Inland Fisheries and Aquaculture Development

by
A. M. Jayasekera
Director of Aquaculture Development
Ministry of Fisheries and Aquatic Resources Development

Development of Inland Fisheries and Aquaculture in Sri Lanka has been given high priority by the Government. There are three important reasons for this; firstly, it will ensure production of fish as a cheap source of animal protein for the rural communities; secondly, it has the potential to increase income and employment opportunities for the people; thirdly, production of high value aquatic species for export will earn foreign exchange to the country. Although freshwater capture fisheries have a fairly long history in Sri Lanka, aquaculture industry is of recent origin. In Sri Lanka there are no traditional aquaculture practices unlike in other Asian countries such as China and India. Aquaculture in freshwaters had been limited to a few experimental trials and government sponsored promotional programmes except for shrimp farming which has developed to a considerable extent during the past decade.

The inland capture fisheries developed steadily since 1950's with the introduction of exotic fish species and efficient harvesting. About 20 million fish fry, (1989) techniques such as the use of nylon gill nets, twelve (12) fish breeding centres and one large shrimp hatchery complex were in operation under the Ministry. Well trained aquaculturists were engaged in the development of aquaculture technologies such as cage culture, pen culture, integrated fish farming and seasonal tank fish farming. A large number of fish seed, although inadequate to meet the growing demand, was produced through artificial breeding of Indian and Chinese carps which were introduced to the country in 1970's and 1980's. Subsidy programmes and demonstation of technologies were undertaken with a view to promote aquaculture in rural areas. The extension systems were strengthened with the support of international funding agencies. Fish seed production increased to nearly 10 million while the inland fish production increased to 50,000 mt. by the year 1989.

The Inland Fisheries Development Program came to a standstill with the decision of the then Government to terminate state patronage for this important subsector which had been contributing 20% to the total fish production in the country. All the extension programmes ceased to operate and assistance to inland fishermen was completely stopped. Fish seed production programme which was vital for the aquaculture development was abandoned. The fish breeding centres were disposed to the private sector and various other agencies. The services of trained technical staff were also terminated. As a result of this unfortunate decision inland fish production gradually decreased to 6% or 12,000 mt. by the year 1994. The loss to the rural economy was nearly Rs. 1240 million according to the findings of a study team sponsored by the World Bank in 1993.

In accordance with the policy decision of the present Government to accord high priority for the development of inland fisheries and aquaculture, the Ministry of Fisheries and Aquatic Resources Development incorporated an aquaculture development program in the Five Year Fisheries Development Programme (1995 - 2000). A separate Aquaculture Development Division was set up in September 1994 to function directly under the Ministry and two large aquaculture development centres were taken over from the private sector for management under the new Aquaculture Development Division. Several new steps have been taken to revitalize the sector and rehabilitate the fish breed centres. Strengthening of regulatory activities, creation of a separate cadre for extension work and launching a community based seed production programme are some of them. The FAO has offered short term technical assistance for aquaculture and the ADB has provided limited assistance for the inland fisheries development programme in two districts. The Australian Centre for International Agricultural Research (ACIAR) has initiated a research program on the development of yield prediction models for reservoirs and cage culture technology. The two fish breeding centres at Dambulla and Udawalawe are being transformed into modern fish breeding centres by rehabilitation and improving the infrastructure that had been neglected by

Freshwater Aquaculture (ha.)	
Seasonal village tanks	100,000
Freshwater fish ponds	5,000
Areas suitable for cage culture	1,800
Freshwater prawn ponds	3,600
Estate tanks	10,000
Rice fields	600,000
Total	722,400

Freshwater capture fisheries (ha.)	
Major irrigation reservoirs	10,850
Medium scale irrigation reservoirs	19,008
Minor irrigation reservoirs	39,271
Hill country reservoirs	8,097
Upland	5,990
Lowland	26,570
Flood plains	12,800
Total	182,582

Brackishwater capture fisheries (ha.)	
Brackishwater lagoons estuaries and tidel flats	120,000

the private sector for several years. Action is also being taken to recruit new staff, train them and re-establish the technical advisory system and extension system for the benefit of the farmers and fishermen. The large number of illegal shrimp farms that were proliferating in the North Western Province during the period of closure of the Inland Fisheries Division brought their own destruction due to unplanned constructions. This situation is now being rectified by the new Aquaculture Development Division in collaboration with the National Aquatic Resources Agency (NARA) through the introduction of new technologies for improvement and enhancement of water quality, in the farm ponds.

A considerable development of aquaculture sector is expected during the next few years while attempting to achieve an overal target of 50,000 mt. of fish production from inland waters by the year 2000. The production from inland fisheries and aquaculture has increased to 17,300 mt. and 20,475 mt. respectively, reflecting the positive impact of establishment of the new division and its efforts in revitalizing the sector.

The resources available for aquaculture and inland fisheries development in Sri Lanka are considerable. A recent classification of resources by a technical committee appointed by the Ministry has identified the following categories of water and land resources for aquaculture and inland fisheries development.

Strategies for development

The main strategies for aquaculture development in Sri Lanka consists of promotion of community participation in fish seed production, diversification of farming species and integrated farming of fish/livestock/crops, diversification of farming systems, strengthening of extension systems, development of management strategies and regulation of aquaculture and capture fisheries through effective law enforcement.

Constraints in aquacultrue development

The Ministry of Fisheries and a Aquatic Resources Development had a

Land based coastal aquaculture (ha.)	
Milkfish farming	10,000
Shrimp farming	6,400
Brine shrimp culture	1,350
Crab farming	50
Total	17,800

Water based coastal aquaculture (ha)	
Milk Fish Culture in Pens	5,000

Sea Farming (ha.)	
Sea bass and grouper farming	1,000
Raft culture of molluse	4,000
Sea weed culture	2,000
Milkfish culture in ponds	10,000
Total	17,000

Potential Production in Inland Fisheries and Aquaculture

Freshwater fish farming (mt.)	
Seasonal tanks	8,500
Fish ponds and integrated fish farming	10,400
Cage culture	3,120
Freshwater prawn ponds	6,000
Freshwater seasonal tanks	4,080
Total	32,100

cadre of well trained technical staff. These officers had been trained in countries such as Philippines, China, Thailand and India where aquaculture is considerably developed. With the closure of the former Inland Fisheries Division their services were also terminated. Lack of trained personnel is a serious constraint in the implementation of the new aquaculture development programme.

Lack of appropriate technology, inadequate supply of seed, inadequate brood stocks, lack of technology for harvesting of major carps from reservoirs incidence of fish diseases, lack of low cost foods, lack of quarantine system, inadequate information on the availability of suitable sites for sea farming and environmental problems are some of technological constraints affecting the industry.

There is a lack of traditional practice of fish farming in Sri Lanka unlike in other countries in Asia. Economically viable farming practices have not been adequately demonstrated.

There are several agencies which claim the right of ownership of fish in reservoirs due to overlapping of legal rights of different agencies such as the irrigation department, farmer organizations, agrarian authorities and the Ministry of Fisheries. Installation of structures such as cages for rearing of fish in reservoirs which is a common practice in other countries needs clearance from various agencies.

Programmes for Aquaculture and Inland Fisheries Development

Fish seed production

Production of quality fish seed is one of the major requirements in aquaculture. The freshwater fish seed requirement is estimated at around 60 million by the year 2000. The Ministry has commenced operation of its fisheries stations at Dambulla and Udawalawe. The fisheries stations at Muruthawela, Panapitiya, Ginigathhena, Pitipana, Rambodagalla, Polonnaruwa and the shrimp hatchery complex at Karukkapone have been long leased to the private sector.

Under the programme for seed production the following activities will be undertaken :

(a) Breeding of major carp species at Uda Walawe and Dambulla fisheries stations and supply of fry of these species for further rearing at the fisheries stations managed by the private sector. The ponds and buildings at the two fisheries stations will be rehabilitated.

(b) Training the fisheries cooperative societies to produce fingerlings required for major reservoirs and medium reservoirs and establishment of self sustainable systems of procurement of fish seed required for each reservoir.

(c) Involvement of estate workers to produce fingerlings in the estate tanks through their active participation of estate workers. Fish fry will be supplied by the Ministry. Suitable training and extension programmes will be undertaken.

(d) Encouragement of NGOs and agricultural farmers in rural areas to produce fish fingerlings in small

scale and establish community based seed production centres. Here too the farmers and NGOs will be given training and technical assistance.

These new activities which are part of the programme will ensure greater participation of the private sector in seed production and provide an additional income source for the farmers/ estate workers. Women will be encouraged to participate in this programme.

Additional breeding facilities will be established by the Government for air breathing fish seed production and freshwater prawn seed production. Backyard hatchery system for the production of freshwater prawn seed will be encouraged.

A programme for purchase of fingerlings from the farmers, fisheries stations and other producers will be implemented and the programme will be phased out over a period of 6 years. Purchase of fingerlings by the farmers will also be encouraged.

Fishery development in major reservoirs

In Sri Lanka, more than 90% of the inland fish production comes from 73 major reservoirs each of which is more than 800 ha. in size. They have an extent of about 70,850 ha. with an estimated production potential of 21,750 mt. annually. Through stocking with fingerlings and systematic management measures the fish production from these tanks can be increased. Tilapia nilotica is the most suitable species for stocking in Sri Lanka reservoirs. A comparatively high yield of 283 kg./ha. has been recorded in Sri Lankan reservoirs. Management measures for the major tanks are being improved through enforcement of fishery regulations under the new Fisheries and Aquatic Resources Act, No. 2 of 1996. These measures include prohibition of use of gill nets with mesh size less than 85 mm. and prohibition of use of seine nets and monofilament net for fishing. The fishermen should get an Inland Fishing Management Licence for fishing.

Fishery development in medium and minor perennial tanks

The 163 medium reservoirs and 3279 minor reservoirs which yield 283 kg./ha. form an imperative fishery resource in the country. The reservoirs having an area between 200 - 800 ha. belong to medium size category while those below 200 ha. are grouped into minor scale tanks. Their production potential is about 20,000 mt./year. The extent of these tanks are 19,000 ha. and 39,000 ha. respectively. Tilapia nilotica, Chinese carps and Indian carps are stocked in these reservoirs.

Hill country reservoirs

These reservoirs 7 in number and 8097 ha. in extent have a fish production potential of about 567 mt. per annum. Usually their yield (70kg./ha.) is relatively low compared to other categories of reservoirs but contribute considerably to fish production in the hill country.

Fisheries development in Mahaweli Area

There are 5,990 ha. upland and 26,570 ha. of lowland new reservoirs with a production potential of about 420 mt. and 7520 mt. respectively. Development of fisheries in these reservoirs will ensure improvement of the socio-economic condition of the communities living around them.

Freshwater capture Fisheries (mt.)	
Major irrigation reservoirs	21,751
Medium irrigation reservoirs	6,461
Minor irrigation reservoirs	13,744
Hill country reservoirs	8,097
Mahawewa reservoirs	7,938
Flood plains	1,920
Rivers	5,000
Total	**64,911**

Brackishwater caputre fisheries (mt.)	
Lagoons, estuaries, mud flat	5,000

Coastal land based aquaculture (mt.)	
Milkfish culture in ponds	500
Marine shrimp culture	24,000
Crab farming	27

Coastal waterbased land aquaculture (mt.)	
Milk fish culture in ponds	2,000

Sea farming	
Sea bass and grouper farming in cages	100
Raft, culture of molluse	6,000
Sea weed farming	150
Total	**6,250**

Flood plain fisheries

The total area available for development is 12,800 ha. Through stocking with suitable species of fish and effective management measures, production from these lakes can be increased. Tilapia nilotica and freshwater prawns are suitable for stocking in these water.

Freshwater fish farming

Farming of aquatic species commonly known as fish farming can be undertaken in small scale subsistence level, small scale commercial level and large scale commercial ventures. Ornamental fish farming is an important business venture, which is carried out in small scale as well as in large scale. This includes culture of fish species as well as plant species for export. Sri Lanka earns about Rs. 300 m. in foreign exchange at present through export ornamental fish and plants. This industry will be further developed in rural areas with the assistance of exporters. Training and technical know-how will be provided by the Ministry.

Food fish farming in ponds cages and pens will be promoted through training, demonstation of technologies and assistance in the production fish seed required for farming. Integrated fish / livestock / crop farming will be encouraged with a view to ensure maximum utilization of resources. Fish cages and pens will be established in reservoris with the involvement of farmer organisations and fishermen organisations. Culture of fish in cages and pens is popular in many countries. It will generate additional income and employment opportunities for the farmer and fishermen. Fish culture in seasonal village tanks has a great potential in Sri Lanka. These tanks about 100,000 ha. in extent retain water for about 6 - 8 months and have a considerable production potenital. An average yield of 750 kg./ha. can be achieved lization of these tanks due to grazing cattle and decaying vegetation enrich

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the water leading to the formation of fish food organisms.

Farming of freshwater prawns in ponds either under monoculture or polyculture along with fish will increase income of the pond fish farmer. Prawns can also be stocked in seasonal village tanks. Back yard hatcheries will be established in coastal areas for the production of freshwater prawn seed.

Farming of high value fish and prawn species in coastal areas and in marine waters on pilot scale will be undertaken and private sector investment in these fields will be promoted. Already about 2400 ha of shrimp farms have been established in the North Western Province, by the private sector. About 24,000 ha. of lands suitable for coastal aquaculture are available in the country.