upto (750 Mtr MSL or 2500 fr). Where comparatively warm weather/temperature is prevalent the species combination should be of Catla, Silver carp, Grass carp, Rohu, Mrigal and Common carp.
- ✓ For **medium altitude** upto (3500 ft. or 1060 Mtr). Recommended species combination is catle, silver carp, Grass carp, Rohu, Marigal and Common carp while Mahseer species may also be tried either as mono-culture or in combination with other.
- ✓ For higher altitude above (3500 ft. or 1060 mtrs). Recommended species combination is Silver carp, Grass carp and common carp, exclusive culture of Brown/Rainbow Trout & Schizothorax spp. Can also be carried out.
- ✓ One fish seed per square meter water area is more than enough.

RECOMMENDED RATIO OF DIFFERENT FISH SPECIES FOR DIFFERENT AGRO CLIMATIC ZONES/CONDITION ARE:

Sl.No	Name of species	Recommended stocking density	Agro climatic zones		
			Lower altitude	Middle altitude	Higher altitude
1	Catla	1000 Nos	20% (200 Nos)	20% (200 Nos)	~
2	Silver Carp		20% (200 Nos)	30% (300 Nos)	40% (400 Nos)
3	Grass Carp		10% (100 Nos)	10% (100 Nos)	25% (250 Nos)
4	Rohu		20% (200 Nos)	10% (100 Nos)	~
5	Mrigal		15% (150 Nos)	10% (100 Nos)	~
6	Common Carp		15% (150 Nos)	20% (200 Nos)	35% (350 Nos)
Total			1000 Nos	1000 Nos	1000 Nos

RELEASING FISH SEEDS INTO POND:

- ✓ Don't release/pour fish seed directly into the pond.
- ✓ Place the plastic bag without opening into water for some time say 10 to 15 minutes so that fish seed in the bag gets acclimatized to the temperature of the pond water.
- ✓ Open the plastic bag and gently tilt and let the fish seed swim out of the bag on their own.



POST STOCKING MANAGEMENT:

After stocking of desired combination of fish species with recommended species ration, the fish species stocked cannot be simply left to feed on its own, but requires care and attention and this management practice is termed as post stocking management.

All steps in pre-stocking management is repeated particularly liming and manuring followed by supplementary feeding then only the desired growth/production can be obtained and the steps are:

- **LIMING:** Quick lime soaked in water over night and cooled @ 2.5 kg/1000 M² should be applied once in a month.
- **MANURING :** Manuring both organic and inorganic helps in meeting the nutrients requirement for producing and growth of micro organism and can be applied as
 - a) Organic manure preferably raw cattle dung (RCD)/Poultry litters/pig dung etc. @600 to 800 kg/1000 M² water area in a split dose per year.
 - b) Preferably urea @ 2 to 3 Kg SSP @ 3 to 4 Kg/1000 M² area mixed with organic manure and dumped at four corners of the pond.

SUPPLEMENTARY FEEDING:

Supplementary feeding is significant as the natural foods available at the time of stocking fish seeds will exhaust in 2 to 3 days and the stocks there after needs to be fed on artificial feed from outside.

- ✓ Supplementary feed comprising mustard oil cake and rice bran in the ration 1.5:1@3% of body weight of the stocked fish per day commencing from 2nd day onwards preferably at one or two points in the pond in perforated plastic bags or in tray to avoid wastage of feed and avoid organic pollution of pond water.
- ✓ The feed quantity can however be manipulated depending on the rate of consumption of such feed by fishes.
- ✓ Grass carp feed voraciously on aquatic/terrestrial vegetation, fodder grasses like Napier grass or even lawn grasses, banana and tapioca leaves, tender leaves of other bushes and vegetables wastes like leaves of cabbage, cauliflower etc.
- ✓ Feed only when the fishes prefer to eat and don't over feed them with the intention to get faster growth. It will be harmful for the fishes and water quality.
- ✓ If fishes are healthy then they will eat quickly.
- ✓ If they don't eat all the foods curtail the quantity next day which can be ascertained by observing the food consumption of the previous day.



TAKING CARE OF POND:

- ✓ Ensure that water is at least waist deep throughout the year.
- ✓ Ensure water is not leaching through the bunds/embankment. If you notice any cracks plug them immediately.
- ✓ Do not let weeds cover more than one quarter of the surface, if there are too many, pull/take them out manually.
- ✓ Keep the pond surrounding neat and clean, cut all weeds and grasses on the bounds.
- ✓ Remain cautious from enemies of fish like wild ducks, cranes, otter etc. they can cause considerable damage to fish stock.
- ✓ Put some bamboo twigs/branches in the pond bottom to prevent any poaching/netting unauthorisely.

FISH HEALTH:

- ✓ Excess manuring and feeding sometimes result in the development of algae. If not controlled it may start forming bloom which is not desirable. In such a case manuring and feeding should be discontinued and re-start as and when it disappears.
- ✓ Surfacing of fishes for gulping air in the early morning is an indication of less oxygen in pond. To overcome such distress condition immediately start-
 - Repeated netting to reduce the no. of fishes in the pond.
 - Apply 2-3 Kg of lime.
 - Agitate pond water with bamboo pole or start splashing or keep an electric/diesel powered aerator, if not reduce the fish density, remove some fishes.
 - If possible add fresh water into the pond in a sprinkled form so as to enrich it with oxygen.

MANAGEMENT OF OLD FISH POND:

- ✓ If the pond is perennial get it completely dried after every 2-3 years and expose the pond bottom to sunlight for 10 to 15 days after desliting.
- ✓ Handle fishes carefully while netting to see growth and health condition.
- ✓ Observe the fish very carefully during the potential disease period.
- ✓ Close inlet and outlet immediately and completely if fishes in the neighboring water shows sign of diseases.
- ✓ Remain alert and take precautionary measures in case of outbreak of disease ***“as preventions better than cure”***. Apply lime, potash and salt in appropriate doses 3-4 times at 3 weeks interval and apply it all over the water surface including pond sides.
- ✓ Diseased fish in no case be thrown out in wild and must be destroyed either by buring or by burying.



HARVESTING AND DISPOSAL

➤ WHEN TO HARVEST FISH AND WHY ?

- ✓ Do not take any fish out of pond during first 5-6 months.
- ✓ Fish must be harvested after 10-12 months when it attains size of 800-1000 gm.
- ✓ Fishes grow quickly in the initial stages of their life.
- ✓ Fish do not grow at the same rate with the increase in their age which gradually decreases.
- ✓ Harvest fish early in the morning when it is cool.

- ✓ Fish gets spoiled quickly after they are taken out of water. Dispose them the same day or take steps to preserve them for later use.
- ✓ Wash them well in clean water and put them in a clean dry container or a basket and cover them with leaves or mat.
- ✓ Transport fresh fish to market/consumption centres immediately as the process of decaying starts within 2-3 hours of fishes being taken out of water.
- Fish culture can also be combined with pig, dairy, duck, poultry and paddy or with fruit plants. Combined/integrated farming of this kind will give more profit and reduce over head costs.
- Adopt pisciculture and ensure protein security, livelihood support, better economic benefits and above all to realize the goal of **“self sufficiency from dependence”**



For more detail/information contact your nearest District Fishery Development Officer or Fishery Officer or may contact Directorate of Fisheries, Government of Arunachal Pradesh, Vivek Vihar, Itanagar