

INTRODUCTION TO FISH POND CONSTRUCTION AND MANAGEMENT

POND MAINTENANCE

Once the ponds have been stocked, it is important that the fish are checked every day for signs of stress and the farm in general for any maintenance that might be required. Both activities are preventive measure that should reduce risk of something going wrong around the farm. Those routine inspections should preferably take place during the early morning when the oxygen levels tend to be at lowest and the fish most likely to be stressed. It is also good practice to carry out the inspection again most time of feeding as the fish can be observed most easily.

During the inspection, the following should be checked and records of the observations kept:

- Fish mortalities
- Physical and chemical characteristics of waters, particularly oxygen levels. If facilities are available, the farmer should endeavor to monitor climatic production on the farm as well as water quality parameters.
- Check whether fertilization of each pond is necessary.
- Behavior of fish, particularly for signs of stress e.g. gasping signifies low oxygen levels, poor feeding, erratic swimming, lethargy and disease.
- Pond banks, dams, monks, and outlets for signs of erosion and for leaks. These can get progressively larger if not quickly dealt with.
- Screens, filters and outlets for debris and blockage which should be subsequently cleared.
- Excessive weed growth and potential problems.
- Predators such as snake, lizards, birds and frogs in and around the pond which should be eradicated if possible.

WATER QUALITY MAINTENANCE

The survival, growth and consequent production of fish depend to a large extent on the physical, chemical and biological status of the water in the culture enclosure. Therefore, the fish farmer must possess the ability to detect and product quantitatively changes in the limnological status of the water and the effects of different fish farming activities on fish production.

Depth: Depth of water in the pond must be kept steady through regular replenishment with fresh clean water to top up for water host by seepaye and evaporation. Low water levels expose fish to the vagaries of predation and extreme temperature fluctuation. High diurnal water temperature associated with shallow grow-out pods (<0.5m) often causes early maturity and stunting in fish. If water level is allowed to rise uncontrolled, it may overflow and eventually break down the dam.

Transparency: The secchi disc (a small disc with black and white sectors on the upper surface) is the instrument used for measuring turbidity or water transparency. A seechi disc transparency ranging between 30cm and 50cm is optimal for fish production in ponds. A high transparency (>80cm) is an index of low production. This can be improved by adding fertilizers. Low transparency (<20cm) may be due to suspended silt, clay, plankton or organic matter. This also encourages low fish production, low transparency due to sand and silt suspension can be avoided by allowing water to flow through a settling or sedimentation system before entering the culture pond and by grassing the perimeter of pond. If low transparency is due to excessive growth of plankton, which is evidenced by the deep green colouration of the water, this can be improved by stopping fertilizer application and use of algrade if necessary.

Dissolved Oxygen: Maintenance of sufficient dissolved oxygen in the fish pond at all times is without doubt, the most essential of water quality management tasks performed by the fish farmers.

It is re commended that the dissolved oxygen level is measured in the early morning and again 14:00 hours. For minimal stress and good growth it should be above 4-5mg//. If the oxygen content falls below this level it will be necessary to aerate the water between dusk and dawn, and, if necessary in the afternoon.

In intensive culture high fish density, continuous aeration may be necessary because the oxygen produced by the plants is usually not sufficient to meet the needs of all the fish. The dissolved oxygen content is inversely proportional to temperature, and high temperature during the early afternoon may cause the oxygen content to fall below the critical level.

Aeration can be achieved in a number of ways, but the method used will depend on financial resources, access to electricity and intensity of production.

pH: water with a pH range of 6.5-8.0 is most suitable for fish production. Since fish can tolerate the temporary increase in pH of the water that occur during the day because of the dissociation of carbon dioxide more than temporary depression of the pH of the water during the night, it is recommended that the pH of the water in the early morning should not be lower than 6.5. Low pH can be improved through the addition of lime while high pH can be lowered through addition of ammonium sulphate, ammonium nitrate and urea fertilizers.

Smell: Any bad smell emanating from the pond or production unit is indicative of a problem. Bad smells from the water are most probably gaseous products of anaerobic breakdown of nutrients in the water and are most often toxic to fish. This can be improved by stopping nutrient input and or aeration. As a last resort lowering the water in the pond and replenishing with fresh clean water should be considered. Unfortunately, this alternative may not always be available particularly during the drought season, therefore careful control over supplementary feeding and fertilization are critical to avoid the production.

Pollutants: With industrialization, intensification agriculture and wide spread use of industrial and agro-chemicals and detergents, it is inevitable that some of the waste products of these ventures find their way into local surface and underground water bodies by run-off or surface and eventually into fish ponds.

The presence of by-products of various activities of man which are pollutants in the pond are evident from the observation of oil films, scum and foam in the surface of the water and at the extreme, fish kills. Oil from workshops, generators and cars, vehicles should be prevented from being washed into culture ponds.

As a rule, water flowing ponds must be analysed routinely for pollutants including fertilizers and pesticides. If water in the pond is found to be polluted, it should be drained and replenished with fresh and clean water, preferably from an alternative source.

WEED CONTROL

Aquatic weeds are macroscopic plants called Macrophytes which grow in water and whose existence, especially in large quantities, may interfere with fish pond management operations such as feeding, test cropping and harvesting. They compete with phytoplankton for available nutrients thereby depriving planktonous fishes of their natural food, provide havens for pond pest and encourage evapo-transpiration. Aquatic weeds include floating plants e.g. *pista stratiotes* (water lettuces), pond weed (*Lemna spp*) and filamentous algae, submerged weeds e.g. *ceratophyllum*, emergent plants e.g. water lilly (*Nymphaea lotus*) and marginal or fringe vegetation.

Submerged and emergent weeds can be effectively checked through fertilizer application. This encourages dense plankton growth shading off the pond bottom, thereby cutting off the supply of solar energy to these plants. This technique is quite effective if the pond is constructed in such a way that no part of it is shallower than 60cm. herbicides are also used for controlling aquatic weeds in ponds. Usually the concentration of herbicides used to kill the weeds are safe for fish but the decay of the weeds killed by the herbicides often cause dissolved oxygen depletion which may be deleterious to fish production. A major disadvantage in the use of herbicides in the control of aquatic weeds is that once the concentration of the herbicides drops below levels toxic to the weeds, the weeds will re-grow thereby necessitating repeat applications. Copper sulphate and synthetic algicides e.g. Simazinbe and Aquazine can be used to control excessive growth of filamentous algae and phytoplankton. The use of copper sulphate and synthetic algicides also create low dissolved oxygen levels after their application. Synthetic algicides tend to have longer residual action when compared with the use of copper sulphate in the control of filamentous algae and phytoplankton.

Biological control of aquatic weeds through the introduction of grass eating fish such as grass carp (*tenopharngoden idella*), *Tilapia zilli* and *Heterotis niliticus* is most often recommended in poly-culture systems. Aquatic weeds can also be controlled through manual removal or mechanically through the use of specially designed amphibious machines.