INLAND FISHERIES AND AQUACULTURE FOR FOOD SECURITY IN SRI LANKA

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ABSTRACT

Total food demand in Sri Lanka has been projected to rise by 1.2% annually between 1993 and 2010, largely as a result of population growth and changes in population structure. Significant levels of under–nutrition exist in Sri Lanka. According to recent estimates, 36% of the population show symptoms of stunting and 18% of wasting. Another 5% show concurrent symptoms. According to World Bank estimates, about 22.4 % of the population, that is nearly 3.8 million, were poor. Poverty is greatest in the rural sector, followed by the urban sector and the estate sector.

In Sri Lanka, the number of people directly engaged in fisheries is estimated at 120,000; most of them are relatively poor. Sri Lanka is producing 206,000 mt of fish from the marine sector and 22, 250 mt of fish from inland water bodies.

Fish and fisheries products are important to ensure food security of resource poor communities, Fish and fisheries products also provide much–valued foreign exchange. Earnings from total fisheries exports from Sri Lanka during the year 1996 were worth Rs. 4297 million.

More than 95% of the fish production in Sri Lanka is from capture fisheries, the rest is from aquaculture. The Sri Lankan Government has realized the importance of carefully managed exploitation of natural fish resources and has made rules and regulations to switch over from open access fisheries to community managed fisheries. While coastal fish resources are approaching their maximum sustainable exploitation limits, there is a considerable potential in Sri Lanka for expanding inland aquaculture in order to attain food security for the nation. Sri Lanka has 3 hectares of inland water for every square kilometer of land, perhaps the highest density of water for any island in the world. The total area of reservoirs in Sri Lanka will rise to over 250,000 hectares when construction of all the reservoirs has been completed as planned.

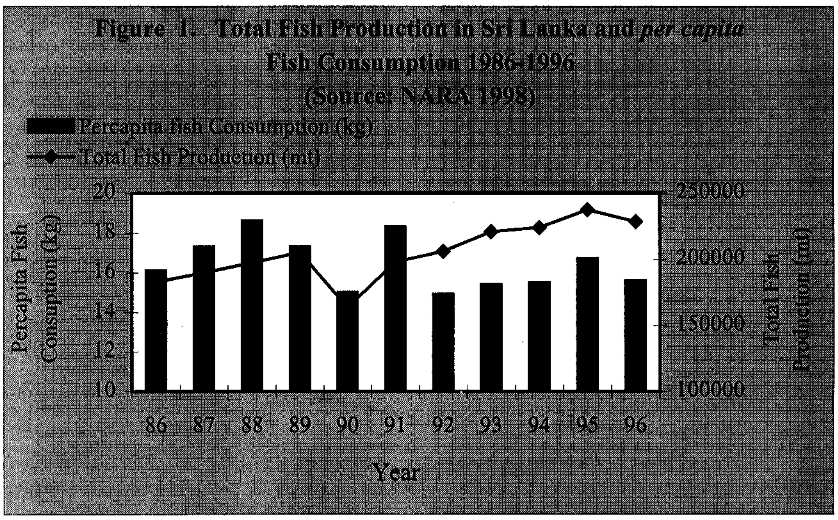
The introductions of exotic fish *Tilapia spp.* has increased the fish yields from 1 kg/ha to 227 kg/ha and has contributed towards establishment of capture based culture fisheries. Considering these trends, the Government policy is to concentrate on the culture-based capture fisheries in inland reservoir to ensure the food security of the poor communities.

INTRODUCTION

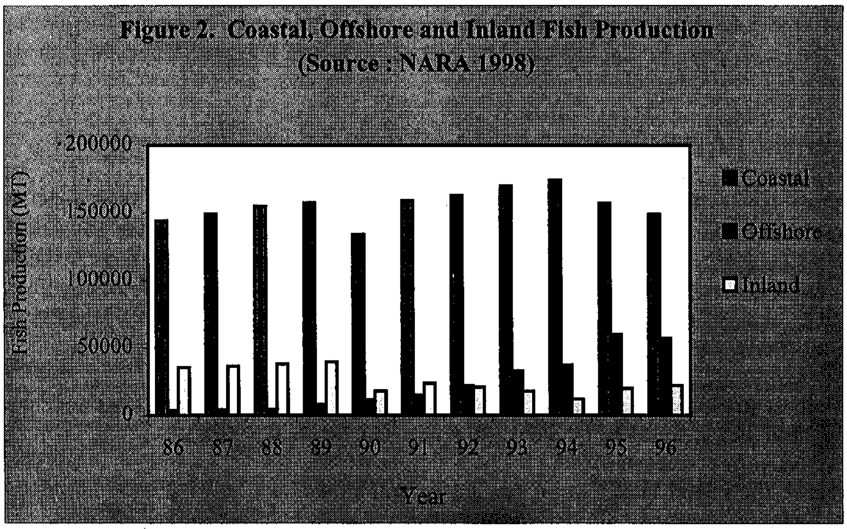
The food demand in Sri Lanka rose by 1.5% per year and an annual rise of 1.2% between 1993 and 2010 is projected. The population growth and changes in population structure is said to be responsible for this change (FAO, 1996). The rate of rise is greater in urban areas and is expected to be 3.3% annually till the year 2010. Analysis of households achieving different levels of calorie requirement show that about 30% of the households consume less than 90% of calorie requirements, while about 40% of households consume over 115% of calorie requirements.

Fish production in Sri Lanka

Coastal fish production has contributed between 65.3% and 78.8% during the period 1986 to 1996 to the total fish production while inland fish production has contributed only between 19.3% and 5.4% during the same period. Figure 1 gives the coastal, offshore and inland fish production during the period 1986 to 1996.



During this period coastal fish production has varied between 174 500 and 134 132 mt while inland fish production has fluctuated between 12 000 and 39 721 mt The drastic reduction in inland fisheries production from the year 1990 is a result of the withdrawal of state patronage for inland fisheries. The country's total fish production has not fluctuated very widely but has stabilized around 230 000 mt. during last few years (Figure 2).



Fish imports

To supplement the fish and fish based protein requirement, considerable quantities of Maldive fish, dried fish and preserved or processed fish are imported to Sri Lanka (Figure 3). During the year 1995, Sri Lanka imported 20 196 mt of preserved or processed fish, 44 798 mt of dried fish and 3371 mt of Maldive fish. The imported fisheries products also contribute significantly to the *per capita* fish consumption in Sri Lanka.

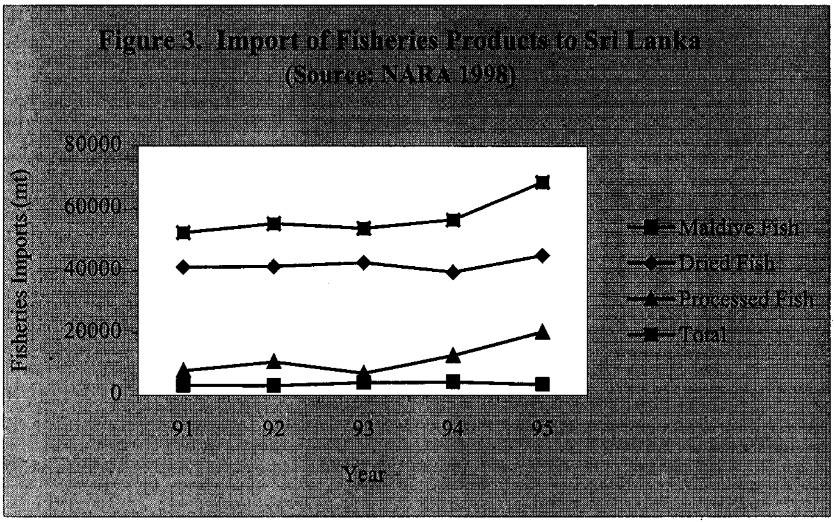


Figure 3. Import of Fisheries Products to Sri Lanka (Source: NARA 1998)

Fish consumption.

Around 56.5% of the total animal protein consumption comes from fish. During 1986 to 1996 period national *per capita* fish consumption has fluctuated between 18.6 and 14.9 kg, while it reached a value of 15.6 kg during 1996. (Fig 2). Although our *per capita* fish consumption is higher than that of India, Bangladesh and Indonesia it is lower than in the Maldives, Malaysia and Thailand. The average intake of fish protein in the rural areas can be increased by promoting inland fish production through culture based capture fisheries.

Food insecurity and rural poverty in Sri Lanka

Significant levels of under–nutrition exist in urban and rural areas of Sri Lanka; 36% of the population show symptoms of stunting and 18% of wasting (FAO 1996). Another 5% show concurrent symptoms. Nutritional status data by age group and sex show that the stunting affects males and females equally (36%), but more males show wasting (20%) than females (17%). Incidence of stunting in different age classes shows similarity among males and females, but females show higher rates of wasting than males in the early stages (FAO 1996).

According to World Bank estimates, about 22.4% of the population (3.8 million) were poor. Poverty is greatest in the rural sector, followed by the urban sector and the estate sector.

To enhance the inland food fish production several exotic species have been introduced to inland waters Three African cichlids, *Oreochromis mossambicus*, *O. niloticus* and *Tilapia rendalli* have successfully colonized inland waters and contribute significantly to the inland fish production. The common carp (*Cyprinnus carpio*) Chinese carps, (*Hupothalimichthys molitrix* and *Aristichthys nobilis*) and Indian carps, (*Catla catla, Labeo rohita* and *Cirrhinus mirigala*) grow well in our inland waters. There is evidence that the trout, common carp and Indian carp (Rohu) are spawning in wild. There are records on the introduction of brackishwater indigenous species *Etroplus suratensis, Chanos chanos* and *Mugil* spp. to inland fresh water bodies.

Capture based culture fishery in inland waters

Sri Lanka's freshwater fisheries have historically not been considered to be of any economic importance. Only subsistence level fishing activities have been evident in both inland freshwater and brackishwater bodies. It was only during 1949/1950 that a concerted effort was made to utilize inland waters to increase fish production. The origin and the gradual development of the inland fishery which to date is essentially the reservoir capture fishery attributed to the introduction of *O. mossambicus,* an African cichlid fish. Within a few years of introduction, *O. mossambicus* had a tremendous impact on fish production, particularly from the larger irrigation reservoirs (Fig 4). By 1956, the introduction of *O. mossambicus* proved to be a tremendous success and small scale commercial fisheries had begun to operate.

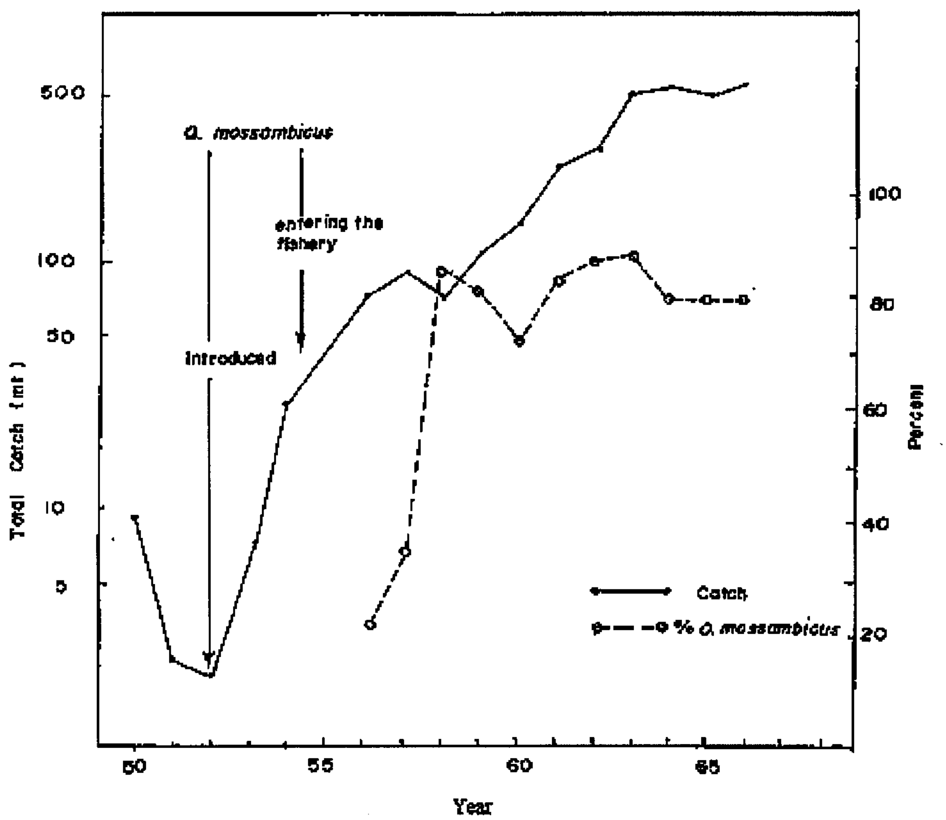


Fig. 4 . Impact of introduction of Tilapia on reservoir fishery

The annual fish yields before the introduction of *O. mossambicus* was around 1 kg/ ha in Parakrama Samudra. The average annual yield increased upto 227 kg/ ha since *O. mossambicus* dominated the fishery. The indigenous fish comprise a sizeable proportion of the catch consisting of herbivorous carps, carnivorous catfishes, snake heads and an indigenous cichlid, *Etroplus suratensis*. Most large shallow reservoirs have the same trends in production as Parakrama Samudra. Fish yields are low in deeper reservoirs like Senanayaka Samudra and in deep upcountry reservoirs with low temperatures, Tilapias have established themselves and are self-propagating. In highland reservoirs relative abundance of *O. Mossambicus* is the highest (30-58%), followed by *O. niloticus* (7-21%) and *T. rendalli* (0.65-3.0). Important factors that affect their colonization success include the food and nesting site availability.

Exotic carps have been introduced to these waters and there is evidence that common carp and rohu are self-propagating in upcountry reservoirs. Seasonal tanks are relatively smaller in size and they are dry for periods of 2-10 months of the year. These reservoirs can be used for culture based capture fisheries. Exotic fish in the reservoirs have potential to maintain natural self-sustaining populations if stocked in adequate numbers (Nathaniel and Silva, 1992).

The present estimated annual inland fisheries production is approximately 18 000 mt. This production is mainly based on capture fisheries of major and medium scale irrigation reservoirs. The highest production (39 700 mt) was recorded during the year 1989 before the withdrawal of state patronage for inland fisheries. According to the estimates of De Silva (1988) the annual fish production is around 307 kg/ha in reservoirs. Sri Lanka's reservoir fishery is mainly carried out by gill nets. The permissible mesh size is over 75 mm. In addition to gill netting, sporadic cast netting and angling takes place in most reservoirs. With the reestablishment of state patronage in 1994, a trend has been observed to increase inland fish production.

Utilization of seasonal reservoirs for culture based capture fishery was initiated in the latter part of the 1970's. High production levels (890-kg. ha^{-1}) can be achieved by polyculture of exotic carps. The combinations used included different percentages of catla/big head carp, rohu, grass carp, mrigal and common carp. Stocking densities recommended are 2 000 to 3 500 fingerlings ha^{-1} (Chandrasoma, 1996).

Government objectives, policies and programmes

The five-year development plan of the Ministry of Fisheries and Aquatic Resources has set the objectives and target for the development of the fisheries sector and aquaculture. There are clear set policies and strategies, and an investment plan to achieve these objectives and targets.

Recognizing the importance of aquaculture and inland fisheries to improve the nutritional status, and to reduce poverty by increasing, gainful employment and income opportunities, the Government of Sri Lanka has included the following development policies in its five year plan:

- Development of aquaculture and inland fisheries as a means of increasing domestic production, employment and nutrition.

- Development of a national programme for the exploitation of the fisheries and aquatic resources on sustainable bases.

- Provision of fiscal and other incentives for aquaculture.

- Implementation of appropriate scheme to provide welfare facilities to fishing communities.

The Ministry of Fisheries and Aquatic Resources will shortly establish an independent authority to be in charge of development, management, production and extension in inland fisheries and aquaculture. It will also be actively involved in transfer of aquaculture technology to the private sector, fish disease control, fish feed preparation, brood stock development and implementation of inland fisheries regulations (MOFAR, 1995).

The common property resources such as reservoirs will be managed in a more effective way by providing fishery rights to fishing communities to ensure greater participation by communities in managing their resources. Seasonal tanks which form an important resource for aquaculture development will be managed through established rural level organizations allotting rights for aquaculture in their tanks to members of such organization.

The new Fisheries Act through rules and regulations controls mesh size, environmental destruction, and fishing pressures on inland fish resources. The same act bans the use of destructive fishing methods.

Considering the resource availability and the present policies, programmes and strategies aquaculture and culture based capture fisheries will play a positive role in future, ensuring food security of the resource poor rural communities of Sri Lanka.

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