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**EMPLOYMENT POTENTIAL
OF
FISHERIES DEVELOPMENT PROGRAMMES
IN
KERALA**

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PROGRAMMES

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by 1985

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FOREWORD

Fisheries sector occupies an important place in the economy of Kerala. The marine landings along the 590 K.M. of coastal line of Kerala account for about 25 - 35 percent of total landings in the country. It is estimated that about one lakh fishermen are actively engaged in fishing.

The development of fisheries gave a fillip to ancillary industries like fish processing and canning, storage and distribution thereby widening the field of employment opportunities in the secondary and tertiary sectors.

The present study is one of the studies included in the current years programme of the Man Power Unit. Employment potential of the fisheries development programme for a period of ten years is estimated on the basis of anticipated marine production and future programmes. The report has been prepared by Sri. K.V. Bhattathiri, Research Officer under the supervision of Sri.R. Gopalakrishnan Nair, Deputy Director.

Though crude estimates are made in this report due to paucity of data and detailed studies are found necessary to highlight employment opportunities in different sectors, it is hoped that this report will be useful for sectoral planning and future programming in the fisheries sector.

Trivandrum
19--1--77

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DIRECTOR

1. Introduction

The fishing industry occupies an influential and unique place in Kerala economy. The quantity, variety and value of fish and other products from different kinds of fisheries are considerable, but the ultimate worth and significance of fisheries are based on other factors which are difficult to measure in concrete terms. Fish provide a balanced diet to the undernourished people of the state. The food deficit in the state can be minimised by increasing the consumption of fish. Fish and fish products contribute Above/considerable foreign exchange earnings. /all the employment potential of the fishery and allied industries is very significant in the context of the grave situation of unemployment and underemployment in the state.

Though there was some progress in the growth of the fishing industry in the past decade, vast potentialities for the development of fisheries, especially in the field of marine fisheries, yet remain untapped. It is true that there is an increase in the annual landings of fish over the past decade. But it may be noted that the increasing trend in the annual fish landings in the country is not in pace with the growth in production in other parts of the world. During the period 1965 to 1974 the production in Japan and the U.S.S.R. was almost doubled (6.91 to 10.25 and 5.10 to 7.76 million tonnes respectively). In China the increase was from 5.33 million tonnes to 7.57 million tonnes (42 %) and the production in Thailand from 0.63 million tonnes to 1.68 million tonnes during the period. Increase in India's production during the period was from 1.33 million tonnes to 1.67 million tonnes (25 %) (Vide table - 1). In Kerala the increment was from 0.34 million tonnes to 0.45 million tonnes (32 %) during the period. (See table - 2). The stunted growth of the industry was due to the slow progress in the introduction of mechanisation and exploitation of the treasure in new areas. The dependance on the traditional methods of fishing in the limited and much exploited narrow inshore region bordering the coast line is the main reason for the slow progress in the fishing industry.

There are large potentialities in the development of fisheries in Kerala. The fishing industry provides employment opportunities not only in the primary sector, but in secondary and service sectors also. By the development of fisheries, ancillary industries like fish processing and canning, storage, ice plants are also

flourishing and the employment potential in these fields is to be taken into account to have a clear picture of the impact of the fisheries development programmes on employment. In the present study an attempt is made to estimate the employment potential of the fisheries development programmes for a period of ten years in the light of the progress so far achieved, fisheries potential which is not yet exploited and different projects proposed to be implemented.

2. Resource Potential

Marine Fishery Resources

The marine fishery resources can be broadly classified into three groups. (1) Resources of the inshore fishing grounds, (2) Resources of the off-shore fishing grounds and (3) Resources of deep sea fishing grounds. The inshore area is defined as the traditional fishing zone along the coast upto 20-25 M. depth contour which is exploited by indigenous boats and gear. Many of the mechanised boats of small size are operating at the further end of this depth zone. The inshore belt of about 15 KM from the shore, stretches about 590 KM along the coast line of Kerala. Since the beginning of 1960's shrimp trawling is carried out extensively in there waters. It is considered that not very substantial yield of pelagic fish is possible unless the area of fishing is extended further. The general pattern of fish distribution in grounds (18-50 m) revealed by exploratory surveys is that the elasmobranchs and miscellaneous fishes like small sciaenids, lizard fishes and flat heads are common all along the region from Cape Comorin to Calicut. In the northern sector from Calicut to Cannanore there is a significant cat fish component.

In regard to deep sea fishing, most of the exploratory surveys conducted in the past were confined to depths upto 75 metres. Beyond this the continental shelf remained virtually a 'mare incognitum' as regards the occurrence of fishing grounds and potential yields. In the exploratory surveys conducted by the Indo-Norwegian project between 1966 and 1968, species like deep sea prawns were detected between Ponnani and South Alleppey.

The pelagic Fishery Project, Cochin, a joint venture of the Government of India, United Nations Development Programme and the Food and Agricultural Organisation which started functioning in 1971 has conducted several exploratory surveys. The Norwegian Agency for International Development (N.O.R.A.D.) also collaborated in the execution of the Project till March 1976. The project has established the fact that the resources of oil sardine and mackerel are much more than known. The average size of sardine and mackerel standing stock is estimated to be of the order of nearly 400,000 and 300,000 tonnes respectively. The average landings of oil sardine and mackerel for the last decade were only 208,000 and 79,000 tonnes. Hence there is considerable scope for increasing their catch further.

Apart from these two species, a continuous inshore belt of fish resources dominated by golden snappers, silver bellies, glass perches etc. within the 15 M. depth line, was detected in the survey. The average standing stock of this shallow water resource per coverage period has been estimated to be about 60,000 tonnes. Beyond this depth dominant species are the white baits, cat fish, ribbon fish and horse mackerel. The white bait resources have been found to be particularly high in certain areas and times and an average stock of 500,000 tonnes have been estimated. It is found with in 40 M. depths for most part of the year.

The resources of cat fish/ribbon fish are considerably large with an average stock of 200,000 tonnes. High concentrations of these are found in depths of 30 m and beyond mainly during May - August on the central and northern shelf and during January - May on the southern shelf. Another resource of considerable importance is the horse mackerel with an estimated average standing stock of 180,000 tonnes. These are found mainly in the middle and outer shelves during October - December and April - May. The Project surveys have also revealed the existence of resources of miscellaneous commercial fishes spread over the shelf. These are found to be of the order of about 390,000 tonnes.

The Pelagic Fishery Project is also of the view that the present level of exploitation of shallow ~~sea~~ resource is fairly high and offers little scope for further increase in the catches. But landings of white bait, cat fish, ribbon fish and horse mackerel

are only marginal compared with their resources and there are possibilities for activating the operations based on these resources. Commercial quantities can be harvested using small boats rigged with pelagic trawls, bottom trawls and purse seines depending on the type of fish to be caught. An extension of the fishing season for mackerel and oil sardine is also possible using small purse seines during April/May, August - October when concentrations are found.

The continental shelf of India stretches along the coast line of about 5600 KM and it accounts for more than one-tenth of the entire country. Nearly 48 million hectares of fishable waters including off shore area is a blessing. The exploratory surveys indicate availability of 0.6 million tonnes of fish and prawns from the coastal belt upto 40 fathoms. At present except for about 5 %, the entire fish production comes from inshore belt. The additional potential yield of the off shore area of different regions has been estimated as follows:

POTENTIAL (ADDITIONAL) YIELD FROM OFF SHORE AREA

State	Total area (Sq. miles)	Potential additional yield (Ton)		
		Shrimp	Other bottom fishes	Total (Rounded to '00)
Andhra Pradesh	5180	1088	25848	27000
Tamil Nadu	8400	7644	75852	83500
Kerala	7560	6880	30089	37000
Mysore	9240	5544	43613	49200
Maharashtra	14340	5194	124953	130100
Gujarat	28000	8680	260120	268800
Total	73220	35030	560475	595600

Thus it is revealed that there is a vast potential for commercial fishing in the Wedge Bank, especially for ground fishes. Similar trawling areas are also found in the Gulf of Cambay and the Gulf of Kutch.

The country is also blessed with extensive inland fishery resources also. The available cultivable area the area that can

be rendered suitable for sweet water fish farming and the area which can be developed for brackish water fish farming are estimated at 1.62 million hectares, 0.65 million hectares and 2.02 million hectares respectively. But of the total 4.29 million hectares of inland waters suitable for fish production, only about 0.61 million hectares (14.2 %) have been partially utilised.

Kerala

Kerala accounts for more than 25 % of the total production in the country. With nearly 590 KM of coast line and other natural facilities, Kerala has very good fishing grounds. The most important economic species of the state are Sardine (20 %), Prawns (13 %), Mackerel (11 %), Sharks (3 %), Silver bellies (4 %), Horse Mackerel (4 %), Sole (3 %) and Ribbon fish (3 %). The continental shelf with an average width of about 50 KM has a fishable ground of nearly 25000 Sq. KM. But the present exploitation is limited to the inshore belt of 15 KM from the sea shore. The report published by polish experts indicates the possibility of a ten - fold increase of fishing efforts and a five - fold rise in productivity as compared with the present annual average production in Kerala. The inshore belt is almost fully exploited and hence the Science and Technology sub committee on Fisheries (Kerala) had recommended promotion of off shore and deep sea fishing by strengthening exploratory and experimental fishing out side the 40 fathom limit. The potential yield from the shelf region along Kerala coast alone is estimated at 1.30 million tonnes of fish of which the present exploited stock forms only one-third.

In a survey conducted to locate lobster fish 25 centres were identified, 8 centres in Kollengode area, 3 centres each in Varkala and Edava areas, 4 centres in Paravoor area and the remaining 7 centres in Quilon area. The total landings were estimated to be 3281 numbers in 1972-73 as against 3146 estimated in the previous year.

The inland fisheries consist of esturine fisheries and the fresh water fisheries. The former occurs in the esturine regions, the extensive back water areas running half way of the state from the south and the connected paddy fields, while the latter is seen in rivers, reservoirs and ponds. The state has a number of irrigation reservoirs, a large number of public tanks and ponds suitable

for fish culture. Malampuzha, Walayar, Mangalam, Meenkara, Pothundy, Peechi, Periyar, Vazhani, Peringalkuthu, Neriamangalam, Kundala, Mattupetty, Sengulam and Neyyar are the important reservoirs in the state. At Sasthamcotta there is a fresh water lake.

There are 44 rivers in the state of which 41 are west flowing. Baliapatam, Anjarakandy, Chaliar, Bharathapuzha, Chalakudy, Periyar, Moovattupuzha, Meenachel, Pamba, Manimala, Kallada and Neyyar are the important among them. The different types of Barbus spp (local carps) are commonly seen in the rivers. Estimated annual production of inland fisheries is about 8000 tonnes, 80 % of which are Prawns and the scope for the development of fresh water fisheries is very limited. However, fisheries of exotic varieties are being developed in the reservoirs. The fishable waters of the state are classified as given under:

Fishable waters ('000 hectares)

1. Sea within 100 fathom limit	-	2439
2. Back waters	-	52
3. Lakes, Reservoirs, Ponds etc.	-	9
4. Paddy land for Prawn fisheries	-	4
5. Rivers (K.Ms.)	-	4827

The following are the important fish landing centres

1. Manjeswar	14. Chowghat
2. Kumbala	15. Nattika
3. Adakath bail	16. Azhikode
4. Hosdurg	17. Cochin
5. Madai	18. Chellanam
6. Cannanore	19. Ambalappuzha
7. Tellicherry	20. Valiyazheekal
8. Badagara	21. Quilon
9. Calicut	22. Neendakara
10. Tanur	23. Edava
11. Parappanangadi	24. Puthenthoppu
12. Koottai	25. Vizhinjam
13. Ponnani	26. Poovar
	27. Kollengode

3. Activities under the Five Year Plans:

Fisheries development programmes in the country are on the ~~xxxxxxx~~ emphasis that every effort to enhance the fish catches will provide an essential dietary supplement and will serve as a source of employment and foreign exchange. In the development of sea fisheries the tasks fall broadly under four heads: 1) Improvement of fishing methods, 2) development of deep sea fishing, 3) provision of fishing harbours and 4) organisation of fish transport, storage marketing and utilization of fish.

The employment potential of the fisheries development programmes also hinges on these schemes. Increasingly the emphasis in the development of fisheries is on a Co-ordinated approach to the social and economic life of villages and groups of villages whose main source of livelihood is fishing.

Over the first and second plan periods about 1800 boats had been mechanised in the country. The programme in the third plan was to mechanise 4000 more boats. There was special emphasis on the schemes like exploration of new fishing grounds, Co-operative marketing and development of refrigerated rail cars and insulated road trucks. There was considerable progress in the mechanisation of fishing industry in the third plan and in the subsequent annual plans. About 5700 mechanised boats were brought under operation during the period 1961 to 1969. The level of fish production during the period increased from 0.96 million tonnes to 1.8 million tonnes. The value of export increased from Rs. 4/- Crores to 18 crores in 1967-68. The pattern of export of fish and fish products had also undergone a change during the period. The main development in exports was related to frozen prawns in place of cured fish.

A beginning was made in the IIIrd plan for the development of fishing harbours in the country. A programme of 16 small harbours was initiated during the period. The provision for landing and berthing facilities for mechanised boats had also been taken up at 30 other centres. For the development of deep sea fishing and export and for development of inland water areas Fisheries Corporations had been set up in different states. The Central Fisheries Corporation was set up in 1966 to promote regulated marketing of fish. In 1961 the Central Institute of Fisheries Education was established at Bombay. Later in 1968 two regional institutions were established one at Agra and another at Hyderabad for

training operatives for inland fisheries. A central Institute of Marine Fisheries operatives was set up at Cochin in 1963 and had been supplemented by a unit at Madras in 1968. In 1967 the fisheries research institute were transferred to the I.C.A.R.

Development Programmes in Kerala

The fishery development programmes under the I and II plans were meagre both in respect of out lay and target. Against the planned out lay of Rs.15/- lakhs for the I plan, the amount spent was only Rs.2.74 lakhs. During the plan period three research stations were opened. Under the Indo-Norwegian project a boat building yard at Sakthikulangara was established.

In the second plan an amount of Rs.64.36 lakhs was spent against the planned target of Rs.93.37 lakhs. During the period a boat building yard at Vizhinjam and three Ice plants one each at Kayamkulam, Cochin and Blangad were established. The Neendakara Ice factory and refrigeration plant was also constructed. Modernisation of fish preservation and marketing through the use of ice and insulated vans were attempted systematically during the period.

As in the case of the national plan, the Third Plan schemes of the state comprised mainly mechanisation of fishing crafts, construction of fishing harbours, establishment of ice plants and cold storage and provision for other infrastructural facilities for marketing and distribution. As against the plan provision of Rs.450/- lakhs an amount of Rs.334.01 lakhs (75 %) was spent in the plan period. Total amount spent in the state sector as on 68-69 was Rs.1085.91 lakhs. Five boat building yards, five fisherman training centres, 685 primary producers' co-operative societies and 9 marketing societies were the important achievements during the period. 1250 boats were constructed and issued to fishermen and a number of ice factories and cold storages were established.

By all these efforts, we could touch only a fringe of the resource potential. The off shore waters lying beyond 15-25 KM from the coast are practically untouched. The tapping of these virgin resources will provide large scale employment and better income to the people. Therefore, the Fourth Five Year Plan aimed at more speedy implementation of mechanisation programme and development of fisheries. An amount of Rs.1100 lakh had been provided in the state sector while the central sector provision for the state was Rs.1089/- lakhs. A co-ordinated and concerted effort had been made

by launching integrated fisheries projects in different centres. The success of the pilot fisheries project sponsored by the Indo-Norwegian project at Neendakara paved the way for the introduction of similar projects in the state. It not only helped for modernisation of fishing industry but also improved the living condition of the fishermen community. The following schemes are envisaged in the project:

1. Mechanised fishing
2. Trawler fishing
3. Boat yards and service station
4. Ice plants and cold storages
5. Training centres
6. Roads and
7. Distribution of fish

Nine centres viz. Vizhinjam, Neendakara, Cochin, Azhikode, Ponnani, Beypore, Thalai, Moplay Bay and Baliapatam were selected for the implementation of the schemes on a phased programme.

The Fifth plan objective is to raise fish production to the level of 7 lakh tonnes (675 ^{lakh} tonnes from marine and the remaining from inland) in 1978-79. That is, the plan aims at exploiting half the estimated potential yield from the continental shelf. The following are the strategies adopted for achieving the target.

1) Diversification of fishing in the inshore region for different species of fish rather than confining mechanised fishing to shrimp trawling alone.

2. Off shore fishing by introducing large vessels.
3. Provision of infrastructural facilities and
4. Assistance to traditional fishermen.

Physical targets:-

State sector:

Mechanised boats	-	540
Large fishing vessels	-	20
Catamarans fitted with out board motors	0	100
<u>Private Sector</u>		
Mechanised boats		500
Deep sea fishing vessels		50

Processing facilities

Production capacity	-	150 tonnes/day
Cold storage	-	380 "
Freezing	-	90 "
Frozen fish storage	-	1080 "
Canning	-	100 "

An amount of Rs.20.00 crores is provided in the draft plan for development of fisheries and welfare activities. In addition to this it is expected that an amount of Rs.22.00 crores will be forthcoming for central sector schemes during the Fifth plan period.

A.R.C. Scheme

In the development of fisheries the projects implemented by the assistance of the Agricultural Refinance Corporation deserve special attention. The main object of the project is to increase fish production by improved methods of fishing and to link production with processing, storage and other marketing facilities. The intensive development of fisheries in a particular area is visualised in the project. The project is implemented through the Regional Fish Marketing Co-operative society and its affiliated primary societies. The pattern of assistance to the scheme is that 25 % of the total outlay is to be met by the state Government and the rest 75 % by the A.R.C., Bombay as long-term loans covering a period of ten years. The scheme involves supply of mechanised boats (about 50 for one centre) with nets and implements, provision of ice plant, insulated van, workshop for boats etc. The boats are issued to groups sponsored by affiliated Societies and the groups will acquire ownership of the boats issued to them on payment of cost of the boats. The total cost of a project will come to Rs.70.00 lakhs which will vary according to schemes contemplated. In the implementation of the scheme successfully, a project Officer in the status of the Deputy Director of Fisheries is appointed and he is assisted by seven Fishery Development Officers. Now three such projects are working with the assistance of A.R.C., one at Puthiyangadi, another at Vypeen and the third at Anjengo.

4. Infrastructural Facilities

In the development of fisheries, it was realised that under the existing facilities and with the fishing equipments in use, the fishermen had reached the maximum limit of efficiency. Therefore, production could be increased by increasing the period of operation and improving the fishing equipments and techniques. As the scope for the development of inland fisheries is very limited the emphasis in the plan programmes is given to the development of fishing harbours, mechanisation of fishing crafts provision of communication and marketing facilities. Thus along with the provision of infrastructural facilities for increasing production, the horizon for employment in the field of fisheries has also been widened.

Fishing Harbours and Landing Centres

Large scale mechanised fishing operations are possible only if there are suitable fishing harbours and landing centres. The harbours help in the operation of fishing boats and assist a large number of local crafts to extend their period of operation even during monsoon. At present Cochin is the only port from where bigger vessels can operate. The development of the port for fishing purposes is initiated by the Cochin port trust under central sector schemes. Works on two other fishing harbours at Vizhinjam and Moplay bay and for providing landing and berthing facilities at Ponnani, Beypore and Baliapatam taken up during the third plan period were almost completed. Detailed investigation for the development of Ponnani is now under way. Sixteen centres are selected for the development of fishing harbours in the state (appendix). The project reports on the harbours at Beypore, Neendakara and Vizhinjam will throw light on the potentialities of production and employment due to mechanisation of fishing and provision of marketing facilities like storage, processing and distribution. The salient features of these projects are summarised below.

The harbour area at Vizhinjam was surveyed by a Swedish Engineer Earl R. Bjeike in the middle fifties. The scheme for the construction of the harbour in three stages was approved by the central and state Governments and was taken up in 1962. The original estimate of Rs.122 lakhs was revised to Rs.193/- lakh in 1967. About Rs.189/- lakhs had been spent for the construction of the first stage of the project viz. sea ward break water.

Vizhinjam is strategically located for the exploitation of the following fishery resources. 1) The huge potential of the wadge Bank lying partly in the Indian Ocean and partly in the Arabian Sea. Of the 4000 Sq. Miles of the wadge Bank area an area of 500 Sq. miles is considered to be very good for intensive fishing. This fishing ground is only 40 KM from Vizhinjam, 2) The deep sea prawn and lobster resources off Quilon, 3) The off shore resources and 4) the gill net fishery available of Vizhinjam. The project report consists of the following programmes:

1. Completion of the first stage project.
2. Construction of a second sea ward break water of 360 meter length.
3. Provision of landing quay of 710 meter length.
4. Construction of 210 x 30 meters auction hall.
5. Provision of 3 ice plants of 300 tonnes capacity.
6. Provision of 5 freezing plants with 30 tonnes capacity and production of 100 tonnes of ice.
7. Other infrastructural facilities like roads etc.

Total cost of the project is estimated at Rs.183 million of which an amount of Rs.39.81 million is earmarked for the stage II expansion of the harbour. The project also contemplates introduction of 297 mechanised vessels (gillnetters 8m-210), trawlers 16m - 75 and trawlers 23m - 12) in a phased programme with in a period of ten years. With the operation of these vessels a total catch of 39600 tonnes of fish is anticipated during the period.

The fishing personnel required for the operation of vessels proposed from the Vizhinjam port within a period of ten years are estimated as follows:

Skipper (for 297 vellels)	-	297
Engineer (for trawlers 87)	-	87
Mate	-	87
Engine driver	-	87
Oiler (for 16m vessel-1, 23m vessel-2)	-	99
Cooks -do-	-	99
Radio operator (23m - 1)	-	12
Bosun -do-	-	12
Deck hands (3 for 8m, 6 for - 16m and 8 for 23m vessels)	-	1176
Total		1956

Personnel required for the shore establishment will be as follows:

Vessel management and servicing	-	100
Ice plants	-	75
Processing and freezing plants	-	220
Auction hall and cold chain	-	90
Project office	-	110
Port management	-	13

Total		608
		=====

Beypore: Beypore is an estuarine port on the mouth of river, Chaliar. Attempts for the development of the river mouth and the adjoining area were made as early as in 1880. The Hydrographic survey branch of the Indian Navy had conducted a complete survey in 1956. There was another fulfilled survey in 1967. The project report for the development of the port is based on the proposals of the Hydrographic survey wing of the state port department. Total cost of the project is estimated at Rs.1045/- million of which Rs.60/- million is for 258 fishing vessels (10m type ~~and~~ 210 and 16m type 48). After completion of the project 27000 tonnes of fish are expected to be produced additionally every year. The requirement of fishing personnel for the project is estimated as follows:

Skipper	-	258
Engineer(16m vessels)		48
Mate	"	48
Engine driver	"	48
Oiler	"	48
Deck hands/cooks		1386

		1836
		=====
For shore establishments		
Ice plants		70
Freezing plants		205
Auction hall and cold chain		90
Vessel management		75
Project office		100

		540
		=====

Neendakara: The Integrated Fisheries Development project for Neendakara envisages only minimum requirements for the development of the Neendakara port for fishing and allied activities. They are 1) constructing landing and berthing facilities for 16 meter and 8 meter vessels 2) providing an auction hall and 3) providing one 100 tonne ice plant with storage facility for ice and fish. A work shop for servicing, 16 meter vessels is also provided. The two fishing villages, Sakthikulangara and Neendakara on either side of the Ashtamudi lake were selected by the Indo-Norwegian project in 1952 for the establishment of fishing and community development programmes. The success of the project in the development of mechanised fishing, processing and marketing has helped very much to start similar integrated projects in other centres.

The total cost of the new project is estimated at Rs. 696/- million of which an amount of Rs. 36.9 million is for the distribution of vessels. It is expected that within a period of ten years 210 eight meter vessels and 30 sixteen meter vessels can be supplied along with increasing provision for landing and berthing facilities and storage capacity. Additional employment due to the implementation of the project is estimated as follows:

Fishing personnel

Skipper (8 meter vessels 210 and 16 meter - 30)	0 0	240
Engineer (16 meter vessels)		30
Mate "		30
Engine Driver		30
Oiler		30
Deck hands/cooks		840

		1200
		=====

Shore establishments

Ice plants	21
Auction Hall	70
Vessel management	75
Project office	80

	246
	=====

5. The Master Plan

In this connection the master plan prepared by the state Government and submitted to Government of India in 1969 for the comprehensive development of fisheries sector is worth mentioning. The plan envisages a total financial commitment of the order of Rs. 305.92 crores for the implementation of the development programmes within a period of 20 years. In proposing the outlay investment possibilities both in public and private sectors are taken into consideration. The following are the important targets fixed to be achieved.

1. 555 large vessels and 8100 mechanised boats
2. Ice plants with an additional production capacity of 950 tonnes per day and 2200 tonnes of storage capacity.
3. 14 new boat building yards
4. 22 centres for the construction of canoes
5. 2 modern boat building yards capable of constructing steel hulled trawlers
6. 19 repair and refitting workshops
7. 4 wireless stations
8. One net making factory
9. Six industrial estates
10. 10 canning plants
11. 14 fish meal plants
12. one marine diesel engine factory
13. 4050 primary societies
14. 35000 houses for fishermen

The reference to the master plan in this context is significant as it provides employment to 2.91 lakh persons at the end of 1989, directly and indirectly. In estimating the figure labour component for the construction of harbours, factory buildings and roads are excluded. The master plan estimated four categories of personnel involved in fishing industry.

1. Fishermen, labourers and technicians at various levels of skill.
2. Managers, accountants, etc. and similar staff.
3. Administration with varying range of responsibility, and
4. Research workers in various applied industries.

The following is the estimate of employment that would be created during the master plan period.

Direct employment ('000)

Indigenous canoes	-	35.20
Mechanised boats below 50 feet	-	64.80
Trawlers	-	7.80
Processing and Marketing	-	117.00
Other fishing establishments	-	1.53
Supervisory, technical	-	0.50
Administrative, Managerial	-	0.50
Research workers	-	0.10

		227.43
		=====

Indirect employment('000)

Fishing personnel on		
1) Canoes	-	19.10
2) Mechanised boats below 50 feet-		38.90
3) Trawlers	-	4.70
4) Labour in processing plants	-	1.00

		63.70
		=====

Total employment at the end of the Master plan period will be of the order of 2.91 lakhs.

6. Training

The training programme for the man power required for fishing industry was only sporadic since 1947. An important pre-requisite for the development of this industry is the supply of certificated personnel required for the sea-going fishing vessels under the Indian Merchant Shipping Act 1958. The availability of technical staff required for the ancillary establishments on shore is also important. In view of this the central Institute of Fisheries Operatives was established in 1963 at Cochin and training is given in fishing second hands, engine driving, radio telephone operations, etc. In 1968 another unit was started in Madras to satisfy the growing demand for the trainees.

The following are the courses conducted in the Institution

<u>Course</u>	<u>Duration</u>	<u>Strength</u>
1. Fishing second hands	15 months	40
2. Engine driving of fishing vessels	"	40
3. Boat building Foremen	"	20
4. Shore mechanics	12 months	10
5. Gear technicians	9 months	15
6. Radio Telephone Operators	"	15

These courses are institutional in nature. The Institute also provides facilities for the post institutional training for fishing second hands and Engine drivers. There are facilities in the Institute for adhoc training courses for teachers in Fishermen training centres of the state Governments and for updating courses for engine drivers holding lower certificates for qualifying themselves as engine drivers of fishing vessels.

There are five fishermen training centres run by the state Fisheries Department at Vizhinjam, Neendakara, Ernakulam, Beypore and Cannanore. In these institutions training is given in mechanised fishing for a period of 38 weeks to the fishermen candidates selected from the nominees of M.U.C.S. by the Regional Advisory Committee. The sanctioned intake capacity in each centre is fixed as 40. The trainees selected are given a monthly stipend of Rs.125/- during the training period. More than 2500 candidates were so far trained in these institutions.

When the scheme of the distribution of mechanised boats at subsidised rate was started in 1959-60, a group of five or six trained fishermen was benefited by the scheme. Later this scheme was modified and one or two boats were distributed to each selected society. It may be better to revive the old scheme, as it will give an incentive to the trained personnel by providing self employment opportunities to those who have entrepreneurial ability and talent. A detailed study by an expert committee on the employment of the trained personnel, present system of training and re-orientation of the training programme may be necessary to equip the trainees with experience in some other connected trades also.

6. Employment potential of the programmes by 1985

Assumptions: The level of achievement in the fisheries in 1973-74 due to the development programmes both in traditional and mechanised fishing is as shown below.

	<u>Traditional fishing</u>	<u>Mechanised fishing</u>
No. of landing centres (No.)	249	23
Crafts (Nos)	25100	2105
Fishermen employed (No)	99807	10805
Total Landings (Kg)	369294 (82.3%)	79446 (17.7%)

The fifth plan target is to increase production to the level of 7 lakh tonnes (6.75 lakh tonnes from marine fish landings). To achieve this target 1050 meahanised boats and 70 large vessels are expected to be introduced during the plan period. In view of the slow progress during the past years it is doubtful whether these targets could be achieved by the end of the fifth plan, i.e. by the end of 1978-79. But it may be noted that between the period 1960 and 1971, the two peak production years, the production had increased from 3.47 lakh tonnes to 4.45 lakh tonnes with the introduction of nearly 1700 mechanised boats. Again, during the period 1967 to 1974 the increase was from 3.64 lakh tonnes to 4.53 lakh tonnes, with the addition of nearly 1100 mechanised boats. During this period about 5000 country crafts were also newly introduced. Though the inshore belt is almost fully exploited, scope for deep sea and off shore fishing is bright. Therefore, there is every possibility to raise the production to the level of 8 lakh tonnes in 1985, by introducing 1750 mechanised boats and 250 large vessels. Here, new projects with the assistance of A.R.C. and with foreign collaboration are expected. There may be doubts in regard to the introduction of small mechanised boats during the period as the inshore belt, where there are to operate is almost fully exploited with the existing number of mechanised boats and country crafts. But, for the reasons such as (1) small entrepreneurs will come forth to invest in small boats as its cost is small compared with large vessels used for deep sea fishing and (2) even with the introduction of more than 2000 boats which are now in operation marginal profit is still higher, there is every possibility for the introduction of 1750 mechanised boats during a period of ten years.

There were five boat building yards in the public sector with a total production capacity of 107 boats in a year. Of these, only two, one at Sakthikulangara and another at Beypore are now working. The boat building yard at Vizhinjam is completely dismantled. The

closure of the boat building yards is not due to lack of demand but for various administrative reasons. There are nearly 30 boat building yards working in the private sector. Most of them are working under capacity. However, it is expected that a few more yards may be established in the private sector.

There were 115 registered factories for ice manufacture in 1974 providing employment to 623 persons. In addition to this, there were 19 ice plants and freezing plants in the public sector. Establishment of new ice factories is now discouraged as most of the existing units are not working with optimum capacity. But with the expected increase in production of fish, demand for ice and freezing plants will be on the increase and a few more such units will be coming up during the sixth plan period.

Disposal of the products in 1974 was as indicated below.

	<u>Quantity (Tonnes)</u>	<u>%age to Total</u>
Fresh consumption	278888	61
Frozen	53552	12
Dried	113514	25
Canned, etc.	8027	2
	<u>453981</u>	<u>100</u>

The distribution of the products marketed according to location of market was as follows.

	<u>Quantity (Tonnes)</u>	<u>%age to Total</u>
Intra District	61559	13
Inter District	321807	71
Inter state	8593	2
Export	62022	14
	<u>453981</u>	<u>100</u>

The above pattern of distribution of products may change slightly when the production especially that of crustaceans which are mainly for export, is increased due to diversification of fishing operations. Hence the pattern of disposal of the 8 lakh tonnes of total catch in 1985 may be as follows:-

	<u>%age distribution</u>	<u>quantity (lakh tonnes)</u>
Fresh consumption	55%	4.40
Frozen	20%	1.60
Dried	20%	1.60
Canned, etc.	5%	0.40
	100.00	8.00

Frozen and canned products are mainly for export. Dried fish are gone for inter-district and inter state marketings. Of the above, about 0.40 - 0.50 lakh tonnes will be wasted in processing which can be used for fish meal and manure. The marketing of products is assumed as follows:

<u>Location</u>	<u>%age distribution</u>	<u>quantity (lakh tonnes)</u>
Intra district	10%	0.80
Inter district	60%	4.80
Inter state	5%	0.40
Export	25%	2.00
	100.00	8.00

From the above, it is obvious that there is scope for starting ancillary industries and a large number of persons can be absorbed in these industries and in transportation and marketing. An estimate of additional employment that would be created in 1985 in fishing industry is made as follows:-

Additional employment in fishing.

skipper - for 1750 small boats	..	1750
for 250 large vessels including 100 trawlers	..	250
Engineer -do-	..	250
Mate	..	250
Radio operators for 100 trawlers	..	100
Bosum	...	100
Engine driver for 250 vessels	..	250
Oiler (for 150 - 1 each for 100 - 2 each)	..	350
Deck hands (1750 - 3 each, 150 - 6 each, 100 - 8 each)	..	6950
cooks (150 - 1 each, 100 - 2 each)	..	350
		10600
For 5200 country boats @ 5 persons	..	26000
		36600

processing, drying etc.	..	15000
Marketing	..	43500
Ice plants, freezing plants, boat building and repairs etc.	..	1500

		96600

It is estimated that there will be employment for more than 200 days in a year in mechanised fishing and employment in mechanised fishing can be considered as full employment. In other sectors under employment will prevail due to seasonal variations in catch. This seasonal under-employment or unemployment can be minimised by starting industries for net making and repairs on cottage basis. It is stated that in addition to the housing programme, there are programmes for constructing nearly 200 roads in coastal areas to be implemented by the Department of Fisheries. There will be about 10 lakh man days for the construction of these roads, the cost of which is roughly estimated at Rs. one crore. If the works are taken in the off seasons under employment will be minimised to a large extent.

The level of employment in fishing and allied industries by 1985 may be indicated as follows:-

EMPLOYMENT IN FISHERIES AND ALLIED INDUSTRIES

Item	1973-74	Addition till 1985	position in 1985	
			Total	%age in- crease
Production level (Lakh Tonnes)	4.53	3.47	8.00	76.6
Mechanised boats (No)	2105	1750	3855	83.1
country crafts (No)	25100	5200	30300	20.7
<u>Employment (No)</u>				
Mechanised Boats	10805	10600	21405	98.1
country crafts	99807	26000	125807	26.0
Processing, canning, etc.	18000	15000	33000	83.3
Marketing	58500	43500	102000	74.4
Ice plants, freezing	2000	1500	3500	75.0
<u>Total employment</u>	<u>189112</u>	<u>96600</u>	<u>285712</u>	<u>51.1</u>

The level of achievement anticipated in 1985 is moderate in view of the fifth plan programmes in which 7 lakh tonnes of production and 1040 new mechanised boats are anticipated. Even if the

target could not be achieved within the period, it is reasonable to assume the level of production of 8 lakh tonnes in a decade with the introduction of 1750 mechanised boats and 5200 country crafts. As the employment, income and level of living of the fisher folk, per capita consumption of fish, foreign exchange earnings, all these hinge upon the annual production of fish, all plans in fisheries sector will be production oriented and we can very well expect that the production target of 7 lakh tonnes if not achieved during the fifth plan period, it will hit the target of 8 lakh tonnes by 1985, thereby involving about 2.86 lakhs workers in this sector.

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TABLE--IFISH LANDINGS OF TOP TEN FISH PRODUCING
COUNTRIES

(In Million tonnes)

country	1965	1966	1967	1968	1969	1970	1971	1972
1	2	3	4	5	6	7	8	9
1. Japan	6.91	7.10	7.85	8.67	8.61	9.31	9.89	10.25
2. U.S.S.R.	5.10	5.35	5.78	6.08	6.50	7.25	7.33	7.76
3. China	5.33	5.63	5.19	5.40	5.54	6.26	6.88	7.57
4. Peru	7.63	8.84	10.20	10.55	9.24	12.61	10.61	4.77
5. Norway	2.31	2.87	3.27	2.86	2.49	2.98	3.04	3.16
6. U.S.A.	2.70	2.52	2.41	2.45	2.46	2.76	2.77	2.65
7. Thailand	0.63	0.73	0.85	1.08	1.27	1.45	1.57	1.68
8. India	1.33	1.37	1.40	1.53	1.61	1.75	1.85	1.67
9. Spain	1.34	1.36	1.44	1.52	1.50	1.50	1.50	1.62
10. South Africa	1.24	1.20	1.58	2.05	1.85	1.56	1.08	1.12
World Total	53.20	57.30	60.40	63.90	62.60	69.60	69.40	65.60

source - Bank of India Bulletin - June 1975.

TABLE - 2

PRODUCTION OF FISH IN KERALA 1960 to 1974

(Tonnes)

Year	Crustaceans - Prawn	Crustaceans - Non-penacid Prawn	Other crusta- ceans	Total crusta- ceans	Pelagic	Fish Demersal	Total	Total fish and crusta- ceans
1960	12793	23	175	12991	279976	53712	333688	346679
1961	20627	43	105	20775	216962	30887	247849	268624
1962	29688	..	22	29710	121174	41586	162760	192470
1963	22228	76	90	22394	146345	34503	180848	203242
1964	35220	..	72	35292	249658	33023	282681	317943
1965	14327	84	130	14541	287699	36933	324632	339173
1966	28120	259	557	28936	270910	46898	317808	346744
1967	27164	88	58	27310	290453	46366	336819	364129
1968	25356	35	177	25568	282013	37720	319733	345301
1969	34334	34	435	34803	210250	49734	259984	294787
1970	36940	14	556	37510	285316	70054	355370	392880
1971	31294	1519	523	33336	352008	60003	412021	445347
1972	34997	711	157	35865	200853	55461	256214	292079
1973	85063	981	1829	87873	269406	91461	360867	448740
1974	63711	1008	1823	66542	253742	133697	387439	453981

Source: Department of Fisheries

TABLE - 3

MARINE FISH LANDINGS IN KERALA

(In '000 tonnes)

Species	1961-62	1966-67	1969-70	1970-71	1971-72	1972-73	1973-74
1. Prawns	15.8	26.1	60.9	63.3	58.3	69.6	74.7
2. Oil Sardines	153.4	96.9	142.8	160.6	93.6	99.7	54.2
3. Other Sardines	7.9	22.3	2.6	5.8	14.6	8.2	6.2
4. Mackerel	7.9	9.6	52.1	44.2	71.1	70.4	45.9
5. Sharks	2.5	1.7	1.9	11.2	15.7	14.8	15.1
6. Tunnies	..	1.7	1.0	7.3	15.5	14.6	13.2
7. Cat Fish	4.5	8.2	10.4	2.4	12.3	10.7	11.2
8. Soles	6.1	4.4	9.7	2.9	12.8	10.8	10.7
9. Skate Rays	1.4	0.5	0.7	6.4	11.3	8.4	11.8
10. Ribbon Fish	4.6	4.3	0.3	0.8	5.8	5.4	7.1
11. Scianindas or Jew Fish	1.0	0.7	1.1	3.1	12.0	7.2	9.1
12. Lactarious	1.5	1.4	0.8	1.0	2.9	4.0	5.4
13. Sabre Fish	0.7	2.2	1.2	0.9	2.3	2.7	3.0
14. Horse Mackerel	1.4	4.2	0.6	1.0	3.2	3.6	4.3
15. Anehovies	..	0.6	1.2	0.5	2.7	0.9	3.0
16. White Bait	3.7	2.0	1.5	0.6	2.7	1.9	1.3
17. Silver Bellies	6.6	7.1	4.1	0.9	2.3	3.2	2.8
18. Seer Fish	3.7	0.8	1.9	1.0	1.7	3.2	1.6
19. Pour fret	0.7	1.0	1.1	0.9	0.1	3.8	2.1
20. Others	33.3	31.8	76.4	65.0	64.6	59.6	55.2
Total	256.7	227.5	372.3	379.8	405.5	402.7	337.9

source: Department of Fisheries

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TABLE - 4

PROGRESS IN THE INTRODUCTION OF MECHANISED BOATS 1960-1974 (Cumulate)

Year	25'	28'	30'	35½'	32'	36'	40'	43½'	50'	Total
1960	8	8	8	8	8	8	8	8	8	16
1961	10	14	14	14	14	14	14	14	14	24
1962	66	42	42	42	3	3	3	3	3	111
1963	86	38	38	38	20	20	20	20	20	206
1964	107	12	163	12	28	26	26	26	26	505
1965	113	12	260	12	90	26	26	26	26	501
1966	148	12	412	12	142	74	74	74	74	788
1967	151	12	509	12	193	104	2	2	1	972
1968	154	12	669	12	320	144	4	4	4	1304
1969	162	12	710	20	416	175	7	1	2	1505
1970	165	12	730	61	449	175	7	1	2	1602
1971	172	12	743	131	484	227	7	2	2	1780
1972	185	12	752	197	560	227	7	2	2	1944
1973	185	12	768	265	564	227	7	2	2	2032
1974	185	12	780	322	568	227	7	2	2	2105

Source: Department of Fisheries

APPENDIX

Centres for the development of fishing harbours

1. Vizhinjam
2. Neendakara
3. Kayamkulam
4. Thottappally Bar
5. Andhakara Azhi
6. Cochin
7. Azhikode
8. Chettuvai
9. Ponnani
10. Beypore
11. Thalai
12. Mepla Bay
13. Baliapattom
14. Palacodu
15. Cheruvatur
16. Chandragiri

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