Cage and Pen Culture in Sri Lanka

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Sri Lanka, with an area of 25,000 sq miles, has about 300,000 acres of fresh water bodies in the form of irrigation tanks, hydropower reservoirs and flood lakes or "villus," and about 300,000 acres of brackishwater areas consisting of lagoons, estuaries and tidal flats.

There are no natural lakes in the Island. Irrigation tanks or reservoirs numbering about 10,000 were built in ancient times dating back to 2000 years. Most of these tanks had fallen into disrepair and disuse until the beginning of the century, when a large number of tanks were restored. Restoration of these tanks has since been a regular undertaking by the Department of Irrigation. Some of the larger tanks are fed from rivers and streams through intricate canal systems. The smaller ones are rain fed and go dry during dry weather. Flood lakes are large flat terrain bordering major rivers which get filled when the rivers are in spate. Some of them go dry, while a few are perennial.

There has been no record of any large-scale fishing in these waters. While fishing had been going on purely on a subsistence level, there had been no organized fishing.

In the second half of the century, a concerted effort for the development of Inland Fisheries was made by the State. Preliminary surveys had revealed that the indigenous species had made hardly any impact on the fish catches. Therefore, *Tilapia mossambica, Osphroneumus gourami* and *Cyprinus carpio* were introduced into the inland water bodies. Tilapia was an immediate success. Gourami and common carp composed only a fraction of the total catch.

Freshwater fisheries had made steady progress during the last 25 years. The total production in 1977 was 20,275 tons and with the accelerated program for the development of Freshwater Fisheries, it is envisaged to step up production up to about 50,000 tons by 1982. The majority of the production could be from existing man-made lakes. A small quantity is expected from specially constructed fish ponds. The number and extent of fish ponds could be increased but a considerable amount of capital would be required for the purpose. Small irrigation tanks as fish ponds for intensive fish culture will be utilized.

With a view to developing freshwater capture fisheries and to popularize pond fish culture, the State has set up six Freshwater Fisheries Stations for the purpose of fish seed production for stocking in large freshwater bodies and for distribution among those interested in pond fish culture. Experimental work on the economics of pond fish culture in respect to different regions of the Island are also carried out at these stations. Bighead carp and grass carp which were introduced into the country in 1975 have been propagated artificially at the Freshwater Breeding and Experimental Station at Uda Walawo.

The diversion of one of the largest rivers in the country — The Mahaweli — would generate more water areas and a vast network of canals.

Of the 300,000 acres of brackishwater areas, 200,000 acres are deep lagoons and estuaries and 100,000 acres are shallow lagoons and tidal flats.

The production from Brackishwater Fisheries will be stepped up from 1823 tons in 1978 to 3225 tons in 1982.

Brackishwater pond fish culture has been fairly well established but purely on a subsistence level. Ponds are either stocked with the fry of milkfish *(Chanos chanos), Mugil spp. Etroplus suratensis, Tilapia mossambica,* or the fry is let into the pond by natural recruitment. *Penaeus indicus* and *P. monodon* are also captured from these ponds.

A Brackishwater Fisheries Station was set up at Pitipana in late 1950 and another is nearing completion at Pambala. Distribution and stocking of the fingerlings of milkfish, *Mugill spp., Etroplus suratensis, Tilapia mosssambica,* and experimental work on developing brackishwater fisheries are being carried out at Pitipana.

Proposals were made to set up a number of experimental cages in some of the freshwater and brackishwater bodies in Sri Lanka.

The International Development Research Centre has agreed to finance some of the experimental projects.

CAGE CULTURE

This method of culture has still not been tried out extensively in Sri Lanka.

Experimental cages were set up in the Negombo Lagoon and available types of fish were introduced.

Cages of different sizes and shapes with different materials would be used to study growth under different stocking densities, depths and feeds.

Initially, one preliminary experiment is nearing completion using:

1. One cylindrical cage made of rigid copper wire frame covered with a 1/8 inch mesh size nylon net.

2. One cylindrical cage made of rigid copper wire frame covered with a closely knit bamboo tat.

3. One wooden frame covered with a nylon net of the mesh size used in (1).

4. One wooden frame covered with finely knit bamboo tats.

5. One 1.5 m x 1.5 m cage made of galvanized mesh, anchored to the lagoon bed with wooden poles and covered with cadjan tats.

Results of these experiments have not been made available.

Sri Lanka is geographically divided into two zones, the wet zone which receives more than 75 inches of rain, and the dry zone. Locations for setting up of experimental cages have been selected to cover a wide range of conditions prevalent in the country. Sites would be located to make feasibility studies on cage culture with indigenous and introduced varieties of fish in the two zones and in different altitudes.

The following sites have been selected for preliminary experiments on cage culture:

Parakrama Samudra. This is one of the largest tanks in Sri Lanka with an area of 6,250 acres. There are a number of small fishing units and colonies situated along the perimeter of the tank. Cages would be set up with the collaboration of the residents who could be persuaded to be in charge of the security and maintenance of the cages. The catch from the harvest would be given to those who actively participate in the project.

Uda Walawe Tank/Left Bank Channel. The channel flows close to the Uda Walawe Freshwater Fish Breeding and Exprimental Station. Bighead carp and grass carp propagated at this station would be extensively cultured in cages in the channel.

Beira Lake. This lake winds around a part of Colombo and opens into the Colombo harbour. It has an abundance of plankton. Certain parts of the lake is polluted, but to no lethal levels. Cages could be erected close to large firms which would be requested to participate in the project.

Wennappuwa Tank. It is a medium size tank close to the Brackishwater Fisheries Station in Pitipana and the Brackishwater Fisheries Station at Pambala. Milkfish and indigenous species which are caught in abundance from this tank could be cultured in cages.

Negombo Lagoon. This is a fairly productive lagoon with an area of 6,900 acres. Salinity range is 0.5-33 ppm. Average salinity is 24 ppm. The Brackishwater Fisheries Station at Pitipana is close to this lagoon. Milkfish, *Etroplus suratensis*, Mugil species could be reared in cages after preliminary studies.

Construction of Cages

It is proposed to construct cages along the designs presently in use in most parts of the Indo-Pacific Region. Rattan and bamboo are cheap and easily available in the country. A simple cage would cost about Rs. 2,000. Synthetic netting has to be imported and is expensive. A firm dealing in plastics offered to assist the Fisheries Department in the construction of an experimental cage made of rigid

P.V.C. The cage consists of two perforated plastic sheets (top and bottom) supported by rigid plastic pipes placed at short intervals. Materials and method most suited to Sri Lanka would be used after suitable trials are carried out.

PEN CULTURE

This method of culture is also new to the country. It is envisaged to carry out trial pen culture projects in certain fertile irrigation tanks. Besides trying out the usual types of pens currently in use in most countries, pens in the form of earth bunds with 2-3 openings could be constructed in shallow coves of irrigation tanks. The barricaded area could then be cleared of all extraneous fish. Fingerlings or fry of a fast growing species could be stocked in the enclosure. This barricaded area could serve either as a nurturing ground for fingerlings/fry prior to release into the main tank or as a pen for adult fish culture.

GENERAL REMARKS

Most of the large tanks/reservoirs/lagoons are fertile. The Beira Lake which has an abundance of plankton yields about 1000 lbs of *Tilapia mossambica* per day. The fish caught from this lake are small. This is due to overpopulation of fish and severe competition for food. Bighead carp, which is a macroplankton feeder, could be stocked in these cages.

Fishing in tanks and reservoirs has been a problem because of the large number of tree stumps and other obstacles in the water. Cage and pen culture would be able to supplement the loss in catches due to the above-mentioned constraints.

In brackishwater fisheries, a main constraint is the very low tidal amplitude. Cages could be entrusted to settlers along these water ways.

Cage and pen culture is in its nascent stage in this country. The Ministry of Fisheries will have to take the initial steps of popularising these methods of culture by carrying out trials and feasibility studies with the help of local residents. Active collaboration of the local population would give the new Project a national outlook. Subsequently, plans could be made for the inclusion of shellfish in this project. The Minister of Fisheries of Sri Lanka has given his assistance to certain suggestions made by a Committee of Fish Culturists for the development of inland fisheries. Initiation of a program for the development of cage and pen culture was one of the suggestions.

Acknowledgments

1. Group of 5 Fish Culturists. 1978. Suggestions for the development of Inland Fisheries.

2. Mendis, A.S. 1975. Program for the Inland Fisheries Development (unpublished).

3. Raphael, Y.I. 1978. Plan for the development of Coastal Aquaculture (unpublished).

4. Silva, S.M. 1979. Some experiments on Cage Culture in the Negombo Lagoon (unpublished).