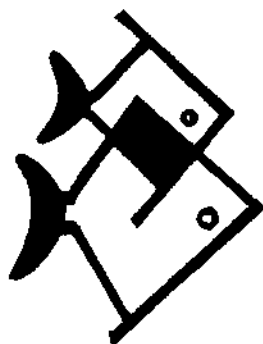


# **INDIAN FISHERIES**

**1947 – 1977**



**ISSUED ON THE OCCASION OF THE FIFTH SESSION OF  
THE INDIAN OCEAN FISHERY COMMISSION HELD AT COCHIN FROM  
19TH TO 26TH OCTOBER, 1977**

## fisheries development

### SMALL-SCALE FISHERIES

The small-scale fisheries comprising of the traditional fisheries and related activities as practised by the artisanal fishermen, play a significant role in the Indian fisheries. About one million active fishermen employing the indigenous crafts and gears and following the traditional methods of fishing are engaged in the small-scale fisheries of the marine region. It contributes to above 65 per cent of the total marine fish production of the country. On the inland fisheries side, the small scale fisheries include almost the entire fishermen as well as the fish farmers and the entire inland fish catch.

The number of indigenous crafts and gears employed in the small-scale fisheries of the country is given in Table 9.

Salient features of the important indigenous crafts and gears are given in the Tables 10 and 11 respectively.

Normally, the fishermen engaged in the traditional fishing carry out a day's fishing, leaving the villages in the early morning hours and returning to the landing centres during the course of the day. Fishing is carried out in the inshore waters extending to 10-15 km from the shore. The gears such as shore-seines, inshore drag nets are operated from the beach, while the boat-seines and drift nets are operated with the help of crafts in the sea. Bag nets and stationary types of nets are fixed in the tidal region in the estuaries, backwaters and inshore sea with stakes or with floats and sinkers. Cast nets are operated both from the shore as well as in the open waters. The craft and gear combination employed in different regions of the coast is given in Table 12.

Table 9. Crafts and gears engaged in small-scale fisheries

Craft			Gear		
Type		Number	Type		Number
Catamarans		47,000	Drag nets		2,56,000
Dugout		47,000	Gill and drift nets		5,98,000
Plank-built boats		39,900	Cast nets		4,24,600
Shore-seine boats		17,000	Traps		7,45,200
Others		67,700	Shore-seines		1,20,900
			Others		4,16,800

Prior to the introduction of mechanised fishing boats, the entire marine catch of the country was produced by the traditional fishing. In 1974, traditional marine fisheries landed an estimated catch of 8,43,961 tonnes out of the total marine fish catch of 12,17,797 tonnes; in 1975, the contribution from this fishery was of the order of 915,058 tonnes in the total marine fish production of 14,22,673 tonnes. The pelagic as well as mid-water fish catches are almost entirely landed by the traditional fishery.

The above data on the number of fishermen, fishing craft and gear, and fish production from this sector indicate the significance of the small-scale fisheries of the country. It is well-known that the inshore sea where the traditional fishery is carried out are productive fishing grounds, and significant increase in fish production can be achieved by improving the gears and fishing methods. Studies conducted by the Programme Evaluation Organisation of the Planning Commission have indicated that the return per unit of investment of non-powered boats is twice that of the powered boats, and generate almost seven times more direct employment opportunities than the mechanised boats. Considering the importance of this sector, the Working Group of Fifth Five Year Plan on fisheries has recommended that not less than 15 percent of the outlay on marine fisheries development should be earmarked for the sector.

The small-scale fisheries received relatively less attention in the early Plans. The important schemes

taken up for the development of the sector prior to Fourth Five Year Plan, were the establishment of Fishermen Co-operative Societies with financial and managerial assistance from the State Governments, establishment and improvement of fisheries schools, fish curing yards, introduction of synthetic twines and assistance to procure these. Model schemes were also implemented for community development in selected fishing villages. In the Fourth Five Year Plan, various State Governments continued to provide assistance to this sector. In the Fifth Five Year Plan, several programmes for the development of the sector have been included, the most important of which are the improvement of craft material and designs of the boats, mechanisation of traditional crafts, assistance to Fishermen Co-operative Societies, provision of ice at the important landing centres, landing and berthing facilities for the boats.

To provide education to the children of fishermen, most of the States have established fishery schools. Besides, the fishermen are also being trained in the Fishermen Training Centres set up in the different States, in the operation and maintenance of the mechanised boats and fish culture.

Although considerable progress and improvements have been achieved during the last 3 decades, the problems of small scale fisheries concerning the methods of operation, inefficient crafts, low production rate, marketing of the catch, procurement of production requirements, conservative nature of fishermen and

**Table 10. Salient features of important fishing crafts of India**

Craft	(Size metre)	Construction	Life-time (years)	Propulsion	Crew	Operational area
Catamaran	L: 4-7 W: 0.7-1.4	2 to 5 logs of wood tied together in a raft fashion	10	Manual	2-4	Inshore
Dug-out boats	L: 3.6 - 10 W: 0.5 - 1.25 D: 0.45-0.7	Hollowing out a single log of wood	10	Manual	2-8	Inshore
Dug-out canoe (Flat bottom)	L: 9.5; 5.4 - 6.6 W: 1.6; 0.9 - 1.3 D: 0.7; 0.5 - 0.6	Hollowing out a single log of wood	10	Manual	—	Inshore
Plank-built boats	L: 6-14 W: 0.9-3.3 D: 0.6-1.0	Wooden planks stitched or nailed to form a rigid frame	10	Manual some are mechanised with 15-30 h.p. engine.	7-12	Inshore

L: Length; W: Width; D: Depth.

their reluctance to adopt new ways and methods of fishing, require immediate attention not only for increasing fish production from the sector, but also for improving the socio-economic conditions of the fishermen and the rural economy. In this connection, the concept of blending the traditional fishing activity with the culture of selected species such as prawns, mussels, oysters, sea weeds etc. in suitable inshore waters based on the indigenous technology is worth mentioning. To test this concept and demonstrate its viability, an Operational Research Project involving the fishermen of a fishing village near Madras, has been drawn up by the Central Marine Fisheries Research Institute.

Table 11. Salient features of the important indigenous fishing gears of India

Gear	Size (length in metre)	Mesh size (cm)
<b>FIXED NETS</b>		
a) 'Dol' nets	12-200	1 at cod end, 4-12 near mouth
b) Ganja	5	1 at cod end
c) Bag nets of east coast	13-7.35	0.5 - 10 at cod end; 4 - 10 at mouth.
d) Stake nets	12 - 30	1-2 at cod end
<b>SEINE NETS</b>		
<b>i) Boat seines</b>		
a) Kollivala	73	1 at cod end, 2 at mouth
b) Tanguvala	50 - 65	2 at cod end
c) Madivala	49	-do-
d) Boat seine of the east coast	22 - 26	1 at cod end; 9 at mouth
<b>ii) Shore seines</b>		
a) Rampan	200-600	1.2 - 5
b) Yendi	80-150	-do-
c) Kambavala	316	0.8 at cod end
d) Korubalai	9	1.0
e) Bari	5.5	1.0
f) Karavala	317	1.2 at the centre
g) Alivivala	364-634	1.2
h) Drag nets	3.6 - 18.3	0.6 - 1.2
<b>CAST NETS</b>	2.5 - 6 in radius	1.2
<b>SCOOP NETS</b>		
	9 - 10 square	0.2 at cod and
	1.8 - 14.2	0.7-2.1 at cod end
<b>DRIFT NETS</b>		
a) Kanthabala	48 - 125	5 - 6
b) Pattavala	216 - 270	3.0
<b>TRAPS</b>	0.5 - 1.8 high	—
<b>LONG LINE AND HANDLINE</b>	Sevral hooks of 1 - 3 number	

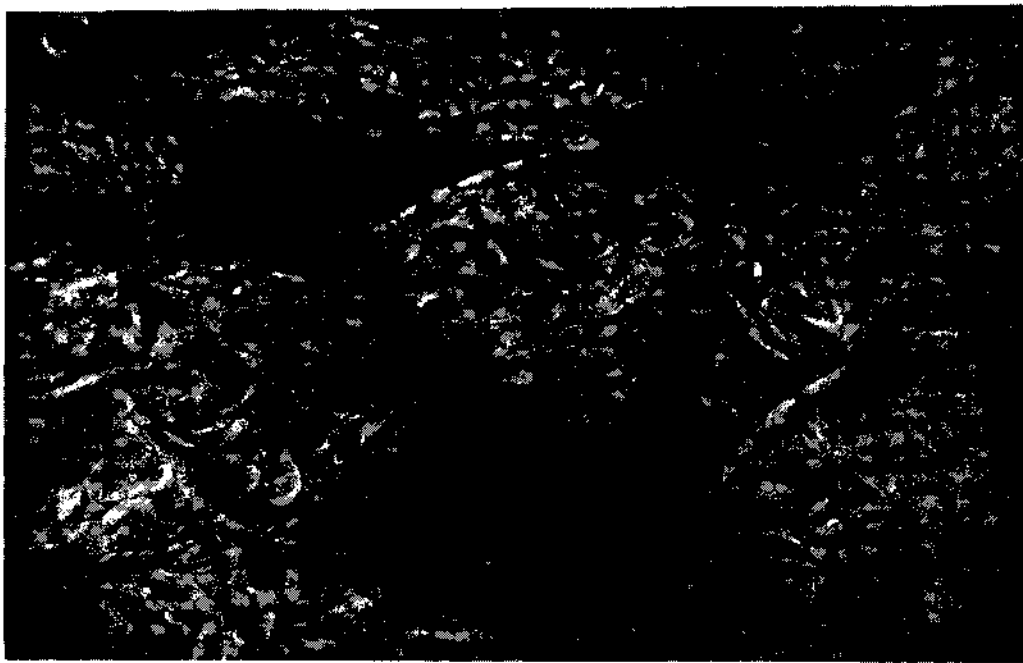
Table 12. Craft and gear combination employed in different regions of the coast

Craft	gear combination	Region
Satpati type boat	drift net, fixed net, bag net, seines, drift net, drag net	Gujarat and Maharashtra
Satpati type boat	longline	
Mechanised Plank-built outrigger boat	shore-seine, boat-siene gill net, drag net	Goa and Karnataka
Dugout boat	cast net, boat-seine	Karnataka and Kerala
Catamarans and Tuticorin-type boat	drift net, longline, gill net, boat-siene	Tamil Nadu and Andhra Pradesh
Masula boat	drift net, drag net	Andhra Pradesh and Orissa
Chandi type boat	Bag net, seines, drift net	Orissa

The results of this project when completed and its extension to other centres by the Institute, would go a long way in the adoption of this new concept of integrated rural development on a wider scale for improving the fish production, income of fishermen as well as the coastal rural economy.

Besides the national programmes for the development of the small-scale fisheries, a project for "the Development of Small-scale Fisheries in the Bay of Bengal" under FAO/SIDA Regional programme is being implemented. The purpose of the project is to assist participating countries (Bangladesh, India, Pakistan, Sri Lanka) to improve the standard of living and the quality of life of the small-scale fishermen families and increase supply of fish. The immediate objective is to develop and demonstrate techniques by which this purpose may be achieved, including *inter alia* the promotion of increased technical co-operation among the participating countries and

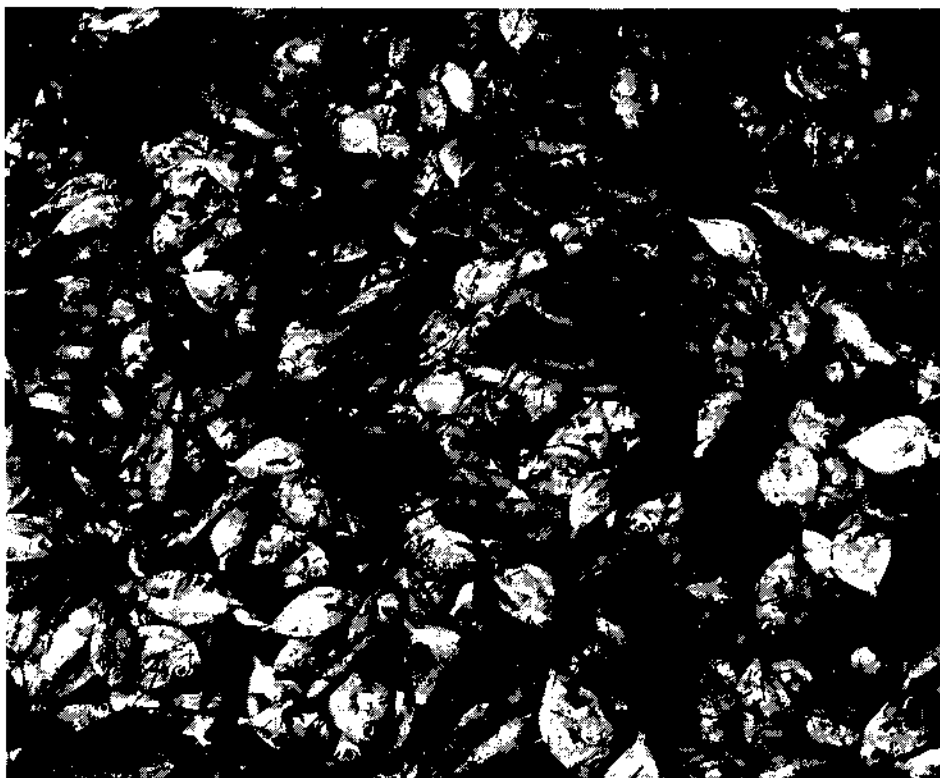
- (i) "improvement, development and application of appropriate existing fishery technology and/or, where required introduction of new technology;
- (ii) promotion of and direct assistance to research and development programmes of existing national institutions in support of (i) above;



Mud bank fishery and bumper catch of prawns at Purakkad, Alleppey, Kerala



Fish landing centre at Rameswaram



Catch of Silverbellies

- (iii) strengthening existing extension services with special emphasis on development and/or strengthening of training institutions to provide adequate training in marine fisheries extension work;
- (iv) training of fisheries personnel, managers and operatives of small-scale fishery enterprises, including fishermen's cooperative organisations and other associations;
- (v) strengthening, where appropriate, the role of fishermen's co-operative organisations and associations, especially in the areas of fish distribution and marketing;
- (vi) demonstration of an effective system of collection, analysis and dissemination of relevant information with particular emphasis on information and data resulting from project activities, and assistance in implementation of such a system;
- (vii) assisting participating countries in the application of the results of successful project activities, and in formulating specific small-scale fishery development plans and projects."

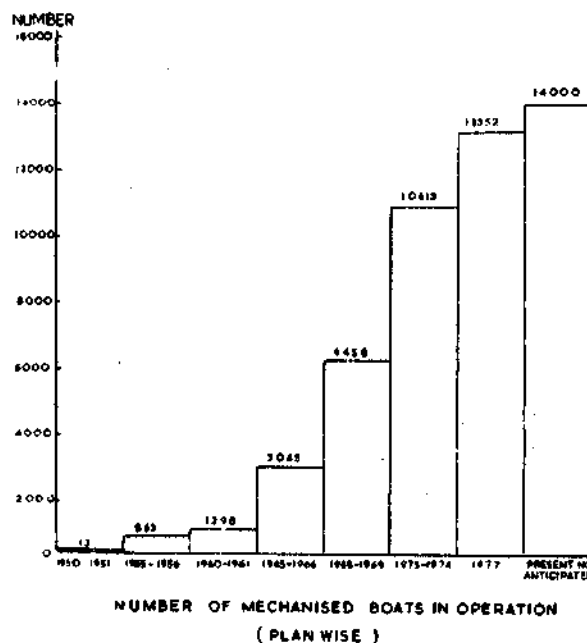
#### COASTAL MECHANISATION PROGRAMME

Coastal mechanisation programme has been one of the main thrusts in the development of marine fisheries in India. In all about 16,000 mechanised boats have been introduced so far, against which about 14,000 are in operation at present.

Although there are a large number of mechanised boats in operation, still they account for only about 5% of the total fishing crafts in India. It has been the endeavour of the Government to see that the primitive crafts are progressively replaced by modern fishing crafts and traditional fishermen get the benefit of updated technology and assistance to procure better fishing vessels.

During the First Plan, a thorough examination of the various designs of traditional crafts was carried out and it was found that only a few designs of traditional crafts were suitable for mechanisation. These were

mostly in the erstwhile Bombay Presidency. In other States, it was found that the traditional craft was not suitable for taking an inboard engine. Simultaneously attempts were made to see whether these boats could be motorised with outboard motors. By and large, the boats were found to be unsuitable due to the high stern. In some boats the outboard motor was mounted on a special bracket fixed for the purpose. An experiment was conducted at Muttom, near the southern tip of the country to motorise catamarans. The high cost of petrol and the quick wear and tear of outboard engine has created apprehension of the economic viability of such programmes. At the same time, outboard motors were found to be economical along the Gujarat coast for 'dol' net (stake net) fishing, mainly due to the availability of increased proportion of high quality table fish in such operations.



One of the first series of small mechanised boats fit for trawling was made by the Indo-Norwegian Project in 1957. The Central Institute of Fisheries Technology, Cochin has also brought out a large number of designs and these are being adopted for construction of mechanised boats. Lured by the higher prices offered for shrimp in the export market, the emphasis in mechanised fishing was suddenly shifted towards shrimp trawling. To begin with, most of the mechanised boats used trawl nets without winches. Very soon trawl winches suitable for small

mechanised boats were indigenously developed and small trawlers became the popular type of fishing craft in India. Initially 9 metre boats powered by 30 to 40 h.p. engines were used. Recent years have witnessed an increase in the size of the boats and the horse power of the engines used. However, the efficient use of the mechanised boat is dependent on the availability of landing and berthing facilities. In this context, need for surf landing mechanised boats is more keenly felt.

#### BOAT BUILDING MATERIAL

Teakwood (*Tectona grandis*) has been the traditional boat building material. In the wake of high cost of teakwood, alternate substitutes such as "aini" (*Artocarpus hirsuta*) and "venteak" (*Lagerstroemia lanceolata*) have become popular. So also an attempt has been made to replace the costly copper sheathing with aluminium alloy sheathing. The latter has not been fully successful. Attempts were also made to make boats in ferro-cement as well as fibreglass reinforced plastics. While the former proved to be a bit heavy for small mechanised boats, the latter was too costly to be popular. However, the search for a suitable alternate as boat hull material is being actively pursued.

#### MARINE DIESEL ENGINES

Until 1966, marine diesel engines were imported. In the meanwhile, a few indigenous firms were awarded licence for the manufacture of marine diesel engines. Some of the licensed units have stopped production, but there is adequate capacity within the country to meet the present requirements of marine diesel engines for use on small mechanised boats. Over the years, the demand for the engines of higher horse power has significantly increased. The current demand for marine diesel engines within the country is about one thousand per annum.

#### FINANCING

With a view to popularising use of mechanised boats, the scheme of introduction of such boats was initially supported with a high element of subsidy, most of the States providing 50% subsidy on the engines except in the Union territories, Lakshadweep and Andamans, where the entire cost of the engine was given as subsidy. However, over the years, the subsidy was progressively tapered off and the beneficiaries

were encouraged to avail of the institutional credit. Around 1965 refinance facilities at lower rates of interest were offered by the Agricultural Refinancing and Development Corporation. This enabled flow of institutional finance for the introduction of a large number of mechanised boats. Eventhough there was initial enthusiasm about this financing, failure on the part of corporate agencies to make repayment in time, dampened enthusiasm in further financing. Unlike the low rate of interests charged for Government loans, the interest of institutional financing was as high as 12½% in Agricultural Refinancing and Development Corporation and 16% when commercial banks financed the project. In addition, the obligatory insurance also proved to be a further financial burden. Some States preferred compensating this financial burden by giving the margin money as outright grant, others subsidised the interest. A new concept in this direction is to provide insurance cover free of cost by the State agencies and provide a revolving capital at low interest rate. However, financial assistance to coastal mechanisation deserves a new approach and a close review with special reference to viability of operations.

#### DIVERSIFICATION OF FISHING EFFORT

The cost of mechanised boat has increased several fold in recent years. The present day cost of a 15 metre mechanised boat is about Rs. 2,25,000 and that of a 12 metre boat about Rs. 1,50,000. The high capital cost and the interest burden have led to selective fishing, particularly for shrimp. Government has been lately encouraging fishing by other methods with a view to ensuring better utilisation of all the resources. In respect of certain varieties of fish which occur in large shoals the possibility of introduction of purse-seine has been tried. During the last few years about 60 small purse-seiners have been introduced along the south-west coast. 14 purse-seiners operating along the Karnataka coast are fishing on an average 400 tonnes of fish within a period of 5 months which performance is quite satisfactory.

Gill netting is one of the traditional methods of fishing. Motorised boats are used for gill netting also. Relatively high priced varieties of fish are caught in the gill nets. This, together with lower horse power of gill netters and consequent lower capital and operational cost, the longer life of the engine in the absence of strain as in the case of trawling, make the economics



of gill netting as attractive as trawling in such areas as Gujarat, where better quality fish is available.

Pole and line fishing for skipjack tuna is restricted to Lakshadweep, where about seventyfive mechanised boats are in operation. Long lining from small mechanised vessels is relatively new in this country and about 40 long lining mechanised boats of 38' have been introduced. These boats catch shark, tuna and tuna-like fishes.

The future expansion of coastal mechanised fishing has to be carefully planned. Increasing the fishing effort for shrimping is not likely to bring in proportionately increased catch in several coastal areas, particularly along the south-west coast where coastal shrimp stocks are showing a level of stabilisation of boat, effort and catch. However, there is scope for further expansion of coastal shrimping in limited pockets on the west coast and more significantly on the upper east coast. The upper Andhra Pradesh Coast and Orissa Coast are attracting shrimping units of other areas. Diversified fishing for coastal resources has to be encouraged and liberal technical and financial assistance have to be diverted to this sector. If subsidy and loans could be considered for deep sea fishing programmes, it is still more required for encouraging coastal fishing, particularly diversification of effort in this area. Vagaries of fish stock availability, often result in large fluctuations in the abundance of fish and is making both the borrower and lender in the fishing industry apprehensive. There is no "crop insurance" in the fishing industry. In times of distress, due to consecutive years of fish famine, some sort of assistance like "interest holiday years" for bank loans for borrowers in the fishing and ancillary industries appear unavoidable and will considerably lift the morale and confidence and dignity of the small boat fishermen and the small scale fish processors. Easy credit facilities with marginal interest rates alone can make coastal fishing economically viable, particularly when non-shrimping is contemplated. If financial institutions are unable to lower the interest rates and service charges, the difference may have to be adjusted under some sort of development assistance scheme. The scope of extending Shipping Development Fund Assistance to the coastal fishing sector requires a close look. These are under active consideration, and that development of artisanal fishery is continuing to receive close attention and assistance

both in technological improvements, infrastructure facilities and for financing. Every effort also has to be made to bring down the cost of engines to economic levels and the optimum horse power requirements have to be worked out to save operational costs. Alternate boat building materials have to be tested to bring down the cost of hull and relieve the shortage of quality wood for hull construction.

#### DEEP SEA FISHING

The policy of the Government is to establish a deep-sea fishing industry in the country oriented to exploiting the entire fishery resources in the Exclusive Economic Zone of 200 miles, declared recently. The policy is to encourage the public and private sector fishing companies and fishermen co-operatives to take up deep-sea fishing. As deep-sea fishing is a capital intensive industry requiring large investments, the policy is to encourage all those who are in a position to make investments in the field.

The deep-sea fishing is a comparatively new activity in India. It is proposed to achieve a level of 200 of deep-sea fishing vessels by the end of the Fifth Plan. Of these, 30 have already been introduced and arrangements have been finalised for the import of 30 more from Mexico by 14 Indian enterprises. 16 vessels under this programme have already started arriving. A further programme to permit import of 60 deep-sea fishing vessels and construction of 40 vessels indigenously by Indian fishing enterprises has been notified by the Government in June 1977 for implementation in 1977-78. Deep-sea fishing programme involves the introduction of deep-sea fishing vessels, application of sophisticated fishing technology, setting up of infrastructure facilities such as fishing harbour, shore processing plants, facilities for repairs and maintenance of fishing vessels, net making facilities, supply of fuel and lubricants.

The indigenous industry for the construction of fishing vessels is not fully developed. Hence, while permitting import of vessels, simultaneous steps have been taken to develop indigenous construction capability. Under an important scheme introduced in 1968, it was stipulated that for every vessel imported, one vessel should be constructed indigenously. However, due to the problem of financing and the state of indigenous industry, not much progress was achieved in this respect. In order to stimulate indigenous construction, the

ship building yards are permitted to import designs and drawings of suitable fishing vessels from abroad. They can also avail of services of foreign experts to acquire the requisite technology. Government has also plans to provide subsidies as an incentive for indigenous construction. Loans to the extent of 95% of the cost of vessels are also available from the Shipping Development Fund. In the case of imported vessels, loans are available to the extent of 90% of the cost.

With a view to facilitate acquisition of technology relating to operation of fishing vessels, Indian fishing enterprises are permitted to employ foreign technicians for limited duration, with an arrangement to provide training to Indian counterparts.

In a public notice issued by the Government in July, 1977, applications were invited from interested Indian parties for the import of 60 deep-sea fishing vessels of 20 m overall length and above, new or second-hand, from reputed foreign shipyards. Second-hand vessels should, however, normally be not more than 5 years old and covered by a certificate of seaworthiness by a recognised agency. Parties were permitted to apply for the import of such number of vessels as they intend to operate from any suitable source. Applications for obtaining vessels on charter were also invited, without any limitation on numbers or source. Applications for foreign collaboration in the field of deep-sea fishing were also invited. The collaboration may involve sale or charter of deep-sea fishing vessels, (new or second-hand) to the joint venture Indian company which will be established in accordance with the Indian regulations. From the enthusiastic response to this notice, it is expected that in the next two years there will be substantial number of deep-sea fishing vessels in operation in the Indian Economic Zone. In order to exploit both the offshore and deep sea resources, vessels in different size ranges with facilities for processing onboard are necessary. Similarly, vessels that could be deployed for different fishing techniques in order to ensure optimum exploitation of both pelagic and demersal resources are also necessary. It is for this reason, special steps have been taken to encourage introduction of different types of vessels in our waters.

In order to undertake pre-investment fishery resources surveys and to train Indian personnel in deep-sea fishing techniques arrangements have been

made to obtain survey and training vessels under bilateral aid programmes. Mention must be made of the programme of construction of eight vessels under Norwegian Assistance Programme (of which two have commenced construction at Goa Shipyard) and two larger vessels availing of Dutch credit. Discussions are being carried out to strengthen the progress through acquisition of additional facilities under UNDP/FAO Programmes also. An industrial fishery resources survey with Polish assistance is under operation along the north-west coast covering Maharashtra and Gujarat Coasts and upto depths of 200 metres and beyond.

#### INFRASTRUCTURE FACILITIES

##### Fishing villages

With a coastline of 6,500 kilometres and 1,300 fish landing centres and innumerable markets including weekly ones spread over 3,280,483 sq. kms, it has been a difficult task to provide all the necessary infrastructural facilities for fish landing, processing, transporting and marketing, at all the centres.

Basic infrastructural facilities were lacking in most of the fish landing centres when planned development was taken up in 1951. Approach roads, water supply, electrification and fishermen housing are provided under normal developmental schemes included in the Five Year Plans of the States. However, in many areas, lack of basic infrastructure has proved to be a limiting factor in the development of fisheries, otherwise having good potential. In this context State Fisheries Departments are earmarking funds towards development of infrastructure.

By now most of the fishing villages are in some way or other linked with existing roads and highways but in many cases these require improvements for motor vehicles transport by way of culverts, road strengthening, black topping and extension to the fish landing sites. The position with regard to water supply is inadequate, and well water continues to be the main source. Under the rural electrification scheme, most of the fishing villages are being covered. Fishermen housing is a sector in which the State Governments are undertaking a phased programme of development. Apart from general amenities, special amenities are required in the fish landing centres. These

include provision of ice, gear sheds, hard ground for fish drying and so on. Under a centrally sponsored financial assistance scheme, a beginning has been made to provide infrastructural facilities in an integrated manner to a limited number of villages in each State. The approach is that on successful completion of the provision of infrastructural facilities in these selected villages, the necessary interest would be created for generating funds within the village economy for extension of such facilities to other areas. Under the centrally sponsored scheme, approach roads, water supply, ice plant including extension of power supply, insulated trailer-cars and a fish curing yard, will be provided. The Rural Development programmes have also come in a big way for assistance to fishing villages, both coastal as well as in the inland centres.

#### Fishing harbours

While there is demand for developing every fish landing centre into a fishing harbour, the high cost limits provision of such facilities to the more promising centres only. It is anticipated that with the provision of self-contained fishing harbours, there will be polarisation of fishing activities around these centres and ultimately the number of centres would get reduced. Minimum landing and berthing facilities have already been provided at about 70 centres. Fishing harbours have been attached to practically all major ports, and in most of the minor ports, fishing harbour is the most important component. A separate project for conducting pre-investment surveys of fishing harbours was established in 1968 with UNDP assistance and has a staff of harbour engineers and economists specially trained for undertaking pre-investment surveys of fishing harbour projects. In all 123 sites have been reconnoitered, 29 sites surveyed and project reports have been prepared in respect of 24 sites. This does not include survey and project report in respect of fishing harbours at 5 major ports. Based on the economic viability, priorities, financial constraints, etc., projects are sanctioned by the Government of India of which several of them are nearing completion. Capacity to handle fishing boats and vessels in the fishing harbours already sanctioned as well as to be sanctioned both at major and minor ports is given in Table 13.

Proposals for fishing harbours are being processed with adequate care taking into consideration not only

Table 13. Fishing boat and vessel component capacity in fishing harbours

Name of harbour	Capacity to handle fishing boats and vessels			
	Draft in metres	No. of vessels in upto 16 m (2m draft)	No. of vessels between 16-25m (2-3.5m draft)	No. of vessels between 25-50 m (3.5-5 m draft)
<i>Already sanctioned</i>				
Kandla	—	—	—	10
Sasoon Dock	2.3—3.5	400	—	—
Karwar	2.5	100@	—	—
Honnavar	3	160	10	—
Malpe*	3	210	23	—
Cochin	5	900	59	—
Tuticorin	3	400	—	—
Kodikkarai	1-2	40	—	—
Mallapatnam	1-2	54	—	—
Cuddalore	—	50@	—	—
Madras*	6	500	200	100*
Vizag 1st state	6	150	—	15
Roychowk*	4.5	—	15	—
Port Blair	4.5	50	20@	—
Dhanra	—	50	—	—
67 Minor site	4	750@	—	—
Mangrol	2.5	180(148M)	—	—
Veraval*	4	430	42	—
Kakinada	2	298	—	—
Ratnagiri	2.4-3.3	390	—	—
<i>To be sanctioned for which project reports are ready/ nearly ready</i>				
Porbunder	2.1	400	—	—
Agardanda*	4.5	282	12	—
Bey pore (State)	—	258	—	—
Neendakara (State)	2.5-3.8	210	30	—
Vizhinjam (State)*	5	285	12	—
Chinnamuttom	2.5	244	—	—
Nizampatnam	2	54	—	—
Vizag 2nd phase*	6	150	—	41
Nagpur	2	40	—	—
Paradeep*	5-5.5	250	20	—
Karanjhalen(Goa)	2-2.5	260	—	—
<b>TOTAL</b>		<b>6,735</b>	<b>443</b>	<b>166</b>

@ estimated; \*can take vessels of over 25 m OAL

the engineering aspects, but also its full utilisation, possibilities synchronising with the programme of introduction of coastal and deep sea fishing vessels. The capacities already sanctioned would be adequate to handle 4,302 mechanised boats, 369 medium boats and 125 deep sea fishing vessels. If the additional

sites for which project reports are already available are also sanctioned, the capacity created would enable handling of 6,735 mechanised boats, 447 medium vessels and 160 large vessels. Some of the large projects including vessels' component, infrastructure and processing and marketing facilities, have also been posed for assistance by the World Bank. Already a proposal covering 2 fishing harbours in Gujarat has been agreed to for the World Bank financing. More such proposals are in the pipeline. The facilities to be provided at fishing harbours would cover provision of breakwaters, dredging of basin, reclamation of foreshore, construction of landing, bunkering and mooring quays, auction hall, gear shed, canteens, slipway and commercial plots for putting up processing plants and workshops. In addition, local agencies are to provide the necessary water, electricity, approach road, etc. as part of their obligation in this regard. The management of fisheries harbours is proposed to be entrusted to a fisheries terminal organisation, which may be a division of the Fisheries Department of the State. It is envisaged that the revenue realised by way of port charges, auction hall charges, rental from commercial plots, slipway charges, etc. would be sufficient for maintenance and operation of the proposed terminal.

#### **Fish processing**

There are three distinct processing sectors, namely: drying, freezing and canning. Prior to 1950, road connections and transportation facilities at the landing centres were meagre. Fish in fresh condition were sent only to nearby places. Rest of them, which formed the bulk of the landing was utilised for curing, turning into offal or using straight as agricultural manure.

The chief methods of curing fish in India are:

1. Sun-dried without salt — the fish is dehydrated by spreading them directly under the sun.
2. Dry salted — the fish is first salted, and after partial extraction of water from the fish, they are sun-dried.
3. Wet salted — the fish is salted in high concentration, causing partial extraction of water, and then marketed without any further drying.
4. Colombo pickling — with salt and tamarind.

In small quantities, fish are cured, in one of the above forms, in individual fishermen houses, in which case, proper care is taken for gutting, cleaning, washing, etc. In some varieties, the fish are even split open, and salted and some are laminated. In glut season the fish were sun-dried just on the open sandy beaches. In 1940's when salt was costly, Government opened curing yards, and issued salt at concessional rates, thus inducing the processors to cure the fish in the Government Yards in order to ensure hygienic process.

The "Ceylon type" of pickling was mostly with mackerel, after gutting, cleaning and washing. This was for export to Sri Lanka, and this has since been discontinued.

There are two methods for curing prawns; (1) simple sun drying as whole especially the smaller varieties; (2) cooked and dried — in this method the prawns are boiled, sun-dried and shells removed. An improved version of this, known as "semi-dried" when sealed in tins with Carbon dioxide, could be kept for nearly an year. In Orissa, there is a special method of drying the prawns, over a quick but smoky fire. Smoking of fish has not come to India so far, though some experiments are being conducted on pilot scale.

Preparations such as fish paste, fish powder and fish curry in various combinations and styles are made in different parts of India. Other products of commercial importance are shark fins, fish maws, beche-de-mer (Sea cucumber), fish oil, shark liver oil, "mas min" (dried skipjack), dried turtle meat, etc. Many of these are exported to different parts of the world. The latest export information indicates 58 different items of marine products having been exported to 60 countries of the world.

The curing of fish is still done in the same old way as was done decades ago by the fisherfolks of the coastal belt. Though improved methods of processing and packing of dried fish have been evolved by various Research Institutions, none of these has been applied on a commercial scale. In short, the dried fish processing and marketing have still not risen to the status of a modern industry.

Quick freezing of shrimp was started in early fifties. The first attempts were so successful, that several freezing plants sprang up in parts of the country in

a short span of 5 to 6 years. Today there are nearly 250 freezing plants and they are largely engaged in freezing of shrimp for export. Besides shrimps, lobsters, fish, cuttle fish, squids and frog legs are also included in the production line. The present total holding capacity of frozen storage is 25,000 tonnes.

The shrimps are frozen as (1) headless tail-on, (2) peeled and deveined, (3) peeled undeveined, (4) cooked and peeled, and so on. Export packings are in 2 kg/5 lbs blocks which are institutional packs. There are no regular arrangements for processing in consumer packs.

There are about 70 canning plants in India, engaged in the canning of marine products. Here too, their main business is shrimp canning, though lately they have taken up canning of sardines, mackerel, skipjack, crab, mussel, etc. in certain localities and seasons.

#### Processing of cheap fish

The trawler catch has a high representation of cheap fish, which may or may not be discarded at sea in preference to the proper on board storing of prawns and quality fish. Potentially the largest resource of cheap fish includes *Anchoviella*, silver bellies, sardines and the small sciaenids. Large vessels operating for cheap fish has not been found to be economical as the landed price is low. A technology has to be developed for the economic utilisation of these catches, without which fishing ventures based on these varieties may not prove to be economical.

The easiest method of utilisation would be to convert them to fishmeal, but this has to be viewed in the light of the following points. Firstly the value realised from fish meal is not steady. Secondly, fish meal goes as poultry and animal feed and the ultimate production of protein by way of meat, milk or eggs is much less than what would otherwise be available if directly used for human consumption, which should have a priority in a country like India.

There is a good demand for cheap varieties in the dried form if hygienic units are set up. But here also the high cost of power and fuel would make it viable only under certain conditions, as the product is consumed mostly in the small income sector. The

third alternative would be to make value added products out of them. This can be by the preparation of items such as minced meat, frozen block and various derivatives like sausage, ham, noodles, spreads and wafers.

#### Utilisation of fish

Prior to 1950, 42.7% of the production was consumed fresh, 25.9% converted into sun dried fish and 24.8% converted into salt cured fish, 6.6% reduced into fish manure. Since 1970, the pattern of consumption of fish in the domestic market has undergone a drastic change. Cold storage and processing facilities have developed and transportation system improved. Fresh fish landed are transported overland to places over 500 km away to be sold in fresh form. As a result, there is a great shift in the demand for fish, from the dried to the fresh condition. The utilisation of the fish catch in the recent years is given in the following Table 14.

While detailed figures on the disposition of fish landings in the earlier years are not available, a comparison of the pattern of development can be seen from the gross figures of 1945 and 1975 as summarised below:

	1945	1975
Consumed as fresh	42.7%	70%
Sun-dried	26.0%	12%
Salted	25.0%	9%
Frozen and canned	..	5%
Fishmeal and others	7.0%	4%

The increase in population, rising standard of living, change in the food habits of people, change in the attitude towards certain types and species of marine life etc., have resulted in the heavy demand for more fish. Those varieties of fish which were once considered as trash have become delicacies or costly exportable varieties. Though the dried fish production has relatively decreased, the demand for it is still great within the country. Though there are only very few fishmeal Plants scattered in different parts of the country, none of them is working to full capacity for want of raw material. When these Plants were established, their economy was based on "trash fish". But, the demand for these "trash fish" has become so high within the country that it has been found unworkable to use "trash fish" to feed the fishmeal plants.

Table 14. Utilisation of fish in India (Quantity in 1000 tonnes)

Year	Qty.	Fresh %	Qty.	Frozen %	Qty.	Canned %	Qty.	Dried %	Reduction & Others Qty.	%
1958	454.5	42.7	—	—	—	—	539.6	50.7	70.3	6.6
1961	460.4	47.9	—	—	—	—	419.9	43.7	80.7	8.4
1962	466.5	47.9	—	—	—	—	425.5	43.7	81.9	8.4
1963	704.9	67.4	4.3	0.4	1.4	0.1	282.7	27.1	52.4	5.0
1964	924.3	70.0	15.7	1.2	3.1	0.2	286.7	21.1	90.4	6.9
1965	908.7	68.3	17.5	1.3	5.1	0.4	340.5	25.6	59.0	4.4
1966	963.1	70.4	26.2	1.9	7.8	0.6	299.7	21.9	70.6	5.2
1967	968.9	68.8	48.0	3.4	11.2	0.8	275.1	19.7	103.0	7.3
1968	1055.1	69.1	61.8	4.1	11.0	0.7	294.9	19.3	103.1	6.8
1969	1090.7	67.9	56.6	3.5	10.4	0.6	345.1	21.5	104.0	6.5
1970	1177.3	67.0	80.7	4.6	12.3	0.7	356.4	20.3	129.4	7.4
1971	1222.4	66.0	97.9	5.3	13.1	0.7	358.7	19.3	159.5	8.7
1972	1119.1	68.2	82.2	5.0	9.5	0.7	286.0	17.5	142.4	8.6
1973	1278.6	65.3	105.5	5.4	15.9	0.8	379.7	19.4	178.3	9.1
1974	1437.0	63.7	101.1	4.5	9.9	0.4	524.0	23.2	183.3	8.2
1975	1616.4	69.4	65.2	2.8	4.8	0.2	441.6	19.0	200.0	8.6

### Transport

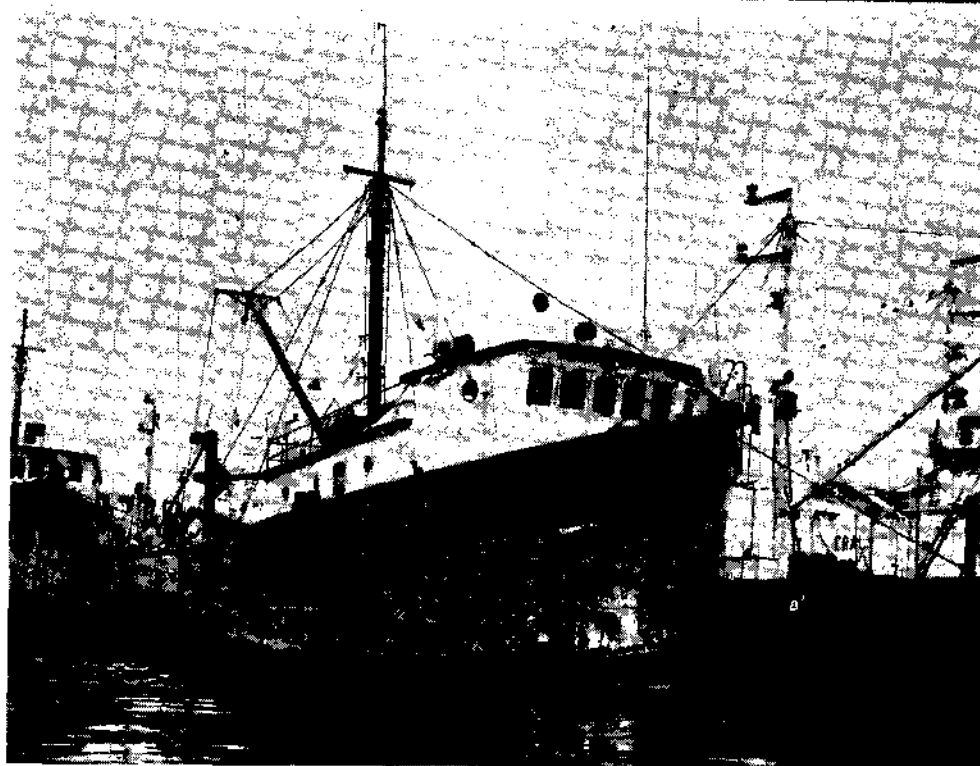
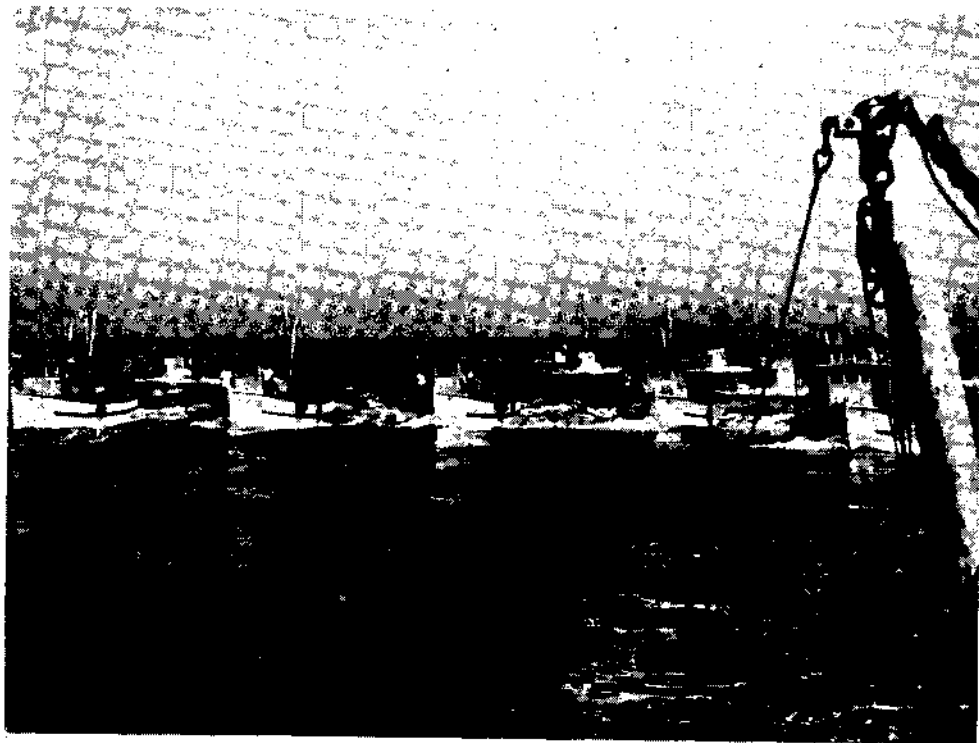
The catches from the landing centres are transported to the consumers, retail markets, cold storages and



Transport of fish by bicycle for local sales

processing plants, by various means. Headload is the most common and cheapest method to transport

the fish to the nearby retail markets, or road-side or door to door sales. Bicycles are now widely used to take the fish to interior places, which are not too far. Fish, well preserved in ice, are sent to long distances in trucks or by rail. Attempts have been made in the last two decades to introduce refrigerated and insulated vans. As many as 30 refrigerated road vans and equipment for 9 refrigerated rail vans were imported. But operations were badly affected due to various reasons including delay in the import of spares. At present indigenous capacities are available for the manufacture of equipment required for refrigerated road and rail vans. However, the limiting factors are (i) on the return journey the empty space is not utilised for transporting other perishable goods as non-fish eating population object to persistent fish smell and (ii) the delicate insulation and lining of the road and rail vans would get damaged if heavy cargo is loaded in the empty space. Both insulated rail and road vans are generally returned empty and makes the programme uneconomical. The refrigerated railway van service introduced on Indian railways as early as 1960 is yet to gather momentum. Only in certain limited sectors, where alternate methods of transport are not available these vans carry full rated load. Due to a variety of reasons like lack of daily service, lack of booking from intermediate stations, lack of facilities for maintaining the refrigerated temperature at despatch and receiving centres etc., the trade is not adequately patronising these services. Instead, transport of fish by ordinary road and rail vans packed in wicker baskets continue to be the



Small mechanised fishing vessels and trawlers



Trawler catch and sorting onboard the trawler



popular method. In case of long distance transport intermediate repacking is arranged by the merchants. In the light of the above, the problem of transport of fish over long distances require a close look.

### Marketing

Traditional Fishermen are engaged in fishing only. For the disposal of their catches they depend upon their household members or the fish merchants. The fisherwomen carry small quantities by headloads to nearby places. In some places, retail marketing is entirely carried out by fisherwomen. Large quantities are auctioned by the fishermen's agents or fish merchants, on the landing centres themselves or transported to the wholesale market. Sometimes, these wholesale markets may be just a vacant plot of land near or away from the landing centres, where the fish are bought by retailers, packed in small bundles, and carried to retail markets. Even though the country has increased its fish landing considerably, good wholesale or retail markets are still very few only. There are numerous fishermen co-operatives and fish marketing federations engaged in production and marketing. In some States, Fisheries Co-operative Federations have been established to develop fish marketing. The Central Fisheries Corporation and some State Fisheries Corporations also promote marketing. Some of them do not have any link up with production units/co-operatives. An efficient marketing system is very much needed for better management of the catch and distribution of the same.

India is exporting fish and fishery products to over 60 countries in the world. In the case of frozen marine products too, the marketing system is far from desirable. Though the value of export has reached nearly Rs. 2,000 million, what is being practised is not real "marketing" but mere "counter sales". The orders for the export of frozen products are booked directly with the buyers in foreign countries or through their agents in India. The main item of export is frozen shrimp, accounting for approximately 90% by value, frozen frog legs (approximately 4% by value), lobster tails (approximately 2% by value), cephalopods, frozen fish, dried fish and others (each approximately 1% of the value).

In view of the fact that frozen fish marketing is not practised in the domestic market, the price tend

to fluctuate very sharply depending upon the availability of catch. When the catch is exceptionally good a situation of glut is created and the prices drop to such a level that for a few days fishing is suspended as it happens along the south-west coast during heavy landings of sardines. On the other hand, the domestic price goes up by almost 100% during the south-west monsoon, when sea fishing is suspended due to the bad weather conditions, and fishing from public waters is prevented under State legislation intended for conserving the breeding stock. Unless frozen fish marketing is taken up on a large scale in the domestic market, it will be difficult to stabilise prices of fish.

### EXPORT OF MARINE PRODUCTS

Till early 1950s the export of dried fish products including dried prawns was of the order of 26,000 tonnes per year. The export pattern of fish products in 1945 is shown in Table 15. Of the total quantity of 26,340 tonnes exported, 22,302 tonnes (84.67%) was dried fish products and 4,038 tonnes (15.33%) fish manure. This export was mainly to the East Asian countries like Hong Kong, Singapore, Burmah and Sri Lanka. In the meanwhile, the demand for dried fish within the country has increased. Improved means of preservation of prawns, namely freezing and canning, started to utilise even the tiniest of prawns which were once sun-dried.

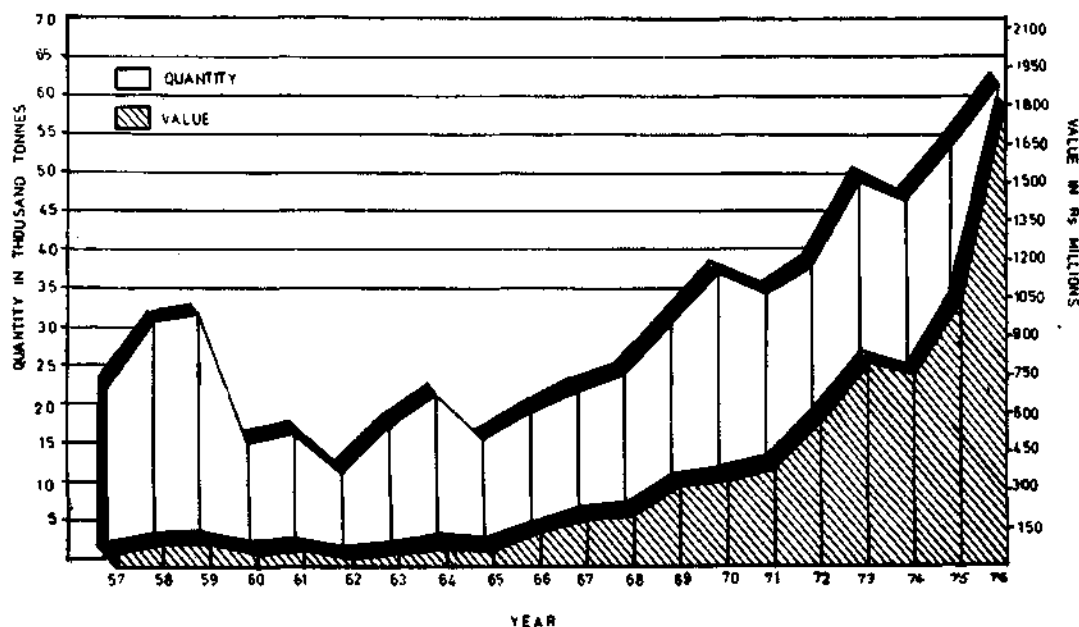
Table 15. *Export Pattern of Fish Products in 1945 (Average 1941-1945)*

Fish Products	Quantity (tonnes)
Fish, sun-dried	12,512
Fish, dry salted	7,822
Fish, wet salted	1,743
Fish maws & Shark fins	225
Fish; other sorts	...
Canned fish	...
Cod liver oil	...
Fish or Whale oil	...
Fish or Whale oil	...
Fish manure	4,038
Total	26,340

The change in export pattern from traditional items to an export of processed fishery products catering to the highly competitive markets is shown in Table 16. As against 84% by weight of cured products previously exported, frozen products now account for 82% by

weight of the present day exports. By value, previously cured products accounted for 96% while the same 96% is now taken up by frozen products. During 1976-77, marine products from India earned Rs.1,891 million accounting for 0.7% of the world trade in fishery products as well as 3.7% of the export earning of this country, ranking as 8 in the order of export earning commodities of India.

and preshipment inspection for the marine products were introduced, initially on a voluntary basis, with effect from 1st September 1963. Export (Quality and Inspection) Act, 1963 (22 of 1963) was enacted in the Indian Parliament in the year 1963 and came into force on and from 1-1-1964. On the same date the Export Inspection Council was also set up. The functions of the Council are to advise the Government



Export trend of Marine Products

With the change in commodities there has been a change in the countries importing marine products from India. So also depending largely on the unit value realised there has been shift in the importing countries also. Table 17 for 4 selected years will reveal this shift.

It may be seen that India's traditional markets for dried fish except for Sri Lanka has practically dried up. In the sixties USA was the main export market, accounting for about 55% of the export earning of this sector, followed by Japan accounting for approximately half the earning from USA. In the mid-seventies, this order has been reversed, the Japanese market accounts for 68% while the USA market only 22%.

#### Quality control

With the object of ensuring high quality of marine products exported from the country, quality control

of India regarding measures to be taken for implementing the compulsory quality control of the various products from Indian Ports. The Act empowers the Government of India to notify the products which should be brought under the compulsory quality control and preshipment inspection prior to export and specify the type of quality control and inspection or both.

The marine products first to be brought under this Act were frozen and canned shrimp, with effect from 15th March, 1965. In a phased manner other marine products were brought under the purview of the Act. The following items of fish and fish products are at present covered by this Act.

	From
1. Frozen shrimp	15- 3-1965
2. Canned shrimp (wet pack)	15- 3-1965
3. Frozen frog legs	1- 3-1966

4. Dried shark fins 12- 1-1970
5. Dried fish maws 12- 1-1970
6. Dried fish 22- 6-1970
7. Dried prawns 22- 6-1970
8. Frozen lobster tails 28-12-1971
9. Dried Bombay duck and laminated Bombay duck 5- 5-1973
10. Canned crab meat 5- 2-1977

Preliminary notification in respect of Fishmeal was issued on 5-6-1976. Other items under active consideration are frozen cuttle fish and squid, and frozen pomfret.

plants were also laid down. Marine Products Export Development Authority have already laid down hygienic standards for fishing vessels, processing plants, storage premises, etc., which have been duly notified.

#### In-process quality control

The Export Inspection Council of India has tentatively decided in June 1977 to introduce an "In-process Quality Control" for marine products processed for export. This is scheduled to start from January 1978. The industry's progress in producing quality goods for export was remarkable and this is supported

Table 16. Export of Marine Products from India (share percentage)

	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975
Frozen shrimps	45.86	51.34	58.03	70.11	59.54	68.11	79.84	73.58	73.69	87.68
Frozen lobster tails	0.42	0.59	1.20	1.73	1.03	0.96	0.96	0.78	0.98	0.75
Frozen frog legs	2.91	3.61	1.82	2.79	6.85	4.26	4.76	5.53	3.12	2.47
Frozen fish	—	—	—	—	—	—	0.05	0.30	0.14	0.25
Canned prawns	7.95	1.01	9.02	5.43	6.93	5.48	2.76	4.51	3.25	0.49
Canned fish	—	—	—	—	—	—	—	—	—	—
Dried prawns	6.07	7.07	5.69	2.73	4.00	2.01	0.36	0.58	0.25	0.18
Dried fish	34.21	23.65	21.72	14.15	19.55	17.46	9.09	6.94	3.75	4.30
Others	2.58	12.73	2.52	3.06	2.10	1.72	2.18	7.78	14.82	3.88
Actual	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Quantity (tonnes)	19,153	21,764	24,810	30,584	37,175	34,032	38,271	48,785	46,629	53,412
Value (Rs. million)	135.2	199.3	220.8	330.7	355.6	391.7	581.3	795.8	763.1	1049.1

#### Standards

The standards laid down for each item are internationally accepted and appreciated. These specifications or standards can be particularly classified into 4 categories, namely, physical, organoleptic, analytical and bacteriological. Since the industry was not well prepared, the standards set for the above were introduced in various stages. Cooked shrimp was brought under bacteriological standards in 1968; Frog legs in 1969. Phase I (Pathogenic bacterial test) of the bacteriological standards for frozen shrimp and lobster tails was introduced with effect from 1st August 1973, and the IIInd phase (for total plate count) from 1st January 1974.

Besides standards for quality of the products, the minimum requirements for the packaging material and minimum hygienic conditions for the processing

by the fact that out of the total marine products processed and offered for quality inspection, more than 90% was found to strictly conform to the said standards. Once the "In-process Quality Control" scheme is finally implemented, the industry has to welcome it as the ultimate aim is perfection for its products and more more than that, uplifting of the country's product image abroad.

#### Export promotion

The Marine Products Export Promotion Council was formed in 1961 exclusively to promote the export of marine products from India. This Council having its headquarters at Cochin had undertaken several market surveys abroad and sent many Sales Team and Delegations in order to accelerate marine products exports. In 1972, this Body has been renamed as 'Marine Products Export Development Authority' under an Act of the Parliament and has been vested with more

powers including development of production for export. The effectiveness of this body was keenly felt by all sections of the Seafood Industry in the country.

Table 17. Quantity of Export Commodities and Its Value

Commodities	Representation by weight (%)		Representation by value (%)	
	1940-46*	1976-77	1940-46*	1976-77
Dried fish	77	8.8	94	1
Wet fish, salted	7	Nil	2	Nil
Fish maws and sharkfin	1	0.4	2	1
Fish manure	15	Nil	2	Nil
Frozen shrimp	—	74.3	—	89
Frozen lobster tail	—	0.8	—	2
Frozen frog legs	—	4.6	—	4
Frozen fish	—	2.6	—	1
Canned prawns	—	0.2	—	Negligible
Others	Negligible	8.3	—	2
	100	100	100	100

\* Includes the present day India, Pakistan and Bangla Desh

The Authority's specific functions include registration of fishing vessels, processing plants and infrastructure facilities, laying down standards and specifications for marine products, improve the marketing of marine products overseas by providing market intelligence, market promotion activities, supply of information on the types of products in demand in different countries, rendering financial or other assistance to exporters, regulation of export of marine products, and arrange for training in different aspects connected with export with special reference to fishing, processing and marketing. For disseminating information useful to the industry and for export publicity, the MPEDA has brought out several publications, and export commodity reviews.

The Authority assists the exporters in solving difficulties in regard to shipping space, export finance,

supply of indigenous raw materials etc. The Authority also participates in International Fairs and Exhibitions abroad, organises Seafood Trade Fairs and sponsors Delegations and Study Teams to and from foreign countries.

Table 18. Countries Importing Marine Products from India

	1939-44 (Average)	1961	1969	1975
	% by wt.	% by value	% by value	% by value
Ceylon (Sri Lanka)	80.6	32.6	3.30	0.50
Mauritius and dependencies	1.2	—	—	—
UK	—	16.3	2.40	0.30
Other Commonwealth countries	1.9	—	—	—
Burma	16.1	22.9	—	—
USA	—	19.8	54.80	21.70
Japan	—	—	27.90	68.10
Australia	—	—	3.60	2.60
France	—	—	2.40	1.90
Hong Kong	—	—	0.96	0.26
Netherlands	—	—	0.22	0.15
Singapore	—	—	1.21	1.04
Sweden	—	—	0.02	0.63
West Germany (FRG)	—	—	0.58	0.19
Others	0.2	8.4	2.61	2.63
		100	100	100

### Export policy and prospects

The general export policy is to encourage high priced low volume fish and fishery products to be reserved for domestic market. The export of marine products could be further enhanced by increasing fish production through the exploitation of areas where the level of exploitation is low and through aquaculture; by reducing rejection through better quality control and introduction of various diversified products particularly the non-traditional items in the export market.