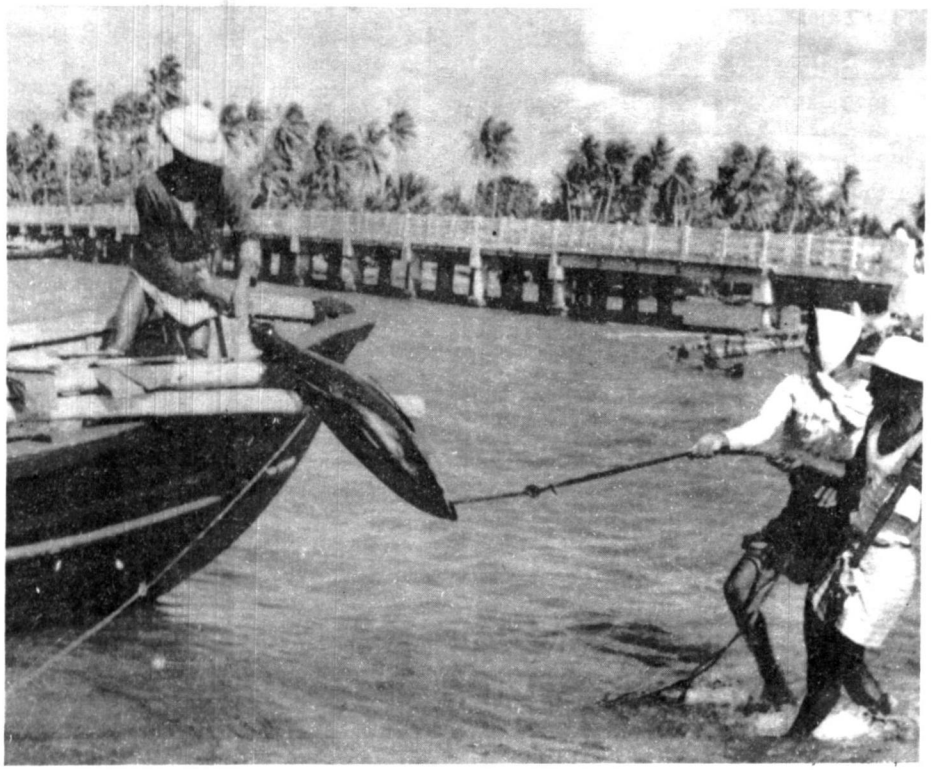


FISHERIES

Sri Lanka's fisheries sector has in recent decades been regarded as one of the major potential fields for expansion in the economy. There are many reasons for this, particularly the reportedly rich resources in the seas surrounding the island, and the numerous fresh water tanks and reservoirs; and brackish water lagoons, estuaries and, swamps available for breeding and harvesting of fish. Furthermore, fish constitutes a popular item of food and provides an important protein element in the local diet. The programme for developing the country's fisheries has therefore continuously enjoyed a position of high priority in all development plans.

The country's Ten Year Plan of 1959/68 for instance, placed much emphasis on the expansion of fisheries and stated hopefully "the Plan seeks, in fact, to meet the country's requirement of fish products by 1968". This goal, however, has not been within sight upto date. Although production has shown a significant increase in the past few years we are no closer to the goal of self suffiency than we were ten years ago. The contribution of the fisheries sector to the country's Gross National Product has also moved up slightly over the past ten years though the overall contribution, remains a comparatively insignificant 3 percent as seen in the table below.

At present the fisheries sector contributed about 85 percent of the total consumption of fish in the country. It also provides employment to about 74,000 persons in fishing and to about 20,000 persons in related anciliary occupations such as marketing and distribution of fish, boat building, ice making etc., according to a report on progress achieved by the Ministry of Fisheries, 1977–1982 complied by the Ministry of Fisheries.

Another fact of significance is that at present this industry supplies a substantial portion of the protein consumed by the population. According to authoritative sources 70 percent of the animal protein consumed locally is from fish.

Local Fish Production

During the last 10 years local fish production is reported to have increased from 99,000 tons to 210,000 tons; the increase in production between 1973 and 1982 being over 112 percent. In the latter part of this period that is from 1977 to 1982, fish production is reported to have increased by 54 percent from 136,000 tons to 210,000 tons, indicating an average yearly increase of almost 11 percent. Compared to the 1977–82 period the average yearly increase in production appears to be higher in the 1978–82 period (See table 11)

The main increase as seen in Table 111 was In coastal fisheries, and the rise in production in this sub-sector is attributed to the increase in the number of mechanized craft and increased availability of fishing gear, engine spares and various other materials that have become available with the liberalized import policy. That these production increases, during the latter period, were achieved in the face of rapidly increasing fuel costs as well as the cyclone which destroyed a large number of fishing vessels on the East coast in 1978, is of particular significance.

During the 1978–82 period the increase in the total value of fish production was four times greater than the value of fish produced during the previous four year period. In 1977 the total value of fish production was Rs.598.6 million, but by 1981 it had reached Rs 1,845.2 million. (Table 111) indicating an increase of 208% over that of the year 1977. This increase in value may be due to both inadequate supply and heavy demand for fish and the increasing cost of production which resulted from growing inflation during the period.

The two types of fishing most commonly practised in the island are Marine fishing and Inland fishing. Since Sri Lanka is surrounded by sea marine fishing has

Table 1 Contribution of the Fisheries Sector to the GNP at Current Factor Cost Prices 1974–1982 (Rs.Mn)

Year	1974	1975	1976	1977	1978	1979	1980*	1981*	1982*
Fishing	310	376	405	741	823	1,379	1,714	2,168	2,903
GNP	23,119	25,478	27,750	34,432	40,242	49,542	61,814	77,625	89,674
Percentage	1.34	1.48	1.46	2.15	2.05	2.78	2.77	2.79	3.24

* Provisional

Source: *Central Bank of Ceylon.*

Table 11 **Local Fish Production 1973–82 and Growth Rates**

Year	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
Total local Production (000 tons)	99	109	127	134	137	154	166	184	203	210
% annual increase/ (–) decrease	99	9.92	16.66	5.21	2.13	12.84	7.53	11.46	11.20	3.15
% increase for the period			37%					54%		
% average annual increase			7.4%					10.8%		

* Provisional

become the predominant activity accounting for about 85 percent of the country's present fish production. (Table 111). However, fisheries can be further divided into three sub-sectors, according to the area of operation, that is:

1. Coastal fishing
2. Off shore and deep sea fishing
3. Inland fishing

Production, according to Fisheries Ministry statistics has shown a considerable growth in terms of both quantity and value between 1977–82. The details of production in each sub-sector over this period are given below in the table 111.

Deep Sea and Off shore Sector

Data on total production production compiled by the Ministry of Fisheries show an upward trend over the five years from 1977–1982. A closer look at table 111 reveals a significant variation in the trend of production in the deep sea and off shore sector. In this sector production recorded in 1977 was 307 tons and by 1982 it was 2,200 tons. After 1978 however, there has not been a growth in production. It reached a peak of 2,900 tons in 1978 and was down to 2,200 tons by 1982; a decline in the deep sea and off shore sector by 703 tons over this period. The reasons for this drop in production have been attributed to the rising cost in production and inability of many new enterprises to meet this increase. The inflationary impact on the local currency also had an effect.

The production figures of the Deep Sea and Off Shore sector constitute the catches landed by the Fisheries Corporation, fish seized from foreign vessels where they fished illegally in Sri Lanka territorial water, and catches of Cey-Nor foundation vessels, 38 foot size ADB Project boats, and licenced foreign consigners operating vessels in our seas.

Research and exploratory fishing in recent years have indicated promising resources in the Deep Sea and Off Shore fishing zone, particularly within 25–60 miles from the coast, where migratory stocks of large pelagic fish notably skipjack and tuna species are available for commercial fishing.

The emphasis in the Fisheries Ministry's Master Plan was on coastal fisheries, but off shore and deep sea fishing was also expected to make a fair contribution. According to the plan total production of fish was to increase from 154,000 tons in 1978 to 300,000 tons by 1983, an overall increase of 146,000 tons over this five year period. In these targets the contribution in the increase from off shore and deep sea fishing was to be 31,000 tons. Unfortunately by the end of 1982 off shore and deep sea fishing contributed even less than in 1978 and also total production of fishing was estimated to have reached only 210,000 , yet approximately 90,000 tons short of the Plan's overall production for 1983.

The shortfalls in production were due to the inability of Ceylon Fisheries Corporation to carry out deep sea fishing operations effectively with its heavy overheads, managerial and labour problems, while the lack of maintenance of the vessels owned by Corporation added to its problems. The absence of private sector investment in this sub-sector due to risks, uncertainity, lack of information and technical know-how were also major constraints in the development of this sector, However, higher fuel costs may have been the crucial factor causing the lower rate of growth in production.

The fish resources lying within Sri Lanka's Exclusive Economic Zone (EEZ) of 200 miles forms the basis for the development of the Sri Lankan fishing industry. These resources are divided into (a) The primary fishing resources lying on the continental fish area, which is narrow, rarely exceeding 25 miles. It is estimated that an annual sustainable catch of about 220 tons can be harvested from this area, although the present catch is only about half this amount (b) A secondary resources is the fish available in the area beyond 25 miles. Substantial quantities of skipjack and tuna species are said to be found in this

Table 111 **Fish Production by Sub-sectors 1977 – 1982**

Quantity (Q): Tons
Value (V): Rs Mn

Sectors	1977		1978		1979		1980		1981		1982 *	
	Q	V	Q	V	Q	V	Q	V	Q	V	Q	V
Deep Sea & Off shore	307	1.4	2,903	9.5	2,066	11.4	2,114	14.1	2,144	18.2	2,200	n.a.
Coastal	123,411	575.0	133,744	758.6	146,507	935.2	162,661	1,218.9	172,318	1690.1	174,500	n.a.
Inland	12,863	22.2	16,474	31.0	17,150	38.0	19,947	58.1	29,124	136.9	33,400	n.a.
Total	136,581	589.6	154,121	799.1	165,723	984.6	184,722	1291.1	203,586	1845.2	210,000	n.a.

n.a. Not available * Provisional

Source: *Ministry of Fisheries*

area; while there are also resources available for trawling in this area. Here too, the potential has hardly been tapped.

It was planned to introduce new and larger vessels, through foreign aided projects, capable of fishing in the area from 25 to 60 miles off shore. In the deep sea sector resources exploitation on the basis of foreign collaboration was to be encouraged; but most of this has not materialised. The Fisheries Ministry also had planned to licence fishing vessels for operating beyond 25 miles from the shore in exchange for specific licences and management assistance. Past experience has shown however, that this facility of licencing foreign boats can be abused.

Foreign Trawl Fishing companies were encouraged to participate in joint ventures for fishing in Sri Lanka waters. Among the conditions offered to these companies were:

(a) The zone of fishing operations should be beyond 25 miles from the coast; and out of the area reserved for local fishermen,

(b) They should pay a "Royalty" from the earnings of their catches.

(c) The Fisheries Corporation should be permitted to purchase 40 percent of their catch on an agreed basis.

(d) The Ministry of Fisheries has the sole power to inspect their vessels and catches at any time.

Agreements were signed by three Foreign Trawl Fishing companies in 1978, and those agreements collapsed after a few months of their fishing operations due to several detections of poaching in Sri Lanka's coastal waters.

There has also been evidence of poaching in Sri Lankan territorial waters by unauthorised foreign trawlers during this time. The crews of these vessels were fined and their catches confiscated and transferred to the Fisheries Corporation. The peak in Deep Sea and Off Shore fish production in 1978, includes 94 tons of fish seized from the foreign vessels that illegally operated in our territorial waters.

Coastal Sector

The coastal sector is defined as the belt of the sea stretching upto 25 miles from the shore, on the continental shelf where there is a comparatively shallow sea zone near the coast.

> *"In the past, there have been a spate of plans and a plethora of proposals for the development of the fishing industry in Sri Lanka.*
>
> *Unfortunately, most of these were ad hoc plans, ill-conceived, lop sided and evidently prompted by political expediency. Consequently, they inevitably sought to ignore basic relities and the larger interests of the industry itself.*
>
> *Therefore, it is not surprising that all these ambitious moves proved dismal failures, despite the vast sums of money frittered away in attempts to implement them, in an indecent haste without due regard to economic feasibility or viability.*
>
> *For instance, some of the plans placed responsibility on a public sector institution or on the cooperatives, but failed to provide the necessary guidance, support and direction required by such institutions. Others relied on the private sector which was fighting shy to invest because of the uncertain political and financial climate rendered worse by import restrictions and the high risks involved. Besides, where the private sector entrepreneur invested no fish was produced.*
>
> *The acts of commission and omission in the past are many and varied. For instance, vessels of new design were put to sea without adequate testing, and with fishermen inexperienced in the operation of these vessels. Crash investment programmes were launched without sufficient research and experimentation. The most common shortcomings were the failure to diligently assess the capacity and needs of the private sector and to take cognizance of the inadequacy of public sector institution and support facilities. Even when fish was caught there was a shortage of ice almost everywhere, except in Colombo. Many fishermen could not fish during certain seasons because of inadequate safe anchorages for their boats. Large harbours were built at considerable cost even though they were not necessary for small coastal boats .....*
>
> *..... In recent years, consumers have been baulked by a steady decrease in fish supplies and rapid price rises. I intend to ensure that these trends are reversed."*
>
> Festus Perera, Minister of Fisheries
> MASTER PLAN FOR DEVELOPMENT OF FISHERIES IN SRI LANKA 1979--83
> Ministry of Fisheries, March 1980.

In 1977 coastal fishing provided almost 90 percent of total fish production, while in 1982 about 83 percent or 174,600 tons was supplied by this subsector. Although the percentage contribution decreased the annual quantity produced by the coastal sector increased by 51,000 tons for the period 1977–82. In the early 1950s "Madel" fishing contributed about 40 percent of the total fish catch but with the introduction of new mechanisation schemes this traditional method of fishing began to fade out. At present Madel fishing contributes only about 10 percent or less of total catches. The following table indicates the proportion of production in the coastal sector according to type of the fishing craft.

Most of the development activities envisaged in the Master Plan for the five years 1977/83 was to have taken place in the coastal fishing sub-sector. The Plan noyed that "this emphasis on coastal development reflects the abundance of unexploited resources in that era, and the Government's view that the owners of coastal fishing boats do not have the experience or finance to make a rapid transition to offshore and deep sea fishing. The coastal fishing fleet will be expanded by the addition of large numbers of craft which have already proved to be successful in fishery".

Production in this sub sector was expected to move up from 135,000 tons in 1978 to 216,000 tons in 1983, but by 1982 the contribution from coastal fishing was only 174,500 tons; nearly 40,000 tons behind Plan targets. The increasing trend in production in this sub-sector, however, is attributed to the large number of new vessels introduced during this period, the mechanisation of indigenous craft and the availability of engine repair and boat repair facilities.

There is also a notable change in the position with regards to production by the type of the craft being used in the coastal sector from 1977–1981. Although the production of non mechanized craft recorded growth during the period the

Table IV **Fish Production in Coastal Fisheries Classified by Fishing Craft 1977–1981 (Tons)**

Type of Craft	1977	1978	1979	1980	1981	1982
3½ ton inboard mechanized crafts	43,149	49,081	49,611	53,962	55,565	59,428
Out board mechanized crafts	39,487	38,124	43,157	56,526	64,480	65,676
Non mechanized crafts	40,775	47,539	53,738	52,173	52,273	54,553
Total	123,411	134,744	146,507	162,661	172,318	179,657

Source: *Ministry of Fisheries*

production increases from other mechanised craft were far greater by 1981.

The failure to increase the number of crafts and availability of gear reduced the growth rate of the fish production from mechanised craft in 1982. As seen in table V, there is a drop in the issue of boats in 1982. The delay in the issue of inboard mechanized crafts to Fisheries Co-operative Societies! increasing cost of production of craft and vessels, and inadequacy of some essential fishing gear have been the major cause for this situation. Also, factors such as lack of technical know-how and managerial inefficiencies in the Co-operative sector, to which a large part of the operational force of the coastal fishing sector belongs, further contributed to the lower growth rate.

In addition to supplying a major part of the fish for the local market, this subsector also performs the function of a valuable foreign exchange earner. The export of prawns and lobsters alone earned Rs 282.6 million in 1981. Furthermore, since the coastal fisheries employed most people and generated most income this sub-sector needs to receive more attention than the other sectors. Also, compared with high cost of production and heavy investment in the Deep Sea and Off shore sector, the coastal sector has a more manageable input cost per unit of fish produced and it uses minimum foreign exchange per head employed.

Problems which face this sub-sector were highlighted in the 1978 fishery sector survey. Among them were the:

1. Acute shortage of fishing nets with the higher costs and unsatisfactory distribution of available nets.

2. Inoperative time of fishing gear and craft due to shortage of spare parts, high cost and lack of repairs and maintenance and;

3. Inefficient and uneconomic fishing operations due to various shortcomings of the co-operative sector. The shortfall in production of about 60,000 tons of fish per year is attributed to such factors.

The main remedial measures are no doubt better capacity utilization of existing fishing fleets, and the supply of adequate infrastructural facilities.

INLAND FISHERIES

Freshwater

The Master Plan for the Development of Fisheries in Sri Lanka 1979–83 set out in its targets a production of 50,000 tons or one-sixth of entire local fish supply to come from Inland Fisheries by 1983. The Plan has accorded high priority to this sub-sector in view of its vast development potential. Public sector investment which was about Rs. 3 million in 1977 was due to reach Rs 30 million by 1982. As the area available for fisheries in inland waters appeared to be over 700,000 acres the targets set seemed to be practicable, although there were certain basic requirements to be met in achieving them. The total spread of water bodies at Full Supply Level (FSL) is given below in table VI.

The development of inland fisheries production, however, involves more problems than that of marine fisheries. The supply of fish for stocking in water bodies, the number of harvesting units, the location of fish breeding stations, the adequacy of water supplies, and the need to build

Table V **Number of Craft and Gear Issued between 1977–82**

Type of craft and gear	1977	1978	1979	1980	1981	1982	Total
28'–32' class boats	218	248	313	565	374	76	1794
17'–23' class boats	–	–	503	1510	676	658	3347
15' FRP boats	–	–	–	166	300	128	594
Inboard engines	31	41	150	270	12	2	506
Outboard engines	56	2124	3263	1637	850	1080	9009
Total	305	2413	4228	4148	2212	1944	15,250

Source: *Ministry of Fisheries*

Table V1 Acreage of Inland Water Bodies at FSL

Type of Water Body	Acreage
Major irrigation reservoirs	175,000
Medium scale irrigation reservoirs	42,000
Minor irrigation reservoirs	97,000
Mahaweli area reservoirs	60,000
Hill country reservoirs	20,000
Flood lakes and villus	10,000
Brackish water bodies	300,000
Total	704,000

Source: *Ministry of Fisheries*

up a consumer preference for this new product are all major issues in a successful Inland Fisheries programme.

Most of the fresh water bodies are spread over the dry zone while the brackish water bodies are located on the coastal belt and this provides an opportunity for creating an integrated network of fish producing centres in every part of the country. A major factor in favour of inland fisheries is that if successful it could reduce the cost per unit of this important dietary item for the average consumer. It could also be more easily accessible to consumers in the hinterland where sea fish is expensive due to difficulties of distribution.

In the 1950's efforts were made to utilise irrigation tanks and reservoirs for increasing fish production. This programme however, was slow in getting off the ground and it was only from the 1960's with the introduction of exotic fish varieties such as Gourami, Thilapi and Carp into the dry zone water bodies that inland fish production began to show marked progress (See Table V11)

Production moved up more rapidly after 1977. From 12,863 tons it rose to 33,400 tons by 1982, an increase of almost 150 percent during the period. The production increase in 1981 was the highest on record. The improvements at some of the existing breeding centres; removal of obstacles in inland waters which limited harvesting capacity, provision of credit and subsidies for purchase of fishing boats and gear and the better adaptability of exotic fish varieties to the ecological conditions of inland water bodies have all helped to account for this situation. But in 1982, production at 33,400 tons did not increase as rapidly as in the previous year. This was caused by the severe drought in the dry zone during 1982, which even resulted in the prohibition of fishing in the Nuwarawewa, Nachchaduwa, Kalawewa and Balaluwewa between June and August 1982.

One of the major constraints in the development of inland fisheries in the dry zone is the difficulty for water bodies to retain reasonable water levels during the drought. A large number of these water bodies run dry with the drought, while some of the major irrigation reservoirs are capable of retaining water at a certain level even under the drought conditions. The tanks in the dry zone are therefore, divided into two categories:

1. Seasonal tanks which retain water for a few months of the year and could provide an adequate period for growth of fish. Production here is not possible throughout the year due to drought. Although the number of these tanks are greater than the perennial tanks, their total acreage is less.

2. Major and medium size irrigation reservoirs in the dry zone, regarded as perennials. Some of these tanks are fed through the river diversification schemes and a network of irrigation channels which help them to maintain a minimum water level at any time of the year.

Table V11 Production of Inland Fish* (000 tons)

Year	Production
1960	3.3
1962	3.8
1964	5.4
1966	9.1
1968	8.6
1970	8.1
1972	8.3
1974	7.5
1976	12.3
1977	12.9
1978	16.4
1979	17.1
1980	19.9
1981	29.0
1982	33.4

Source: *Ministry of Fisheries*

*Inclusive of brackish water fish production

Research carried out by the Ministry of Fisheries in the 1960's noticed that the fertility rate in seasonal tanks was much higher than in the perennials and that fish production too could be higher in the former. The problem of predators in the perennial tanks has also caused a certain amount of anxiety; while lack of knowledge and disinterest of inland residents in fishing, in addition to the conflicts that arise from the competing use of water for irrigation and drinking purposes all affect fish farming in these areas.

Another problem for inland fisheries has been its marketability, mainly that it is less palatable than sea fish. Another factor is the old cultural and religious taboo against fish rearing for consumption. There also appears to be a class bias against inland fisheries in that the prices of inland fish are lower than those of sea fish, and therefore those consuming inland fish may seem to fall into a lower social category.

These factors have not been a major obstacle however, and the Ministry of Fisheries has pursued a vigorous programme for development of the inland fisheries sector with a separate Division of Inland Fisheries being set up by the Ministry for this purpose in 1979.

The experience of some Asian countries, as well as findings of our own research workers, has led to setting up of intensive farming projects with the assistance of foreign agencies. For instance, the IDRC Cage Culture Project, the Fish Breeding Station, Dambulla established with UNICEF assistance and the UNDP Development and Training Project. In addition pond space capacity has been increased in the existing stations and new extension centres opened up.

In order to promote and increase harvest of fish in the inland tanks and reservoirs, the Ministry is offering a 90 percent subsidy on the total cost of new non mechanised boats and the fishing gear used for farming in these water bodies. For those engaged in fish farming in the tanks and ponds a 50 percent subsidy is offered on their total cost. The in-

creasing interest in this assistance is seen in table V111 below.

There are also plans to build up a mariculture laboratory and to use it as a base for extended research training and development programmes. The Government's

Table V111 Subsidies and Crafts Issued for Inland Fisheries and Pond Fish Farming

Year		1980	1981	1982	Total
Inland Fishery	No. of boats issued	7	197	1871	2077
	Subsidies paid (Rs.Mn)	0.004	6.918	14.789	21.711
Pond Fish Farming	No.of cases	60	121	460	641
	Total extent (acres)	6.40	140.15	99.25	245.80
	Subsidies paid (Rs.Mn)	0.173	0.242	1.131	1.546

Source: *Ministry of Fisheries*

A definite advantage of inland fisheries for a developing country like Sri Lanka is its low capital requirements compared to the marine sector.Furthermore, there is no need for mechanisation of operations and fuel and this could keep consumer prices at lower levels than those of marine fish. Development of this subsector could also encourage people to consume more protein in the form of fish and help to relieve malnutrition problems of the poorer segments, particularly in Sri Lanka's dry zone areas. It also has the potential to generate more full time employment and thereby improve the rural economy. It is for these reasons that inland fisheries have been accorded their present high priority.

Brackish water

In addition to the potential 400,000 acres of fresh water tanks and reservoirs there are 300,000 acres of brackish water lagoons, estuaries and swamps available for breeding and farming of high value species such as prawns, lobsters and crabs. The development of brackish water fisheries has been slower than that of fresh water mainly because of the lack of sufficient experience in this area. The low tides in Sri Lanka present problems of designing ponds for breeding purposes, while the heavy cost of pumping equipment to replanish pond water supplies has been another problem. Also, the techniques of culturing of seed of more important species for stocking lagoons and ponds in Sri Lanka have not been sufficiently developed and there is a lack of skilled personnel to develop them. Furthermore, the major breeding centre at Pitipana has suffered a major problem of water supply.

function in this regard would be connected with the basic research on collecting, distributing and harvesting fish, prawns and crabs and extension services to private sector entrepreneurs who will engage in the actual production.

The entire inland fisheries development programme is expected to take on an added significance around the mid 1980's when marine fisheries exploitation is expected to be pushed near to the upper limit. Furthermore, any further expansion of the high value species (lobsters, prawns, etc) will not be possible without development of fish culture since the wild stocks of these species are limited. Also, the rising costs of marine fishing could place a greater financial burden on Sri Lanka's economy and it would therefore be more beneficial to produce fish in inland waters in terms of both local and foreign exchange costs.

Fish Imports

Despite increasing production of fish in recent years in Sri Lanka ithasnot been possible to meet the country's entire demand from local catches. Imports of fish and/or fish products have been necessary to fill this gap in demand. National fish requirements at the recommended rate of per capita consumption have increased over the years mainly due to the growth in the country's population. Local production increased from 137,000 tons in 1977 to 210,000 tons in 1982. while imports also rose sharply from 9,000 tons in 1977 to 21,000 tons in 1982. An increasing portion of the gap between actual requirements and total local production available for consumption has been met through imports over the last decade. See table 1X.

Though there has been a gap between the country's requirements and local fish production which was met through imports, the overall percentage of imports has not been high and fluctuated between 20 percent in 1975 and 4 percent in 1981.

The unit prices of specific import items of fish have gradually increased over the years, with the exception of Maldive fish where a price decline was recorded in 1981. This trend has also resulted in an increasing outflow of foreign exchange in recent years, particularly in 1979, 1980 and 1982 when the volume of imports was also high. See tables X and X1.

Table 1X Percentage Shared by Fish Imports in the Local Market ('000 tons)

P = Production; E = Exports; I = Imports

Year	1975	1976	1977	1978	1979	1980	1981	1982
Total requirement at recommended level	289	293	297	304	308	315	317	321
Total local fish available for consumption (P.E)	126	131	134	149	160	181	202	205
Total fish supply to the market (P–E+I)	158	147	143	158	185	215	211	226
% shared by fish imports in the market	20.25	10.88	6.29	5.70	13.51	15.81	4.27	9.29

Table X Unit Value of Fish Imports and Exports (Per ton in Rupees)

Category	1977	1978	1979	1980	1981
Imports					
Maldive fish	5,914	9,352	16,451	18,632	13,745
Dried Fish	2,140	6,034	9,086	11,822	15,808
Preserved or Prepared fish	5,637	7,139	11,052	14,552	15,948
Others	23,745	10,303	13,333	19,290	41,177
Exports					
Prawns	40,281	81,617	105,118	107,031	120,511
Lobsters	81,865	137,288	117,007	130,294	154,884
Shark fins & Fish maws	64,610	21,154	178,163	213,998	291,721
Beach De-Mer	34,541	94,842	104,466	139,540	194,696
Fish (alive chilled and frozen)	21,264	46,124	8,344	101,540	224,799
Others	2,818	9,655	14,979	46,626	72,488

Source: *Ministry of Fisheries*

Table X1 Total Value of Fish and Fish Products Imports (Rs. Million) CIF

Year	1977	1978	1979	1980	1981	1982
Value of fish and fish products imported	19.9	33.9	139.4	297.9	108.8	317.8
Quantities imported (Tons dried weight)	5134.8	5112.9	18494.9	22384.6	6903.1	13595.1

Source: *Ministry of Fisheries*

The main item of fish imports was dried fish which has also taken up a large slice of the fish import bill. The next largest item of imports was preserved and prepared fish, followed by canned fish. These imports have been permitted in order to meet shortages and help stabilise prices. The imports of these items can therefore only be reduced with adequate local supplies coming into the market and this no doubt could also contribute to the development of the fisheries sector, as well as to a considerable saving in foreign exchange.

Fish Exports

Although Sri Lanka's fish production could not meet the country's entire requirements and there was a need to import fish to fill the gap in demand, exports from Sri Lanka exceeded 3,000 tons by 1982. However, present fish product exports are estimated at about 2 percent of total local production. The Ministry of Fisheries has announced that it would permit exports as long as availability of fish for local consumption is not affected. It permits exports only if they are of high price species which do not constitute a major proportion of domestic fish supplies, if there is a high employment added value content in the production process; if there is no depletion of fish stocks; and if foreign exchange earnings from overseas sales are substantial. Some of these items such as Beach-de-mer; Shark-fins; and Fish Maws are not consumed

Table X11 Exports of Marine Products and Relative Foreign Exchange Earnings

Q = Quantity in Metric Tons
V = Value in Rupees Million

	1978		1979		1980		1981		1982	
products	Q	V	Q	V	Q	V	Q	V	Q	V
Fresh fish alive	128.5	10.5	147.0	12.1	160.0	17.4	138.9	30.8	35.5	25.7
Shark fins and fishmaws	365.5	8.9	50.0	8.7	53.5	11.3	40.2	10.5	45.4	12.7
Chilled/Frozen live prawns	1969.4	158.3	2357.8	243.9	1733.5	182.6	2173.8	257.8	2190.3	326.4
Chilled/frozen lobsters	275.2	37.2	126.6	14.8	149.7	15.9	161.0	24.8	479.8	33.4
Beach De-Mer	68.7	6.5	61.4	6.3	78.7	10.8	72.7	13.8	76.7	17.3
Other marine products	113.1	8.2	217.0	14.8	141.8	7.9	115.7	8.4	385.2	21.8
Total	2920.8	229.6	2961.8	300.6	2317.2	238.9	2701.8	346.1	3195.3	437.3

Source: *Ministry of Fisheries*

locally. Of the marine products exported, forzen prawns, shrimps and lobsters account for about 75 percent of total foreign exchange earnings.

The value of exports of marine products reached a peak of Rs. 437 million in 1982. This was an increase of 361 percent over the earnings of Rs.95 million in 1977.

Factors such as the dearth of knowledge and experience in respect of culture methods and deep sea fishing operations; low level of knowledge among processors regarding maintenance and improvement of the quality of exports; inadequacy of laboratary facilities for testing of sea foods; and the lack of reliable data on availability of marine resources continue to act as constraints to the development of a marine products exports industry. The biggest export market for frozen sea foods are USA and Japan but Sri Lanka's share is less than 1 percent of either, the main reason being limitations in supply. Unless culture methods are introduced and developed rapidly and steps taken to remove the constraints there is little hope for establishing a marine products export industry. Meanwhile the Institute of Fish Technology and the National Aquatic Resources Agency (NARA) are continuing to identify and develop sources of marine products for processing and export and attempting to improve the quality and competiveness of marine products.

Fish Consumption

Per capita annual consumption of fish stood at 25 lbs in 1978. One of the targets set in the Plan for the Development of Fisheries was to raise annual per capita consumption of fish to 48 lbs by 1983 and thereby the nutritional level. Sri Lanka's fish consumption levels are far behind those of many other countries where fish is available; the reason for this being the inadequate supply of fish in the country. The recommended allowance of fish to be consumed by a person, according to the Medical Research Institute (MRI), is 60 grams per day or 48 lbs per year. On this basis Sri Lanka's fish requirements in 1982 should have been 321,000 tons, but production last year war only 210,000 tons. A part of the gap in the availability of fish was met through imports, but there were limits. The remedy for under-consumption of fish lies not in imports but in increased local production.

The actual requirements of fish at recommended levels and the total supply to the market are given in table X111 below.

Two distinct features can be observed in the above table, namely, in the period from 1972–1977 per capita consumption declined in the later years; and in the period from 1978–1982 per capita consumption shows a rising trend. Per capita consumption requirements are directly related to the growth of population, and levels of imports, exports and local production. Diagram 1 below shows the co-relation between per capita consumption and fish imports.

Diagram 1

FISH IMPORTS AND PER CAPITA CONSUMPTION

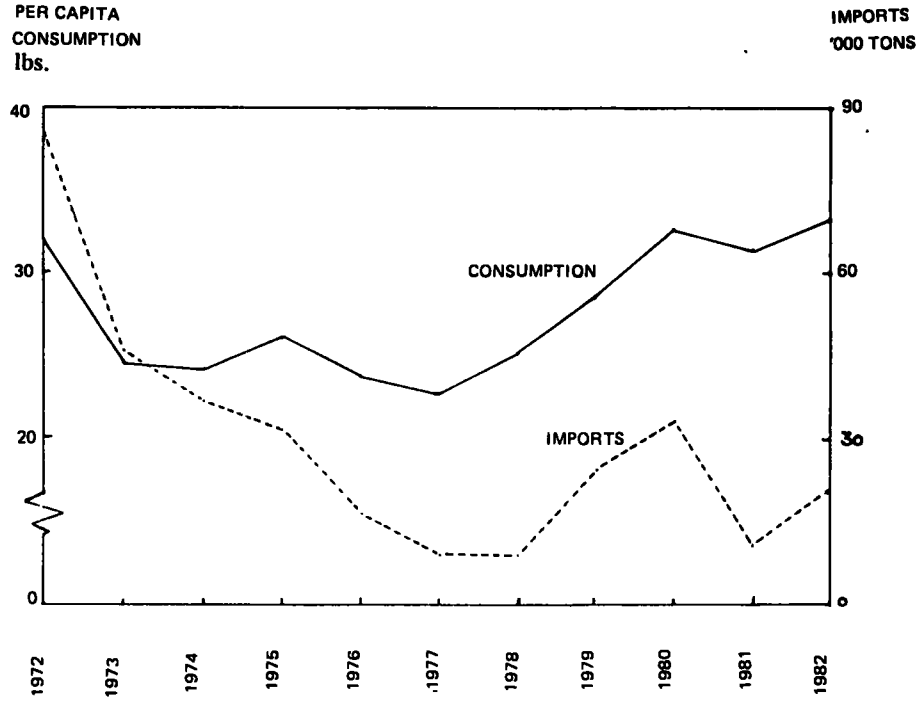


Table X111 **Total Fish Supply as a Percentage of National Fish Requirement at Recommended Level and Per Capita Consumption**

Year	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
Requirement	278	280	285	289	293	297	304	308	315	317	321
Total supply to the market	185	144	144	158	147	143	158	185	215	210	226
Supply as a % of requirement	66.5	51.4	50.5	54.6	50.1	48.1	51.9	60.0	68.2	66.2	70.4
Per capita fish consumption	32.0	24.6	24.2	26.1	23.9	22.9	25.0	28.6	32.7	31.4	33.2

Source: *Ministry of Fisheries*

Table XIV **Average expenditure for one month on fish per head by income groups (all island) and as a percentage of total food expenditure**

Income Groups (Rs.)	0-100	101-200	201-400	401-600	601-800	801-1000	1001-1500	1501-2000	2001-2500	2501-3000	3001
Expenditure for one month on fish (Rs.)	9.01	7.17	6.36	7.30	7.84	8.45	9.10	9.74	10.36	8.91	10.43
As a percentage of total food expenditure	8.22	6.75	5.77	6.40	7.26	8.60	10.31	12.19	14.54	13.35	17.93

Source: *Central Bank of Ceylon*

The main reason for the drop in per capita fish consumption in some years, reflected above, is the reduction of imports in these years. This feature is clear in the period from 1973 to 1978. The rapid growth of consumption in 1978, 1979 and 1980 is also related to heavy imports in those years. With the reduction of imports in 1981 consumption levels dropped and in 1982 it went up again with increasing imports. The significance of fish imports is apparent here; it helps to keep up levels of consumption in a situation where fish production is not keeping pace with increasing requirements.

The highest consumption levels for the ten year period indicated here was in 1982; this was not due to an increase in production but an increase in imports of fish.

Factors which influence consumption of fish are mainly the income levels of people; availability of fish in the market, and food habits of the people. People of different income groups show variations in consumption levels and household expenditure patterns. The table below on the expenditure pattern of fish per head by income groups gives a clearer indication of this.

Due to the non availability of reliable data the method of computation used to arrive at an idea of per capita fish consumption is total domestic fish production, plus fish imports, minus exports, divided by the country's population. The equation would be:

$$\frac{\text{Domestic fish production + fish imports − fish exports}}{\text{Country's population}} = \text{Per Capita Consumption}$$

The shortcomings in this formula are that:

a) Domestic fish production figures were based on the eye measurement of the sample selected by the officials and enumerators located in a few selected centres. In such circumstances the production figures may not be 100% accurate.

b) In computing consumption it is taken for granted that total fish production is edible. But there are unedible portions such as the fins, tail, gills, scales, bones, gullet, intestines etc. The edible portion of fish is estimated to differ from 35 percent to 65 percent, according to the variety.

c) In the exports of fish there is a large component of live fish and other varieties or parts of fish not generally consumed locally. In addition the foreign tourists to Sri Lanka consume a considerable quantity of fish which is not listed under either local consumption or exports. Tourist consumption was estimated at 2,327.4 tons in 1982.

In terms of the above formula per capita fish consumption was 33.2 lbs. in 1982 but in comes down further when the above factors are given consideration. The first two factors, particularly, if considered closely, can reduce per capita consumption.

Even with the help of over calculation per capita fish consumption appears to be around two-thirds the recommended allowance. These figures can result in misleading assumptions by nutritionists and planners of fisheries development projects. A more correct equation would be:

$$\frac{\text{Total domestic fish production − Minimum of 35\% unedible portions + fish imports − fish exports − fish consumed by foreign tourists}}{\text{Country's population}}$$

Relevant data according to this equation based on 1982 figures, are given below;

	Tons
* Total domestic fish production	210,000 –
Minimum of 35% unedible portions	73,500
Sub total	136,500
Fish imports	21,093
Sub total	157,593 –
Fish exports	4,999
Sub total	152,594 –
Fish consumed by foreign tourists	2,325
Sub total	150,269 ÷
Country's population	15,242,000
Per capita fish consumption	.01

(.01 tons = 22.4 lbs per person/year whereas the recommended allowance is twice this figure). If the production and consumption figures are looked at more realistically, in this manner, it appears that the point of self-sufficiency in fish is yet far ahead.

Self Sufficiency

An assessment of self-sufficiency could be made on the growth of population and fish production over the last decade. This assesment is based on assumptions such as no imports, no exports,

that the whole product is edible, the requirement based on recommended allowance by Medical Research Institute of Sri Lanka (MRI), and the growth of population according to projections of the Census and Statistics Department.

From 1972 to 1981 the fish requirement is estimated to have increased 1.45% over the years according to the growth rate of population and the MRI's recommended allowance of per capita fish consumption. In the meantime fish production has increased 7.83% over the years. On this basis the trend of both requirement and production can be clearly identified. When fish production/requirement is projected over the 10 years (1981–1991) on the above criteria the year in which self sufficiency may be reached can be 1989. (Diagram 11).

In the event that 35 percent of the unedible portions of total fish production is deducted; in order to attain a level of self sufficiency, either the rate of growth of fish production or the time taken to reach this target should be increased.

Fisheries Co-operatives

The Fisheries Co-operatives were incorporated on recommendations under the Fisheries Ordinance No.24 of 1940 and provided for specific facilities such as project financing, product marketing and mechanisation of the fishing industry. The type of Co-operative that emerged was the small Primary Co-operative of 20 to 30 members, but these did not possess either the financial and manpower resources or the geographical distribution necessary to make a significant impact on the fishing industry. By 1970 there were 290 co-operatives with a membership of about 7,000 fishermen, and in that year legislation was enacted for the amalgamation of these Small Fishermen's Co-operative Societies into 45 larger Primary Co-operative Societies. By 1975 these Primary Co-operatives had a membership of nearly 15,000 active fisherman which was estimated at nearly 20 percent of the total work force in the fisheries sector.

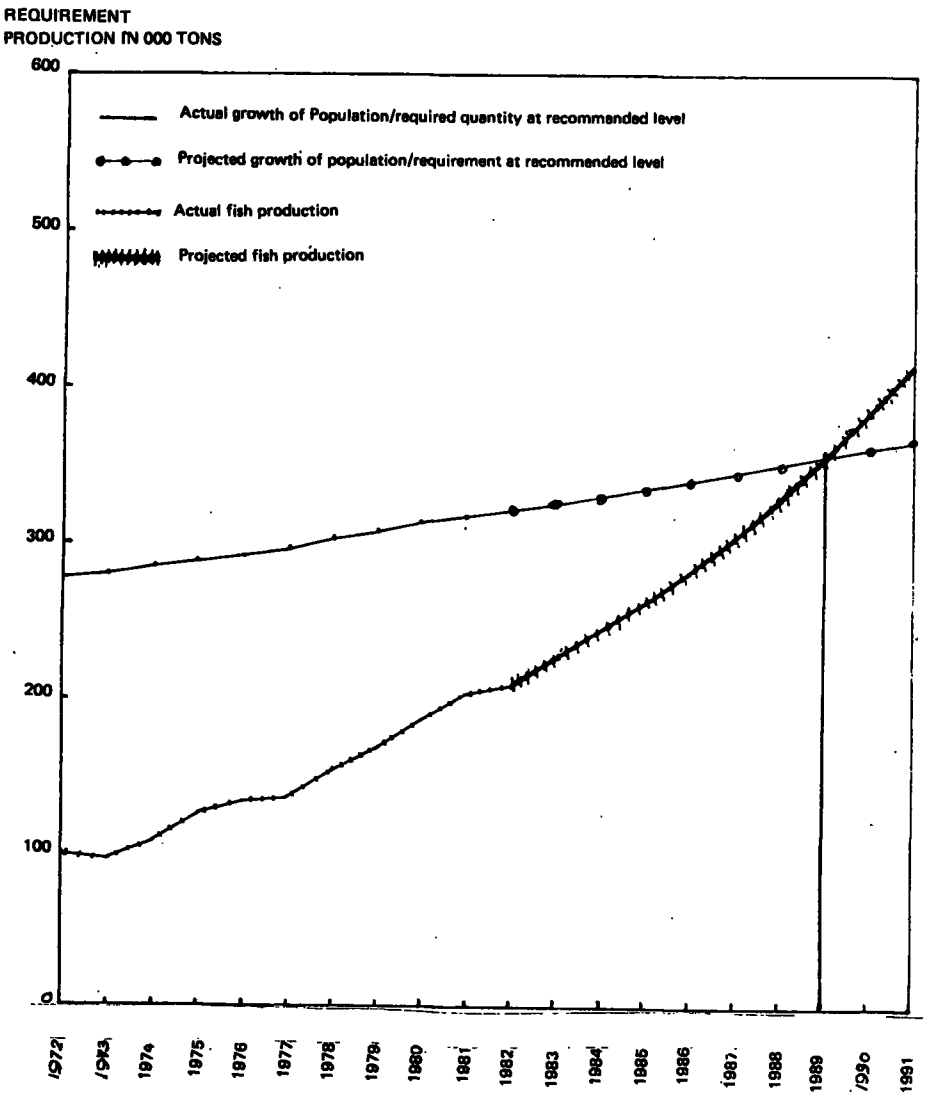
During this period, it was accepted that the future of the fishing industry depended on improving of the small boat sector and with a strong and active fishermen's organisation could help in improving the catches and handling and marketing of fish. The Ministry of Fisheries therefore adopted the policy of restricting the issue of 3½ ton mechanised boats, under hire purchase terms, to the Primary Fisheries Co-operatives Societies. The 3½ ton mechanized boats have played an important role in fish production, (see table 1V) and also in the Government's programme of mechanisation of marine fishing craft. These fisheries Co-operatives were therefore expected to develop into strong and viable organisations and perform a crucial function, but for various reasons they failed to come up to expectations. With catches far below the anticipated yields and other management problems, the majority of these co-operatives were not able to repay the loans they received.

A study carried out by the Ministry of Plan Implementation revealed many operational and organisational problems in these organisations. In order to repay their loans a 3½ ton mechanised boat was expected to bring in 38,000 pounds of fish per annum, but their catches were far below this level. A vast majority of societies obtained an annual catch of less than 30 percent of their caspacity.

The members of these co-operatives also faced problems of the lack of equipment such as nets and other fishing gear, a major cause for low catches.

The study revealed that catches delivered by members of the Co-operatives did not always represent the actual quantity of fish caught, since members were selling direct to traders in order to avoid a part of their returns being deducted on their loans. It was also found that members of the crew tended to regard these boats as not their own property but that of Government and it appeared that a formal transfer of ownership could have helped in increasing fish production and also raising the incomes of these fishermen.

DIAGRAM 2



The Fisheries Co-operatives were not able to cope sufficiently with the demands and requirements of their members and to stir in them the enthusiasm necessary to make a success of the concept of co-operative fishing.

The unsatisfactory situation in the Co-operatives led to various measures being taken by the Ministry of Fisheries to strengthten these organisations. Among the steps taken were:

1. The responsibility for the development and supervision of co-operatives Department, the Director of Fisheries being appointed a Deputy Commissioner Co-operative Development for this purpose.

2. Reorganisation measures were adopted in the co-operatives to enable them to be viable institutions.

3. A policy decision was taken to transfer the ownership of fishing craft to the skippers after repayment of loans. This had led to an improvement in the operational efficiency of these boats and in loand repayments.

From the beginning of 1981 the granting of credit to Fisheries Co-operatives on Advance Account was stopped mainly due to unsatisfactory loan recoveries. However, the People's Bank and Bank of Ceylon continue to provide credit to the societies. The Ministry of Fisheries has recorded that its loan recoveries from the mechanisation account and Co-operative Advance Account amounted to Rs 6.3 million in 1981 and Rs 3.9 million in 1982.

In addition to normal credit facilities provided to the Fisheries Co-operatives financial assistance has been channelled through the two State Banks on the special development projects such as the ADB's South West Coast development Project and a self employment project.

The failure of the Fisheries Co-operatives appears to have been in the lack of proper storage, marketing and distribution of fish and other infra-structural needs. Had these been better planned and supervised, the loans granted to the Fisheries Co-operatives could have been more easily recoverable, with these organisations functioning as viable units. This feature is evident in the ADB Project where loan issues and repayments have been more closely monitored. The result has been different in many self employment projects where supervision has been more slack.

Fisheries Banks

The People's Bank inaugurated a scheme for setting up Fisheries Banks in 1978 with a view to popularising the banking habits and helping to raise the socio-economic conditions of the poorer segments of the fishing community. The objective of these specialised banks was to service less priviledged fishermen more effectively than the existing Fisheries Co-operatives to provide a comprehensive credit structure for those engaged in the fisheries industry made such an alternative necessary. These banks, however, were to be housed as far as possible in buildings occupied by Fisheries Co-operatives Societies and were expected to maintain a close laison with the Co-operatives.

Some of the problems that these banks encountered in their first two years of operation were discussed in a Bank study in 1980. It was found that some of the Fisheries Bank branches were located at sites away from the fishing centres although the intention was to set up these banks where there were heavy concentrations of fishermen. It was also found that monopolistic private businessmen were already long established in these fishing communities and the Fisheries Banks with their formal structure and systems were finding difficult to meet this competition. These businessmen also had a close knowledge of the problems and conditions under which these fishermen operated and were therefore at an advantage. One of the objectives in setting up these Fisheries Banks was that in the course of time the fishermen should reduce or break off altogether their heavy dependence on the Mudalali but if this objective is to be achieved the Fisheries Banks should not stay there at a disadvantage when competing with the businessmen.

At present there are 20 branches in operation in the Western, Eastern and Southern coastline and they operate as part of the People's Bank branches in their particular areas. The areas in which these branches are set up are: Trincomalee, Addalachchenai, Kalmunai, Pottuvil, Tirukkovil, Valaichchenai, Koralawella, Ratmalana, Ambalangoda, Mathaluwa, Pereliya, Negombo, Wennappuwa, Beruwela, Panadura, Chilaw, Mahawewa, Gandara, Tangalle and Weligama. Among those that have shown most progress and results in the fishing communities where they operate were the Tangalle, Gandara, Chilaw and Wennappuwa, banks.

These banks provide facilities for maintenance of savings, investment savings accounts and fixed deposits accounts; pawn-broking; loans for production, purchase of small boats and fishing gear, housing, redemption of debts, emergencies and essential consumer needs; and facilities for diversification into other fields of gainful employment during offseasons.

As at 31st December 1982, savings, fixed deposit and Investment Savings Accounts at these branches numbered 13,762 with a balance of Rs 7.6 million. The advances of the fisheries banks amounted to Rs 15.8 million in respect of 150 loans. Pawning accounts had increased to 12,534; while the balance outstanding amounted to Rs 20.7 million.

In addition to its other fisheries financing schemes the People's Bank also promoted special fisheries projects. At Matara where ten selected fishermen have been provided assistance to purchase 28 ft. boats; while at Kalutara the Bank is participating in a scheme to provide 100 fibre glass fishing crafts to fishermen.

Producer Subsidies – Marine

Although the fishing industry was provided with certain producer subsidies from the 1950's, over the last two decades with the increasing requirements in this sector these subsidies have been made more comprehensive. The subsidy payments from 1977 in respect of boats issued are given below. (see table XV).

Prior to this producer subsidy schemes offered by the Director Fisheries covered up to 50 percent of the cost of mechanised craft and fishing gear. In view of the considerable price escalation due to mechanisation schemes a modified subsidy scheme

Table XV **Producer Subsidies Granted (Rs.Mn)**

Sector	1977	1978	1979	1980	1981	1982
Marine Sector	3.953	15.562	38.800	58.985	58.527	28.357
Inland Sector				.004	6.918	14.798
(Ponds)				.173	.242	1.131

Source: *Ministry of Fisheries*

was started in 1979. Under this scheme a higher percentage of subsidies were granted and the new beach landing boats were also included in its coverage. All this has resulted in an increase of the producer subsidy from Rs 3.9 million in 1977 to a peak of Rs 58.9 million in 1980. The introduction of the new scheme which includes new 17–23 ft. Fibreglass Reinforced Plastic (FRP) boats through the self employment scheme in later 1979, led to a heavy increase in total subsidy payments in 1980 In 1981 a further subsidy scheme was introduced to encourage the use of sails particularly as a fuel saving measure, where the amount of subsidy was 75 percent of the cost of sail. A 90 percent subsidy scheme on the issue of traditional non mechanized craft was also introduced in 1982 for the benefit of the small scale fishermen. Table XV gives details for the years 1977 to 1982.

The subsidy scheme was initiated as an incentive towards mechanization of craft which was found to have a higher productive capacity. This scheme included incentives to encourage the introduction of non mechanized crafts which had the advantage of lower cost of production. In this manner the subsidy scheme incorporated both systems of fishing, namely, mechanized and non-mechanized under two different subsidy programmes.

Producer Subsidy – Inland

In order to promote harvesting of fish in the inland water bodies the Fisheries Ministry introduced a new subsidy scheme, where 90 percent of the total cost of new – mechanized craft and gear is covered. Each of these crafts is capable of producing approximately 12 tons of fish per annum. The objective of this scheme is that with the quantum of the subsidy there would be a substantial increase in inland fish production.

Another subsidy scheme was introduced by the Ministry of Fisheries in 1980 for those engaged in fish farming in tanks and ponds. The data shown in table XV on pond fish farming projects gives an indication of the popularity of this scheme. This subsidy scheme grants 50 percent of the cost; ranging from Rs 2,000/– to Rs 10,000/– according to the area covered by the fish farm; and includes fish farming in upcountry estates and in seasonal tanks.

These schemes could help to increase the number of producer units as well as the quantity of fish produced provided no obstacles are allowed to stand in the way of their successful implementation.

Fish Prices

Prices of fish in the market have been most influenced by private fish traders who had a control of supplies. When the Ceylon Fisheries Corporation was established in 1964 one of main objectives was the marketing and distribution of fish at reasonable prices to the consumer but the Corporation could not assume the role of an organizationally strong and financially viable competitor and so the private sector continued to control conditions in the market. This private sector dominated by the middleman/trader or Mudalali has based its operations on the principle of minimum producer prices and maximum consumer prices. This trade is well organised with their purchasing, distribution and sales network covering almost every populated part of the island.

As noted earlier, there has been a decline in per capita fish consumption from 32 lbs in 1972 to 25 lbs in 1978. One of the major reasons was the decline in supply, though imports prevented a further aggravation of the situation. It is mainly the result of the shortage in supply and the increase in demand, particularly with a growing population, that has resulted in the sharp increase of prices; other factors have been the increase of prices of competing animal proteins and the growing popularity of fish as a food item, together with the rising incomes and the stronger inflationary tendencies over the years. The middleman have been able to increase their margin in this situation and during the periods of heavy shortages even higher prices have prevailed. Unlike in the case of certain popular food commodities in the case of fish there were no buffer stocks available to influence the market and keep down rising prices. In 1979 when the Ministry of Fisheries drafted its Five Year Master Plan it decided that the Fisheries Corporation will restrict its activities mainly to fish marketing and helping to improve and stabilise the supply of fish to the market. It also announced its intention of doubling domestic production in the five years upto 1983 and of encouraging investment by both the private and public sector and also in providing other facilities which could not only increase the supply of fish and the quality but also act as a restraint on consumer prices. Fish prices were thus expected to rise at or below the average rate of inflation over this period though it does not appear to have happened as seen in the average prices for all varieties of fish indicated

The Table XV1 gives details of prices of fish between 1977 and 1981. Retail prices have been fixed by adding intermediary costs and profit margins to the producer price. The main factors affecting prices of fish are: 1) producer prices: based on the cost of production, availability/scarcity, market obligations and commitments to middlemen, 2) trader overheads: such as costs of transportation, icing, loading and unloading, interest on funds spent, etc; 3) consumer preference which creates competition at the level of the retail market; and 4) profit margins.

The increasing prices of fish over the years have not helped to overcome the socio-economic problems of those directly involved, namely the fisher families, since they continued to operate in a vicious circle which is controlled by the

Table XV1 Average all island retail fish prices by variety of fish

(Rs./lbs)

Variety	1977	1978	1979	1980	1981	1982
Seer	4.77	6.23	6.82	8.85	10.31	
Paraw	3.97	4.72	4.98	6.22	77.56	
Balaya	3.65	4.64	5.28	6.90	8.12	
Kelawalla	4.32	5.60	6.49	8.27	9.44	
Other blood fish	4.40	4.08	4.90	6.20	6.84	
Shark	2.68	3.50	4.09	5.01	5.90	
Skate	1.92	2.39	2.59	2.85	3.45	
Rock fish	2.46	3.26	3.69	4.03	5.02	
Shore seine varieties	1.79	2.35	3.13	3.39	4.53	
Others (including prawns, lobster cuttle fish & crab)	6.23	7.16	11.07	10.80	14.35	
All varieties	2.81	3.53	3.90	4.49	5.94	
Fresh water fish	1.08	1.27	1.72	2.11	2.99	

Source: Ministry of Fisheries

fish mudalalies/traders. The real beneficiaries in the high pricing of fish have therefore been not the fishermen but the mudalalies or traders.

Factors behind the regional price variations are also clearly evident. These variations are based on the demand and supply situations Colombo fish prices are generally high due to the demand though prices here are not always the highest since fish supplies from different coastal landing centres come in mainly to the city. For example, the highest prices for Seer, Paraw and Balaya were found to be in Kalutara, while the lowest prices were noted in Mannar and Mullathivue in 1981. The highest prices were due to the low production and high demand, while lowest prices in Mannar and Mullathivue were mainly due to the high production and low demand.

Due to the non availability of prices of fish in the hinterland it is difficult: to compare prices here with those in the coastal areas. However, prices inland are always generally higher than in coastal areas because of greater scarcity, and overhead costs of transportation and distribution. The Ministry of Fisheries places great hopes on the development of inland fisheries, which it expects would reduce the demand for as well as prices of marine fish and be more easily accessible in internal markets. To this extent a successful Inland Fisheries programme could alter the entire balance in the market situation for fish in Sri Lanka.

Fishing Technology

All governments over the last few decades have continuously attempted in some way to increase fish production and in trying to do so were convinced that the answer lay in modern technology and mechanization of the industry. However, the notion that by emulating developed world models local problems could be satisfactorily solved has characterised much of the development in these earlier decades. A corollary trend was the failure to see indigenous technology as an effective and valuable technology, by reason of the fact that it required to use the inborn skills and traditions of the local fishing community and was based on locally procurable raw materials over which fishermen had complete control. Sufficient weight was not given to the fact that since it involved the superimposition of foreign technological inputs, with which the fishermen were not familiar, problems of the switchover should have been anticipated by providing adequate fisheries education to as a wide section of the fishing population as possible.

There exists a very contradictory situation in that fisheries development has been delayed by difficulties in introducing more advanced fishing methods and this still remains the main problem today.

In Sri Lanka fishing technology is divided into small and large scale sectors. The small scale sector is more significant as the majority of fishing operations and the workforce are within this category. With the introduction of mechanization schemes from the 50's operations in this sector grew more complicated. Before steps towards mechanization were taken the traditional technology was firmly established in local fishing community. Under this technology fishing fleets operated in relatively primitive conditions and were controlled by environmental factors such as monsoons and rough seas. Thus in the 1950's traditional technology such as "madel" fishing dominated and as much as 40 percent of the total landings (in 1953) were from "madel" operations. With the growing demand for fish and the introduction of more modern methods of fishing the importance of "madel" operations began to diminish. The type of technology used began to vary according to the place and time of fishing, the type of fish and craft, financial capabilities of the fishermen etc. The four techniques that evolved with mechanisation were:

(1) Mechanized indigenous craft;

(2) Mechanized craft with outboard motors and relevant fishing gear (17 ft. to 22 ft. in length)

(3) Mechanized craft with inboard motors and relevant fishing gear. (called 3½ tonners and 28 to 32 ft. in length);

(4) Small trawlers and related fishing gear.

The introduction of mechanization and modern fishing gear enabled fishing fleets to disregard what were earlier environmental barriers such as strong winds and monsoons and high seas and tides. Though these improved fishing techniques have been adopted over the last three decades nearly one-third of total landings are yet from indigenous non-mechanised craft and about 85 percent of the total catch is from coastal shallow seas.

Landing places and areas of operation were decided according to the type of the craft and the gear used in fishing. An example is seen in the traditional indigenous crafts, for instance, Oru, Vallam, Kattumarm and Teppam which use outboard engines when they need to go out to rough seas or distant places and they then operate certain fishing gear which needs fast moving or rough seas. But in calm seas or for inshore fishing the engines are removed and the craft rowed, while a different type of fishing gear is used for catching specific fish varieties. Small crafts also do not harbour anchorages as it is easy for them to land on the beaches. But, the in-board motor boats and trawlers equipped with gear for deep and rough seas and for specific fish varieties, have necessarily to be anchored in a harbour or similar safe place. These crafts are therefore found very rarely on line beaches. The Western coast is an ideal example of this, where generally fishermen knowledgeable of seas and fishing operations, and more facilities available to them, select the correct and most viable technology according to the fishing time and area of operations; which in turn has helped them to get better results.

Among the various fishing methods adopted locally are trawling lines, gill nets, drift nets, bottom set nets, bottom long line, floating long line, beach seine nets, cast nets, dip nets, rod and line, hand line, and a range of fish trap techniques. These different fishing techniques are used to match the various fishing environments, fishing seasons, specific types of fish and capabilities of fishermen. Fishing methods are adopted to suit different conditions and it is clear that both the traditional and modern techniques are equally useful and appropriate for the local fishing community.

Conclusions

Lessons of the past have shown that development in fisheries cannot be achieved merely with an injection of the technological hardware. The fisheries sector should also be sufficiently equipped to cope with the new demands, while conditions should be conducive to the absorption of the new technology. It was found, for instance, that training facilities were inadequate

and have lagged behind the mechanization process. There were also many contradictions that arose with this process of mechanization. For example, non-mechanized craft were found to be safe and cheaper but the return per unit was lower than for mechanized boats. In the mechanized craft on the other hand many fishermen are finding that their fixed and variable costs were very high and the return on such investment was not sufficient to meet the overall costs of production.

The objectives of the planners are still not within sight. The reversal in the trends of insufficient production and rising prices has not taken place. Most fishermen have not been able to find the prosperity they hoped for. The local consumer often finds that the fish he needs is not available or beyond his means, while considerable foreign exchange expenditures is necessary to keep the industry alive.

The one area that fish production has been aggresively and productively promoted is the fresh water sector, but here too the problems of consumer acceptance are yet to be overcome. An anticipated problem in the marine fisheries coastal sector is that before the mid 1980's fish production here would be pushed towards its upper limit. The laternative is to either turn to fish culture and fish farming in homesteads and inland waters while building up a consumer preference for inland fish, or to launch out on large scale commercial fishing operations with foreign collaborators (and the necessary controls) in the open seas, harvesting the waters of Sri Lanka's exclusive economic zone. There is no doubt that an increase in fish production and its easier availability to the consumer is today an urgent need; it is also a fact that there is greater scope for expansion and improvement of facilities available to the fishing industry, but to realise this goal and at the same time cope with demands by both producers and consumers of fish will require a more firm commitment by all concerned to the priority areas and a greater reliance on the potential in our own human and material resources.