

Pen Culture—an improved culture method for fish

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Most of the current aquaculture activities in South Asia are land based and there is a growing concern that the availability of lands with adequate water fronts is becoming a limiting factor.

Due to limitations in the access of land based fishing and fish farming activities, the importance of pen culture, among other fishing activities, has been realised sometime back in East Asian countries such as Philippines, China and Thailand. In the early stages of their pen culture projects fresh water species were utilised in the farms. During the last decade however rapid development with suitable fish species in both marine and fresh water has been reported. In Sri Lanka the Ministry of Fisheries also started pen culture activities at an experimental level, in 1982, with the financial assistance of the IDRC Canada to determine economic feasibility and technical viability and also develop technically sound pen culture systems together with identifying constraints in adaptation.

"Pen" is a fixed enclosure in which the bottom is the bed of the water body. Rather than floating as a cage does, a pen is a stationary structure, generally fixed to the bottom of a waterbody by poles and

enclosed on the sides by netting. Therefore, the hydrobiological conditions (except the fish species expected to be cultured) of the pen is always decided, by the nature of the water body it is fixed on to. More commonly, pens are constructed with nets and supporting frame work (generally bamboo or wooden poles) and the size of the net is decided by the fish species expected to be introduced into it. Prior to the introduction of fish, the pen should be rid of all predators, in order to ensure greater chances of survival of the new species coming in. The pen, therefore, will be dominated by the fishes introduced and their feeding system will not be distributed, as the net provides adequate space for normal water circulation. Until such time as the harvest takes place, the fish can grow well in the pen. One of the prerequisites for the success of a pen culture system lies in the selection of a suitable site. Also an extensive knowledge of the environment of the site is required and a number of physical and hydrabiological factors should be taken into consideration to evaluate the suitability of the project.

Pens can be fixed at a certain depth of the water body (not in the extreme deep or extreme shallow) and it is not necessary to have a heavy investment unless the pen covers a large extent. As the pen is simply a fence fixed on the bottom of the water body, there is no need to have advanced technical inputs too. A primary advantage, therefore, of pen culture for the Third World poor is

that people who have a limited capacity for investment could engage in it, as considerably little inputs are required to have a fish farm. Coastal small fishermen who cannot go out fishing during the rough season could turn to the lagoon pens in their difficult times for seasonal employment and income. The other advantage is brackish water areas offer a relatively non competitive field since large scale enterprises do not yet cover it.

The most important part of cultivating selected species of fish in a pen is the close supervision and care until it reaches a commercially viable stage of production.

It provides work for all active family members and also provides nutritious food. The economic feasibility of pen culture projects in Sri Lanka have not been worked out yet, and experiments are in progress; but in Philippines a 1-5 hectare size pen is commercially viable as an aquaculture enterprise and a one hectare size pen provides adequate income for an average 2-6 member family, for their living.

However, some of the topographic surveys conducted in the inland water bodies in Sri Lanka have found the man made lakes unsuitable for pen fish farming activities due to their physical nature, i.e.

- (a) deepness,
- (b) seasonal variation of water depth,



Sri Lanka for pen culture operations. The choice of fish species for stocking in commercial production units are largely decided by the two following basic requirements:

- a) The adaptability of the species in confinement to the conditions of the water body and
- b) The ability of the species to take advantage of the productivity of the waterbody. Apart from the biological and economical factors for the selection of species the availability of fish seeds for stocking is also a major consideration in the commercial fish pen. Milk Fish, that is, mullet, *Europlus* and *Tilapia*, seems to be suitable for culture in pens in Sri Lanka.

- (c) inadequate (shallow) silt layer on the chard bottom.

But over the extent of 300,000 acres of brackish water spanning the island there are lagoons like Puttalam, Batticaloa, Negombo, Ratgama and Jaffna, where certain parts contain necessary ecological conditions, suitable for pen culture projects. Most of the lagoonal areas are located in the North and East, where there aren't many development activities to engage in. However, the total area that could be taken under pen culture has not been identified and computed yet, due to various practical difficulties. Since the fish pens are usually built in shallow but muddy bottoms and fertile water, the lagoons are more promising than fresh water bodies in

The experimental pen culture projects located in Puttalam and Bolgoda waters with milk fish reported an approximate crop of 850 kg/ha for a single crop and an 1700 kg/ha per annum in two similar cycles.

Priority has been given to the following objectives in the pen culture programme of the Ministry of Fisheries.

- (a) To provide more fish protein with maximum economic feasibility and
- (b) To transfer low cost technology towards rural fishermen/fish farmers.

Taking the experience of the Philippines, the expansion or development of fish farming activities in pens may create some practical problems such as:

- (a) Development of pen culture projects would require a large extent of similar depth water bodies by competitive fish farmers. This situation will restrict other traditional fishing in the same depth zone, and new pen fish farmers coming in. On the other hand acquisition of a water mass on a more permanent basis would also create management problems such as ownership and tenure changes, licensing etc.
- (b) Also, at one stage densely located pens could disturb normal circulation of water, to which pollution problems as well as fertility discharges are closely connected.
- (c) Navigational problems may also occur when there is no space for a thoroughfare due to the zone of pens established.
- (d) Further, a possible impact is that scenic changes may also occur due to pens.

The above problems have paved the way for the urgent need for mariculture legislation and seems necessary in the case of countries like Sri Lanka which are now at the early stage of pen culture.